

Characterization of the workplace, exposure(s) and the exposure agent(s)

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Lecture Notes

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Purpose, goal and outcomes of characterization

- Purpose
- Goal
- Outcome

At a minimum we need information to answer the following questions

- What are the chemical, physical and biological agents in the work environment?
- What is the health effects associated with excessive exposure to the environmental agents?
- What are the Occupational Exposure Limits (OELS) for each agent?
- How is the workforce organized and staffed?

At a minimum we need information to answer the following questions

- What are the significant sources of exposure?
- What are the processes and operations that have significant potential for worker exposure to the environmental agents?

At a minimum we need information to answer the following questions

- What tasks and work practices pose a significant potential for worker exposure to environmental agents?
- What controls are in place?
- What is the functional state of LEV of other engineering controls?

Elements and tools of characterization

- Workplace characterization
- Workforce characterization
- Identification and characterization of agents
- Characterization of existing controls
- Past assessments/results
- Historical exposure data
- Environmental emission data

Workplace characterization

- Understand the process – on a macro as well as a micro level.
- Spend time getting to know what is going on
- Ask questions if you don't know – workers like to tell you about what they do

Workplace characterization: Plant layout

- Doors & windows
- Fans
- Flow of raw material, by-products & waste
- Maintenance shops
- Offices or control rooms
- Etc.....

Workplace characterization: Find or make a process flow diagram

- Continuous, semi-continuous, and batch operations
- Identify equipment: reactors, filter presses, pumps, grinders, crushers, etc.
- Transfer methods for material entering or leaving the process: pipeline, trucks, railroad car, drumming, bagging, etc.

Workplace characterization: Others factors

- Ventilation systems
- Open-top tanks, open sumps, trenches
- Use of PPE
- Maintenance and repair activities
- Document and watch how the job is done.

Workforce characterization: Job classification

- Goal: understand the division of labor and work practices
- Plant roster
- Job descriptions

- Worker and management interview
- Personal observation of work practices

Workforce characterization: Job activities

- Review job activities to identify potential groups of workers having the same risk of exposure to an agent
- Observe and document job tasks for each job classification
- Record work activity and percent of time spent in each task

Workforce characterization: Other factors

- Task analysis
- Number of workers
- Shifts and duration
- Work schedules
- Identify potential hazards associated with the job

Identification and characterization of Agents: Goal

- Develop an inventory of all potentially hazardous chemical, physical and biological/botanical agents that are present
- Assess the risk potential of each agent
- Tie each agent to one or more work groups

Identification of Agents: Chemical

- MSDS inventory should cover the greatest majority of chemical agents

- Identify the presence of process off-gases, by-products, waste products and products of pyrolysis or combustion

Identification of Agents: Physical and Biological/Botanical

- Identify potentially hazardous physical and biological agents
- They include noise, ionizing radiation, microwave fields, laser radiation, hot environments
- Pathogenic microorganisms – anthrax, etc...
- Botanical – wood dust, poison ivy, etc....

Characterization of Agents: Goal

- Gather information for each agent describing its.....
- Use
- Physical properties
- Routes of exposure
- Potential health effects
- Pertinent OELs

Characterization of Agents: Quantities and Physical Properties

- Approximate quantities or use rates
- Warehouse or production records are useful for finding bulk rates
- Environmental reports are a source of information on use rates

Characterization of Agents: Quantities and Physical Properties

- Physical property data
- Particulate, gas/vapor or mixture
- Boiling points, vapor pressure, particle size distribution, specific gravity, density, etc.....
- Environmental temperature and humidity
- Frequency, wavelength, etc.....
- Species or variety

Characterization of Agents: Health effects data and OELs

- Must know enough about the agent to differentiate acceptable and unacceptable levels of exposure
- Sources of information include

Characterization of Agents: Health effects data and OELs

- Occupational Exposure Limit OEL is the limit selected or established by the IH for the purpose of judging exposure profiles to be either acceptable or unacceptable
- OELs generally come from one or more of the following categories:

Characterization of Agents: Health effects data and OELs

- Internal OELs or Working OELs
- Some private organizations devise internal OELs for substances for which there are no regulatory or authoritative OELs or when the regulatory or authoritative OEL is dated

Characterization of Agents: Health effects data and OELs

- In the absence of a formal OEL from a regulatory, authoritative or internal source, the IH must identify a "working OEL" to differentiate acceptable from unacceptable exposures
- A "working OEL" is an informal limit created in the course of performing an exposure assessment – not a job for a single IH

Identification and characterization of Agents

- Review MSDSs and any other toxicological data available
- Review worker health and medical records
- Review health effects data

