



## MEMORANDUM

**DATE:** August 26, 2009

**TO:** BAQ Engineering Services, BAQ Technical Management, BAQ Enforcement, Regional Air Program Lead's

**FROM:** Christopher Hardee, P.E., BAQ Engineering Services

**SUBJECT:** Concrete Admixture Storage Tanks as an Unlisted Exempt Activity

Concrete admixture storage tanks have been exempted per SC Regulation 61-62.1, Section II(B)(2)(h), which states that sources with an uncontrolled VOC emission rate of less than 1,000 lbs/month are exempt from construction permit requirements. These tanks are normally listed in a concrete batch plant's exempt equipment list in the operating permit; however, due to the mobility of small tanks and the frequency of their installation and removal from concrete batch sites, tanks with a volume of less than 1,000 gallons are not listed on the permits.

### Background

A survey of concrete producers and admixture suppliers yielded 15 common admixtures used in South Carolina. MSDS's of the admixtures found 2 that had any ingredient that was a HAP, TAP, or VOC. Admixture A had 2,3,7,8-tetrachloro-dibenzo-p-dioxin (HAP, TAP, VOC) at a maximum concentration of < 0.1% by weight. Admixture B had ethylene oxide (HAP, TAP, VOC) and dioxane (HAP, TAP, VOC), both at a maximum concentration of < 0.1% by weight.

### Basis

Maximum dosage of Admixture A is 10 fl oz/cwt<sup>1</sup> of cementitious material and the maximum dosage of Admixture B is 15 fl oz/cwt of cementitious material. Per AP-42 Section 11.12 the average cubic yard of concrete uses 491 lb of cement and 73 lb of cement supplement for a total of 564 lb of cementitious material. Specific gravity of Admixture A 1.2 and Admixture B is 1.05. For calculation purposes admixture is abbreviated AM and cementitious material is CM. For a worst case scenario it was assumed that an extremely large concrete plant rated at 400 yd<sup>3</sup>/hr and 50% of the admixture used was emitted to the atmosphere (not realistic, but extremely conservative for the purposes of emission estimates).

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<sup>1</sup> cwt is the notation for a mass measurement in "hundred weight." It is the measurement of how many hundreds of pounds material weighs. For example 1,200 lb is equal to 12 cwt.

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**Admixture A:**

$$\left(\frac{10 \text{ fl oz}}{\text{cwt}}\right)\left(\frac{\text{gallon}}{128 \text{ fl oz}}\left\{1.2 \text{ SG}\left(\frac{8.345 \text{ lb}}{\text{gallon}}\right)\right\}\right)\left(\frac{\text{cwt}}{100 \text{ lb}}\right) = 7.82 \times 10^{-3} \left(\frac{\text{lb Admixture}}{\text{lb CM}}\right)$$

$$\left(\frac{400 \text{ yd}^3}{\text{hr}}\right)\left(\frac{24 \text{ hour}}{\text{day}}\right)\left(\frac{31 \text{ day}}{\text{month}}\right)\left(\frac{564 \text{ lb CM}}{\text{yd}^3}\right) = 1.68 \times 10^8 \left(\frac{\text{lb CM}}{\text{Month}}\right)$$

$$\left(\frac{1.68 \times 10^8 \text{ lb CM}}{\text{month}}\right)\left(\frac{7.82 \times 10^{-3} \text{ lb AM}}{\text{lb CM}}\right)\left\{0.001 \left(\frac{\text{lb TCDD}}{\text{lb AM}}\right)\right\}^{0.5} = 657 \frac{\text{lb}}{\text{month}} < 1,000 \frac{\text{lb}}{\text{month}}$$

**Admixture B:**

$$\left(\frac{15 \text{ fl oz}}{\text{cwt}}\right)\left(\frac{\text{Gallon}}{128 \text{ fl oz}}\right)\left\{1.05 \text{ SG}\left(\frac{8.345 \text{ lb}}{\text{Gallon}}\right)\right\}\left(\frac{\text{Cwt}}{100 \text{ lb}}\right) = 1.03 \times 10^{-2} \left(\frac{\text{Lb Admixture}}{\text{Lb CM}}\right)$$

$$\left(\frac{1.68 \times 10^8 \text{ lb CM}}{\text{month}}\right)\left(\frac{1.03 \times 10^{-2} \text{ lb AM}}{\text{Lb CM}}\right)\left\{0.001 \left(\frac{\text{Lb EO or Dioxane}}{\text{Lb AM}}\right)\right\}^{0.5} = 865 \frac{\text{Lb}}{\text{Month}} < 1,000 \frac{\text{Lb}}{\text{Month}}$$

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<b>Record of Revisions</b>	
<b>DATE</b>	<b>Description of Change</b>
August 26, 2009	Initial Document
June 8, 2011	Revised Document