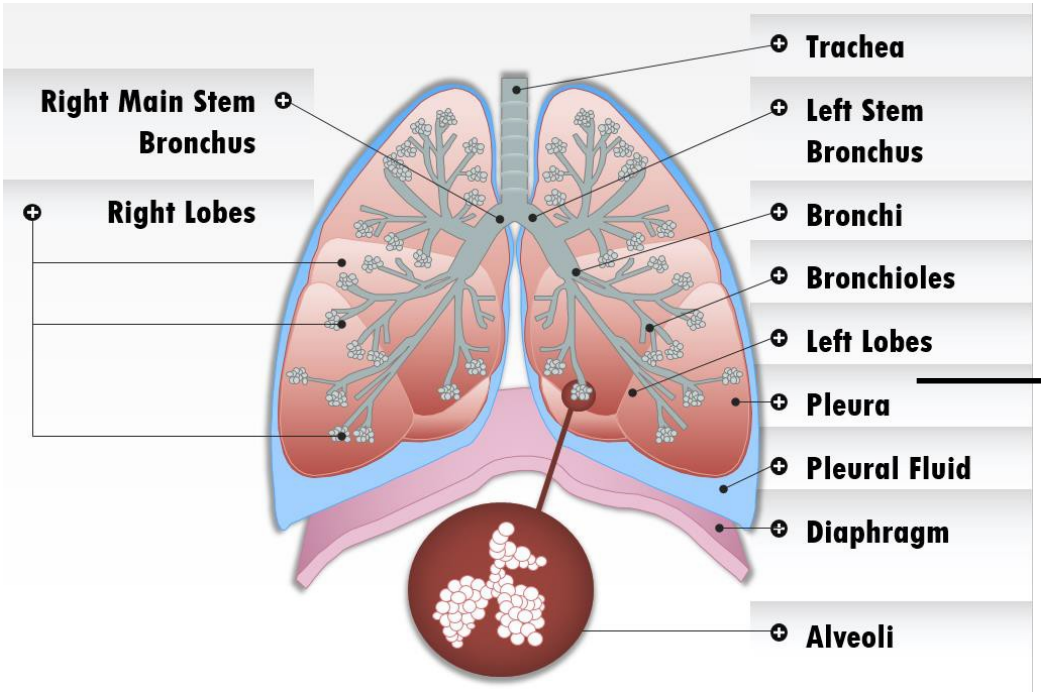
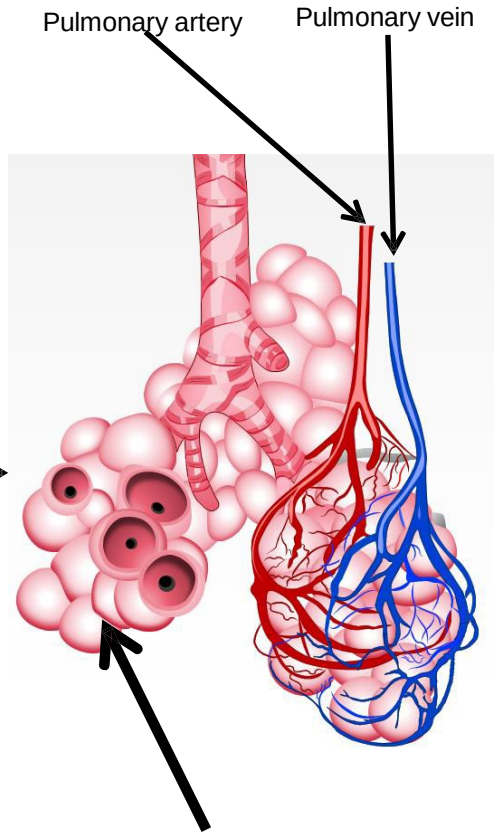
Keep Beryllium Out of the Lungs

