APPENDIX 4

SURVEY WEIGHTING PROCEDURES

This appendix describes the survey weighting procedures. Survey weights will be computed in three steps:

1. Compute initial sampling weights by stratum (Establishment size small: 1–19 employees; medium: 20–499 employees; large: 500 or more employees; and tattoo ink manufacturers).
2. Adjust the initial sampling weights for unknown eligibility.
3. Use the WTADJUST procedure within SUDAAN 11 to adjust the weights for nonresponse to the survey (RTI International, 2012).

Each step in the weighting procedures is described below.

Initial Sampling Weights. Each establishment in the sample (i.e., sample point) will be assigned an initial sampling weight. The initial sampling weight (W_0) is equal to the inverse of the selection probability, where the selection probability is equal to the sample size (n) divided by the population (N). Thus, the initial sampling weight for each stratum is calculated as follows:

$$W_0 = \ .$$

For the Large and Tattoo Ink stratum in which a census is being taken, the initial sampling weight is equal to 1. For each stratum, the sum of the initial sampling weights across all sampled establishments is equal to the population.

Adjustment for Unknown Eligibility. Adjustment factors will be calculated within each stratum to adjust for sample points for which the eligibility status is unknown.[1] The adjustment factor for establishments with unknown eligibility is calculated as follows:

$$F_1 = \ .$$

The adjustment factor for establishments with known eligibility is equal to 1 (i.e., $F_1 = 1$).

The adjusted weight for each establishment in a stratum is equal to

$$W_1 = W_0 \ x \ F_1$$

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[1]   It is anticipated that the eligibility status for some establishments will be unknown if we are not able to reach the manufacturer during the survey administration period.

Nonresponse Adjustment. Nonresponse may cause bias in survey estimates if establishments choosing not to respond would have provided answers to questions that differ systematically from answers provided by establishments that choose to respond. If a response rate of 80% is not achieved, a nonresponse bias analysis will be conducted to examine the characteristics of respondents and nonrespondents to determine if they are statistically different. The results of this analysis will inform us of characteristics we should include in our nonresponse bias adjustments. Characteristics included in the nonresponse bias analysis are those found on our sampling frame as we have information available for both respondents and nonrespondents. Potential characteristics include establishment size (stratification variable), census region, and establishment type (manufacture cosmetics only; manufacture multiple lines of business including cosmetics, drug and medical; manufacture multiple lines of business including cosmetics, but no drug and medical manufacturing; manufacture tattoo ink).

The nonresponse adjustment factor will be calculated using the SUDAAN procedure WTADJUST (RTI International, 2012). This procedure uses a constrained logistic model to predict the likelihood of responding as a function of a set of explanatory variables (establishment size, census region, and establishment type for the Cosmetics Survey) and calculate a nonresponse adjustment factor. This adjustment factor will be applied to the unknown eligibility adjusted weight, W_1, to create the final weights.

The final weights will vary by the variables included in the WTADJUST procedure. We will review these weights and identify unusually large weights and determine if any additional weight adjustments are needed. If any are found we will use the SUDAAN WTADJUST procedure to calculate a weight trimming adjustment factor that will reduce the size of the large weights.

All results will be weighted using the final adjusted weights. For each stratum, the sum of the final adjusted weights across all respondents to the survey is equal to the population of eligible establishments.