Characterization of existing controls

- Type

- Age

Characterization of existing controls

- Condition
- Preventive maintenance program

Past in-plant assessments / results

- Review past sampling reports
- Review original design specifications of controls

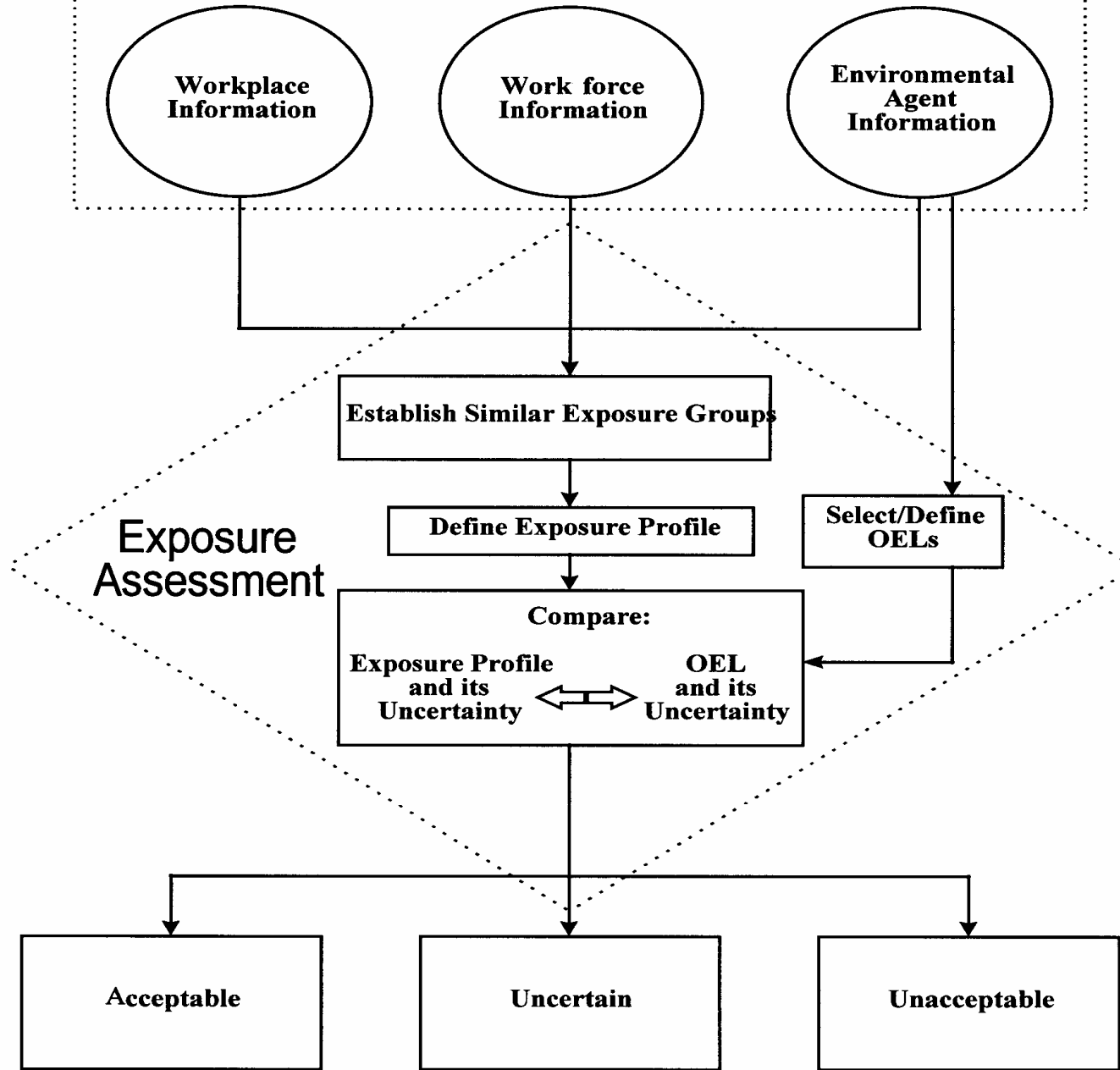
Other sources of data on potential types and levels of exposure

- Scientific / professional literature
- AIHA conference
- NIOSH HHE's
- World Health Organization
- Etc, etc, etc,.....

Closing thought on characterization

- You can't know too much about the plant and the production processes, the controls used, the workforce and the exposure agents involved
- The more you know the better and more specific you can make your evaluation and recommendations – bottom line making you more valuable to workers and the company

Basic Characterization





The End