July 2018

Keep Beryllium Out of the Lungs





Keep Beryllium Out of the Lungs- Guiding Principles

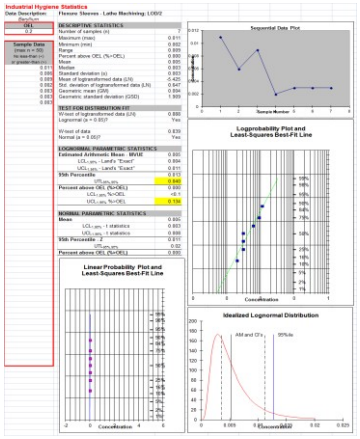
- Employees are not exposed to levels of particulate that cause chronic beryllium disease.
- Operations leadership know the jobs having exposure potential and have a plan for reducing exposure, if necessary
- IH analysis and support for effort
- IH/operations leadership keep up with changes through auditing

Keep Beryllium Out of the Lungs - Definition

- Procedures are in place and observed to measure worker beryllium airborne potential, analyze and interpret data. Respiratory protection with an adequate protection factor will be worn when airborne exposure can exceed the OEL more than 1% of the time at 95% CI. *(more on that later)*
- Worker exposure potential is updated with air level sampling when the process changes, production level increases, etc., suggest important changes in worker exposure levels may have occurred.

Assessment

Interpretation



RP Decisions

Out of the Lungs- Definition

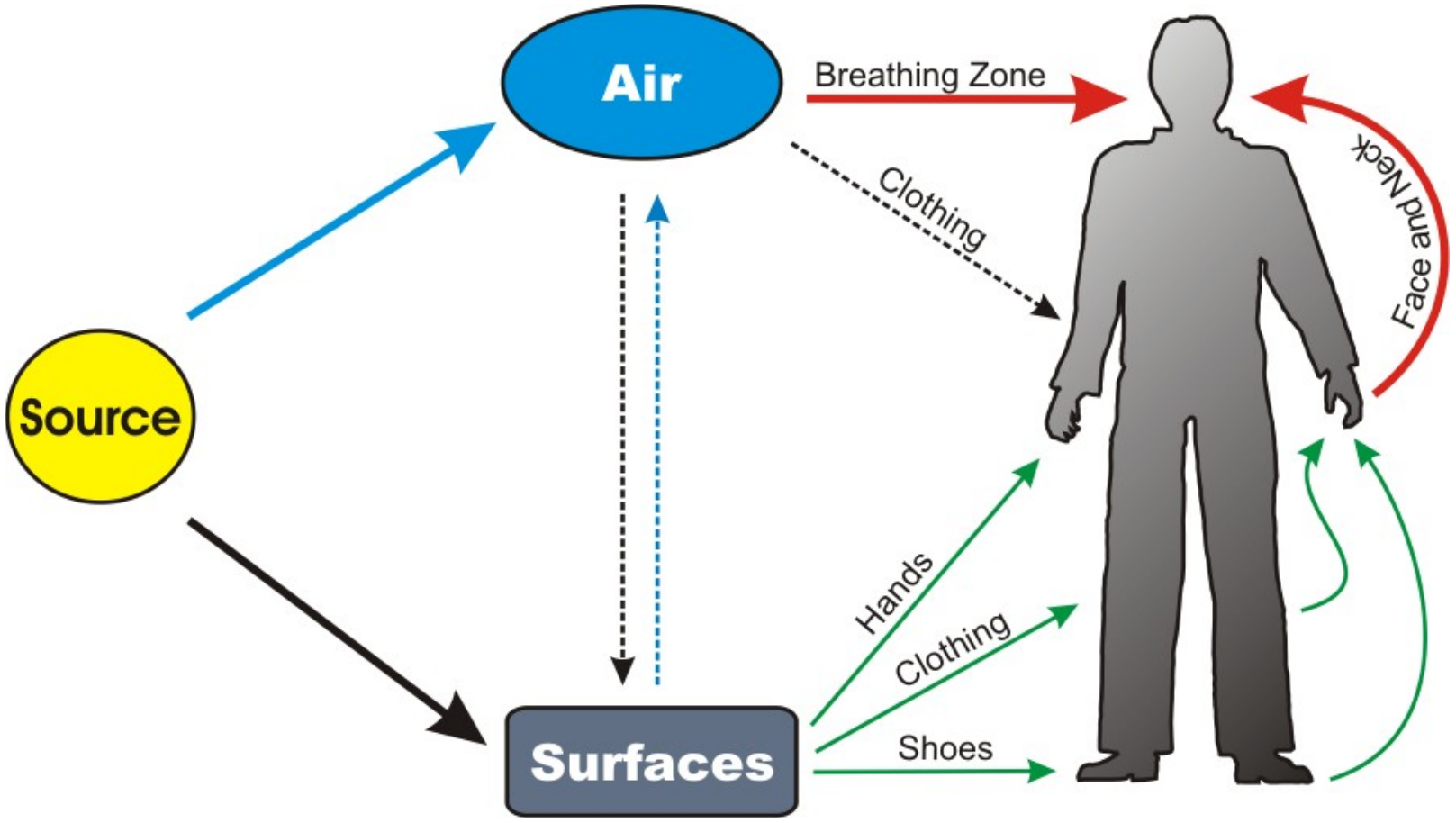
- Airborne beryllium measurements, along with other relevant information, are used to set goals and priorities for intervention to control beryllium air concentrations to lower levels.

