

Performing a Qualitative Industrial Hygiene Assessment

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- Yorke assists Industrial and Government clients with safety/industrial hygiene (IH) and environmental regulations issued by the local, state, and federal agencies
- Founded in 1996 and has worked for over 1,500 customers at well over 2,000 facilities
- Over 7,500 safety/IH, air, water, and waste projects completed



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Today's Agenda

- **Regulatory Background for Sampling**
- What is Qualitative Industrial Hygiene Assessment?
- Performing a Qualitative Industrial Hygiene Assessment
- Case Study



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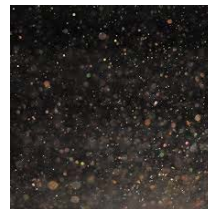
California Regulations

- California Code of Regulations (CCR) – Title 8, Section 3203, Injury and Illness Prevention Program (IIPP)
 - California’s “general duty clause” is the IIPP
 - Every workplace must identify and control hazards



Section 5155, Air Contaminants

- Requires Workplace Monitoring
 - Whenever it is reasonable to suspect that employees may be exposed to concentrations of airborne contaminants in excess of Table AC-1



Substance-Specific Standards Sections 5200-5220, Air Contaminants

- Substances with unique properties have a substance-specific standard
- Some of the standards require initial monitoring
- Examples you might be familiar with:
 - Methylene chloride
 - Hexavalent chromium
 - Silica
 - Lead (8 CCR 5198)

Section 5144, Respiratory Protection Standard

- The employer shall identify and evaluate the respiratory hazard(s) in the workplace
- Shall include a reasonable estimate of employee exposures to respiratory hazard(s)
- Must know what the hazard is to control it!



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The Industrial Hygiene Program

- An Industrial Hygiene Program is defined
- Has a purpose, scope, responsibilities, and procedures:
 - Training
 - Engineering and Administrative Controls
 - Personal Protective Equipment
 - Qualitative and Quantitative Exposure Assessment/
Monitoring
 - Medical Monitoring, if required
 - Recordkeeping

Industrial Hygiene Assessments

- Quantitative industrial hygiene exposure assessments are often performed:
 - As a response to an employee complaint or symptom
 - Too late
 - Concern about the usage of a new product
 - Noticeable odor in an area

Industrial Hygiene Assessments

- Can lead to:
 - Inefficient and sometimes unnecessary monitoring
 - Hazardous exposures that are not addressed
- Using a documented, systematic approach can allow for the most impactful sampling with the available resources

Qualitative Industrial Hygiene Assessment

- Preliminary assessment to identify potentially problematic exposures
- Rate the potential exposures based on the route, duration, magnitude of exposure, and the agent toxicity
- Independent of personal protective equipment
- Looks at the whole facility

Qualitative Industrial Hygiene Assessment

- Qualitative Industrial Hygiene Assessment will inform your Industrial Hygiene Plan
- Determine areas that need quantitative exposure assessments
- Evaluate the chemicals and hazards in the workplace and prioritize potential exposures for evaluations



Qualitative Industrial Hygiene Assessment

- Outlines all areas/tasks
- Identifies potential exposures in those areas
- Ranks potential exposures to determine areas for monitoring
- Determines type of sampling to be conducted

Qualitative Industrial Hygiene Assessment

- Living document
- Should be reviewed and updated annually
- New processes, chemicals should be added
- If controls were instituted, efficacy should be confirmed



Industrial Hygiene Monitoring Plan

- Starts with a Qualitative Industrial Hygiene Assessment
- Benefits
 - Systematic
 - Cost effective
 - Prioritizes high risk exposures

Potential Goals

- Create a systematic method to evaluate hazards
- Characterize new operations
- Document no exposure (negative exposure assessment)
- Develop a history of employee exposures (prevent future liability)

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Sources for Success

- Occupational Exposure Sampling Strategy Manual, **NIOSH 1977**
- Bayesian Decision Analysis
- Professional Judgement

Sources for Success

- AIHA
 - Risk-assessment tools
 - IH Occupational exposure health and safety exposure-scenario tool – Excel sheet
 - And more

Performing a Qualitative Industrial Hygiene Assessment

- Identify the hazard
- Characterize the work force
- Anticipate/estimate severity of exposure
- Develop exposure monitoring priorities
- Evaluate monitoring methods



Identify the Hazard

- Evaluate all IH hazards:
 - Physical – Noise, Ergonomics, Radiation, Heat
 - Biological – Bacteria, Fungus, Viral
 - Chemical – Dust, Mists, and Fumes



Identify the Hazard

- Workplace Characterization
 - Tabulate hazardous agents
 - Look at the Chemical Inventory
 - Review relevant Safety Data Sheets
 - Watch employees perform tasks
 - Review Standard Operating Procedures



Identify the Hazard

Consider the type of hazardous exposure:

- Source – solid, liquid, particulate, gas
- Routes of exposure
- Health effect
 - Chronic
 - Acute
 - Reversible vs. irreversible



Identify the Hazard

- Prioritize hazards according to the severity of the effect associated with the hazard
 - IDLH
 - Reproductive hazards
 - Carcinogens
 - Respiratory sensitizers



Identify the Hazard

- Investigate Exposure Limits
 - Cal/OSHA Table AC-1
 - American Conference of Governmental Industrial Hygienists (ACGIH) TLV book
 - Occupational Exposure Limits
 - Occupational Exposure Banding
 - Other Sources
 - Account for mixtures and extended hours
 - Action limits



Identify the Hazard

- Workplace observation
 - Observe what tasks are being performed and the related exposure hazards
- Can be done as part of a Job Hazard Analysis (JHA)



Work Force Characterization

- Work force will be broken into groups
- Inventory job descriptions, departments, tasks, and work shifts
- Include infrequent tasks that may have exposures

