Sampling Strategies

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Introduction

• Basic problem
• Recognition of exposures
• Significance of exposures
• Overexposure
• Control of exposure
• Professional judgment
Basic Characterization

- Qualitative evaluation
- Characterize workplace
- Characterize work force
- Characterize agents
- Identify homogeneous exposure groups
Basic Characterization - Workplace

- Process and operation descriptions
  - Texts, references, past experience
  - Similar operations or processes
- Chemical agent inventory
- Physical agent inventory
- Biological agent inventory

Basic Characterization – Work Force

- Job titles and descriptions of jobs
  - Be cautious of job titles
- Task analysis
  - Direct observation
- Number of workers involved
Basic Characterize - Agents

- Health effects data
- Regulations
- Exposure limits and guidelines

Homogeneous Exposure Groups

- Job description approach
- Task-based approach
- Chemical-based approach
- Process and job-based approach
- Process/job/task approach
- Data analysis
Qualitative Risk Assessment

• Prioritization among homogeneous exposure groups

Exposure Rating

• Past monitoring data
• Similar operations
• Professional Judgement
Health Effects Ratings

- Chronic versus acute effects
- Reversible versus irreversible effects
- Potential consequences
- Employee or public concern

Homogenous Exposure Group Ranking

- Exposure Ranking
- Health Effect Ranking
Exposure Monitoring

• Monitor actual exposures during a given time period, diagnose critical sources of exposure in the workplace

Routes of exposure

• Sources of exposure
• Exposure pathways
• Critical pathways (most important)
Monitoring

- Objectives
  - Baseline
  - Diagnostic
  - Compliance

- Methods
  - Personal
  - Area

Interpretation and Decisions
Evaluate Exposure Data

Professional Judgement

- Experience
- Consensus
Statistical tools

- Descriptive statistics
- Probability plots
- Tolerance limits
- Confidence intervals on mean exposure
- Control charts

Descriptive Statistics

- Mean
- Standard deviation
- Range
- Detectable observations
Probability Plots

- Normal probability
- Lognormal probability

Tolerance Limits

- 95% of population is within a certain range of values.

\[
\bar{X} \pm K_s
\]

- K taken from chart, depends on p and n.
Confidence Interval on Mean

- The population mean is within 2 SD of sample mean (95% confidence interval)
- Use t-table, \( p = 0.5\alpha \), N-1 degrees of freedom

\[
\bar{X} + \frac{t_{0.5\alpha} S}{\sqrt{N}} \quad \bar{X} - \frac{t_{1-0.5\alpha} S}{\sqrt{N}}
\]

Control Charts
Recommendations and Reporting

- Maintain a record of exposures
- Form a baseline for future evaluation

Tools

- Written report of results
- Archive of reports
- Effect of PPE and other controls
- Communication to
  - Management
  - Workers
  - Other EH&S Professionals
Reevaluation

• Periodic review
  – recommendations from previous studies
• Employee health complaints
• Process changes
• Health surveillance needs
• New health effects data
• New regulations