- Respiratory protection with an adequate protection factor will be worn whenever needed to assure achievement of exposure below 0.6 microgram per cubic meter ($\mu g/m^3$) – Inhalable as averaged over an 8-hour period.

Execution

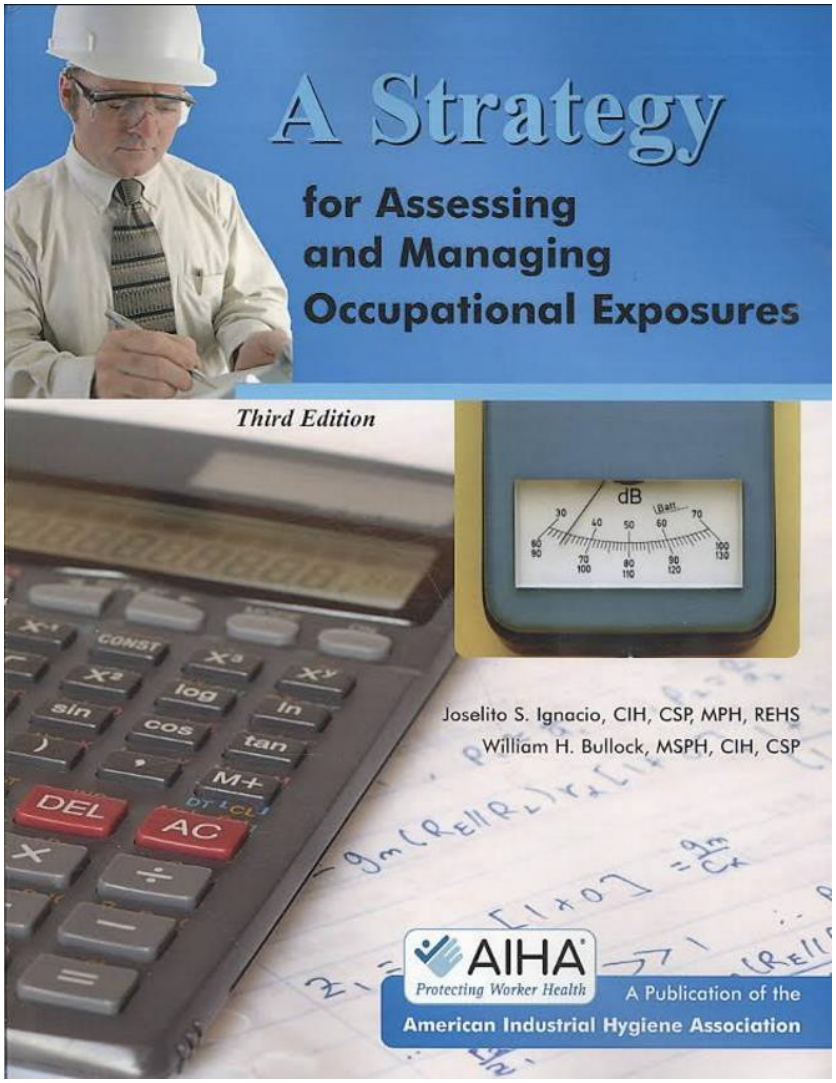
- No employee is exposed to beryllium levels exceeding 0.6 μg/m³ – Inhalable more than 1 percent of the time (95%CI) without respiratory protection (RP)
- Level of RP determined by 95/95 UTL @ 0.6 μg/m³ - Inhalable accounting for respirator protection factors
- Exposure reduction plan for each business unit when exposures exceed above criteria
- Data used as a tool for intervention priority setting, not the only variable considered

