

Titel

Comparing methods to detect significant Between Worker differences when applying the BOHS-NVvA compliance Testing Guidance (TG, 2011).

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Doel

Detecting significant Between Worker differences with undetectables (LoQ) when applying the NVvA-BOHS compliance testing guidance (TG, 2011).

Methoden en technieken:

The universal single factor ANOVA variance ratio test for repeated measurements and the ad-hoc variance difference test (B&W), both described in the TG (chapter 3.5), are calculated using an Excel worksheet (<http://www.tsac.nl>) that also calculates the TG screening, group and individual compliance. The TG proposes a 3 stage, not fully validated, approach if more than 10% of the exposure values are <LoQ. The compliance testing program HYGINIST(same website) uses an unbiased lognormal goodness-of-fit approach to threat LoQ values and the two sample Student t-test for detecting individual Between Worker differences.

Resultaten

ANOVA and B&W do not indicate a significant between worker difference in series of 5 workers with 5 repeated samples (GSD=2,5) each, in which one exposure distribution is 3 times higher than the other 4. However, with the Student t-test the Geometric Mean of higher exposure distribution differs significant from the rest.

Conclusie

The results indicate that the classic Fisher's single-factor ANOVA and the B&W test with a 20% significance level from the TG perform comparable, but that the Student two sample t-test may be a better method to detect individual deviation from a group.

Also, as workers at the lower site of the distribution must encounter more <LoQ values, an unbiased regression handling of LoQs should be preferred over the three stage approach of the TG.

The personal air monitoring results from a Similar Exposure Group "Physical Distribution in chemical formulation" on five workers filling vessels every 2 hours during 15 minutes with each five repeated TWA15min sampling measurements were used. 20% of the outcome were below the lower detection limit (LoQ). One workers exposure distribution was 3 times higher than the other for workers.

Speaker Profile

Industrial Hygiene Consultancy with 35 years Health and Hygiene experience in research (TNO), (bio)chemical industry (DSM, Sabic), engineering (Royal Haskoning), software development (DOHSBase, HYGINIST) and an active involvement in the international Industrial Hygiene Community (NVVA, BOHS, AIHA). Focus on human health chemical risk assessment and compliance based engineering & innovation.