Work Force Characterization

- Divide into Similar Exposure Groups (SEGs) – Groups of workers having the same general exposure profile
 - By chemical/hazard
 - By job description
 - By task
 - Process



Work Force Characterization

- For each group:
 - Number of employees in the group
 - Typical shift
 - Location in the facility
 - Duration of tasks
 - Available controls



Anticipate Severity of Exposure

- How severe are exposures to each hazard?
 - Frequency of exposures
 - Duration of exposures
 - Potential amount of exposure
 - Routes of exposure
 - Controls in place
 - Size of the room
 - Examine past exposure data, if available

Prioritizing exposures

- Now you have enough information to prioritize which tasks should be monitored for which hazards
 - Lowest Permissible Exposure Limits (PELs)
 - Greatest exposure potentials
 - Most impactful in terms of hazard or numbers

Develop Criteria

- Decision criteria should be clear and in writing
- Negative exposures should be documented as well
- An IH sampling plan will then address priority items

Prioritizing exposures

- Organize assessment in a spreadsheet
- Many ranking strategies available where hazards are scored by individual properties, PELs, frequency and severity of exposures

Exposure Priorities

Health Effect Rating

- 1 – Insignificant
- 2 – Reversible health effects
- 3 – Severe reversible health effects
- 4 – Irreversible health effects
- 5 – Life threatening or disabling injury/illness

5x5 Risk Matrix Sample

Impact
How severe would the outcomes be if the risk occurred?

	Insignificant 1	Minor 2	Significant 3	Major 4	Severe 5
5 Almost Certain Medium 5	High 15	Very High 16	Extreme 20	Extreme 25	Extreme 25
4 Likely Medium 4	High 12	Very High 15	Extreme 20	Extreme 25	Extreme 25
3 Moderate Low 3	High 9	Very High 12	Extreme 15	Extreme 20	Extreme 25
2 Unlikely Very Low 2	High 6	Very High 8	Extreme 12	Extreme 15	Extreme 20
1 Rare Very Low 1	High 3	Very High 4	Extreme 6	Extreme 8	Extreme 12

Probability
How likely is the probability for risk and exposure?

Safety/Culture

- Can use GHS data from SDS for determination
- Can use PEL/TLV

Exposure Priorities

Frequency/Duration

Job Task Duration	Frequency of Job Task		
	>1/month	>daily/<monthly	daily
<15 min	1	1	1
15 min - 1 hour	1	2	2
1-2 hour	1	2	3
2-4 hour	1	3	4
>4 hour	1	4	5

Exposure Priorities

- Score the parameters
- Total the risks
- Prioritize sampling based on pre-established criteria

Evaluate Monitoring Methods

- Personal sampling
- Area sampling
- Account for short-term exposure samples and ceilings
- Decide on monitoring frequency
- Develop criteria for repeat monitoring

Sample Collection Methods

- NIOSH Manual of Analytical Methods
(www.cdc.gov/niosh/nmam)
- OSHA Chemical Sampling
(www.osha.gov/dts/sltc/methods/index.html)
- SKC Air Sampling Guide
(www.skcinc.com/guides.asp)
- EPA Methods (www.epa.gov/Standards.html)

Evaluate Monitoring Methods

- Number of employees to be monitored
- Two types of sampling strategies:
 - Worst-case sampling
 - Professional judgement
 - Random sampling
 - Larger number of samples

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Exercise: Qualitative Industrial Hygiene Assessment – 1

- Aerospace company
- Manufacturers airplane parts
- Welding shop
 - Welders
 - Helpers
 - Grinders
- Let's work through the steps



Exercise: Qualitative Industrial Hygiene Assessment – 1

- Identify the IH hazard
 - Welding fumes
 - Hexavalent Chromium
 - Solvent usage – review SDS
 - UV
 - Noise? – observe tasks
- Characterize the work force next

Exercise: Qualitative Industrial Hygiene Assessment – 1

- Characterize the work force
- 50 workers in weld shop
 - Location – 35 inside, 15 outside
 - Type of welding –which workers do stainless
 - Controls –LEV's inside, no LEV's outside
 - Helper tasks vs welder tasks
 - Do welders perform grinding?
- Anticipate/estimate severity

Exercise: Qualitative Industrial Hygiene Assessment – 1

- Anticipate/estimate severity of exposure
 - How long does the welding occur each day?
(15 min, 4 hours?)
 - How much welding?
 - How much solvent do they use per day?
 - Frequency of grinding?
- Develop exposure monitoring priorities

Exercise: Qualitative Industrial Hygiene Assessment – 1

■ Develop exposure monitoring priorities

- Lowest PEL – Hexavalent Chromium
- UV – evaluate PPE
- Welding fumes
- Does monitoring for the solvent need to occur?

■ Evaluate monitoring methods

Exercise: Qualitative Industrial Hygiene Assessment – 1

■ Evaluate monitoring methods

- NIOSH or OSHA Methods
- Which compounds have ceilings?
- Sometimes ease of use is a consideration for screening.

Exercise: Qualitative Industrial Hygiene Assessment – 2

- Countertop manufacturer (as time permits)
 - Fabricators – cut, smooth
 - Bridge saw operators
 - Finishers – seal and treat
 - Janitorial
- Let's work through the steps

Exercise: Qualitative Industrial Hygiene Assessment – 2

- Identify the hazard
- Characterize the work force
- Anticipate/estimate severity of exposure
- Develop exposure monitoring priorities
- Evaluate monitoring methods

Qualitative Industrial Hygiene Assessment

- Recommend that you perform a Qualitative Industrial Hygiene Assessment
- More cost-effective IH monitoring
- More impactful monitoring events through careful prioritization
- Better regulatory compliance

Questions?

- IH Webinar Questions
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