Migration Pathway Model



Exposure Assessment Strategy Overview

- Familiarize yourself with: AIHA text entitled “A Strategy for Occupational Exposure Assessment”.
- Establish similar exposure groups (SEG)
- Rank order exposures based on variability and central tendency.
- Develop prioritization scheme for intervention and control



Start

- Determine purpose of assessment
- Examine latest epidemiological information
- Review current exposure levels

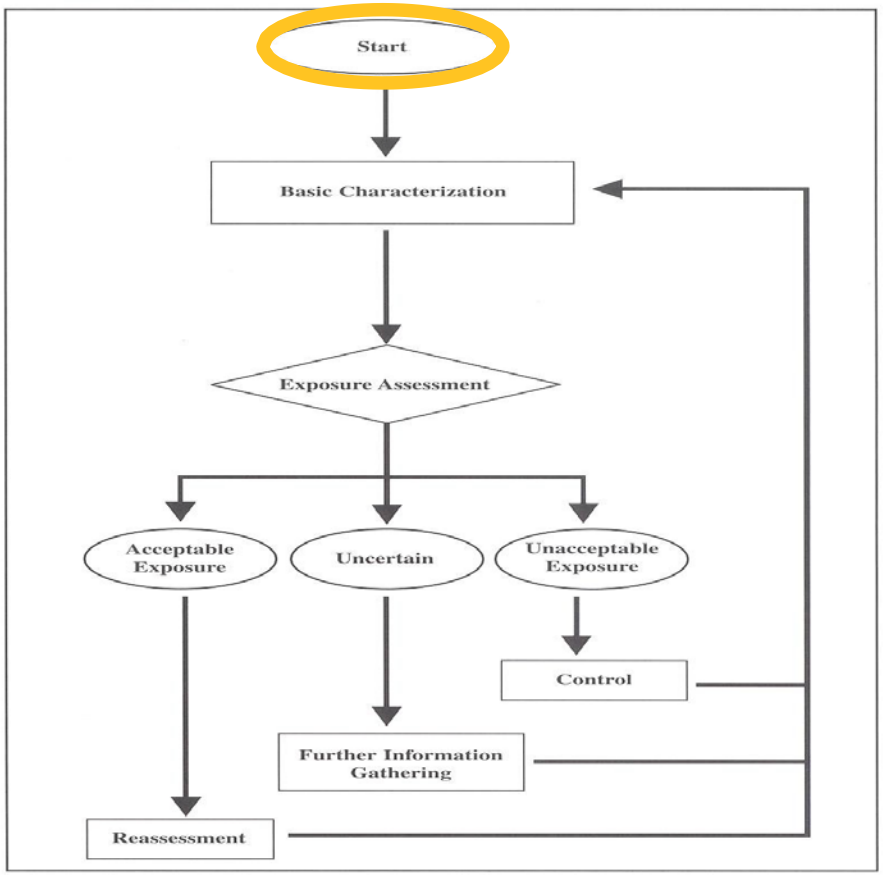


Figure 1.2 — A strategy for assessing and managing occupational exposures.

Basic Characterization

- Observe and record each task performed to create qualitative exposure assessment (QEA)

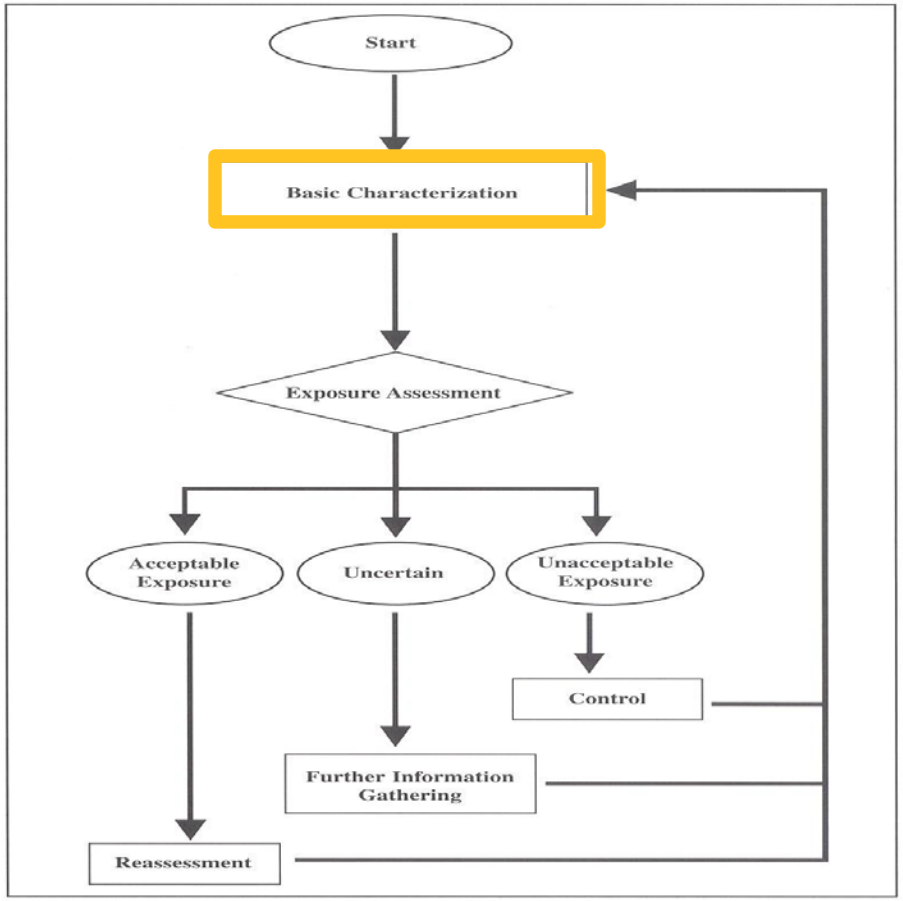


Figure 1.2 — A strategy for assessing and managing occupational exposures.

Basic Characterization- Qualitative Exposure Assessment

- Visually judge potential sources of exposure for the SEG.
- Rank order judgments by exposure magnitude
- Record work practice or engineering control parameters

Exposure Assessment

- Determine SEGs-
- By: Job or Task

- How:
  - Collect 6-15 full shift personal (lapel) samples or each job
  - Analyze samples using the lowest LOD

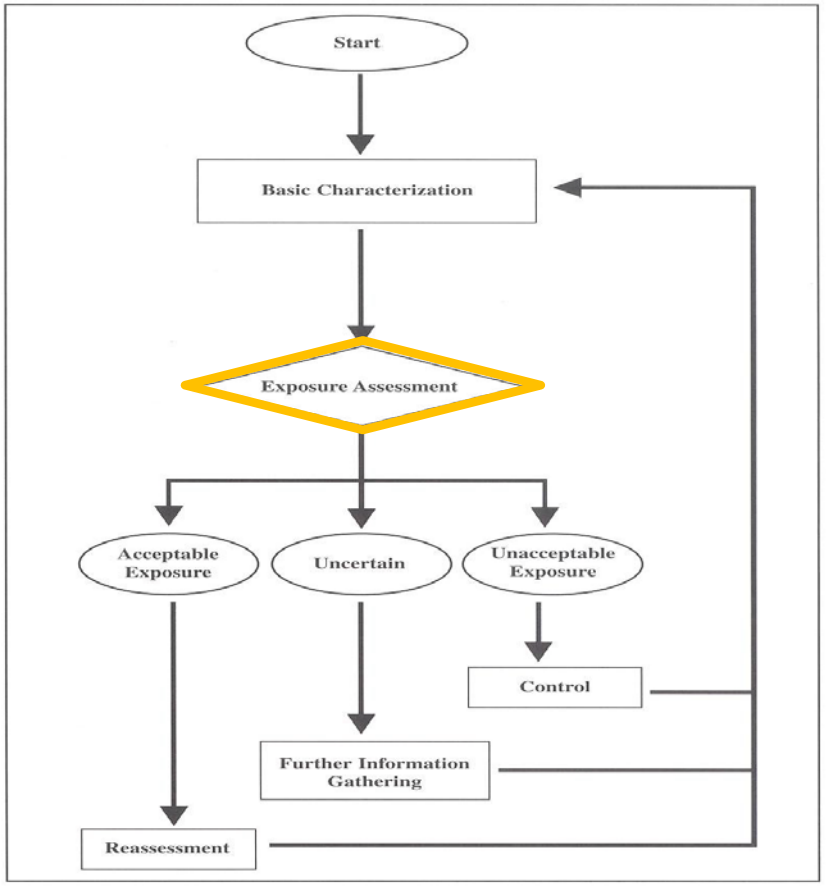
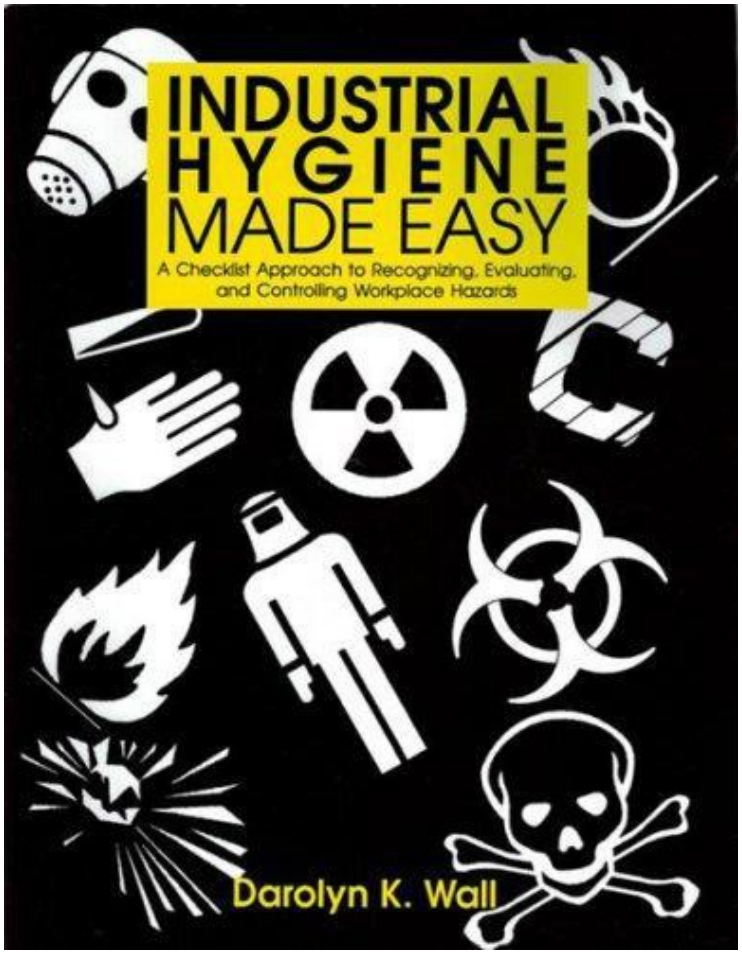
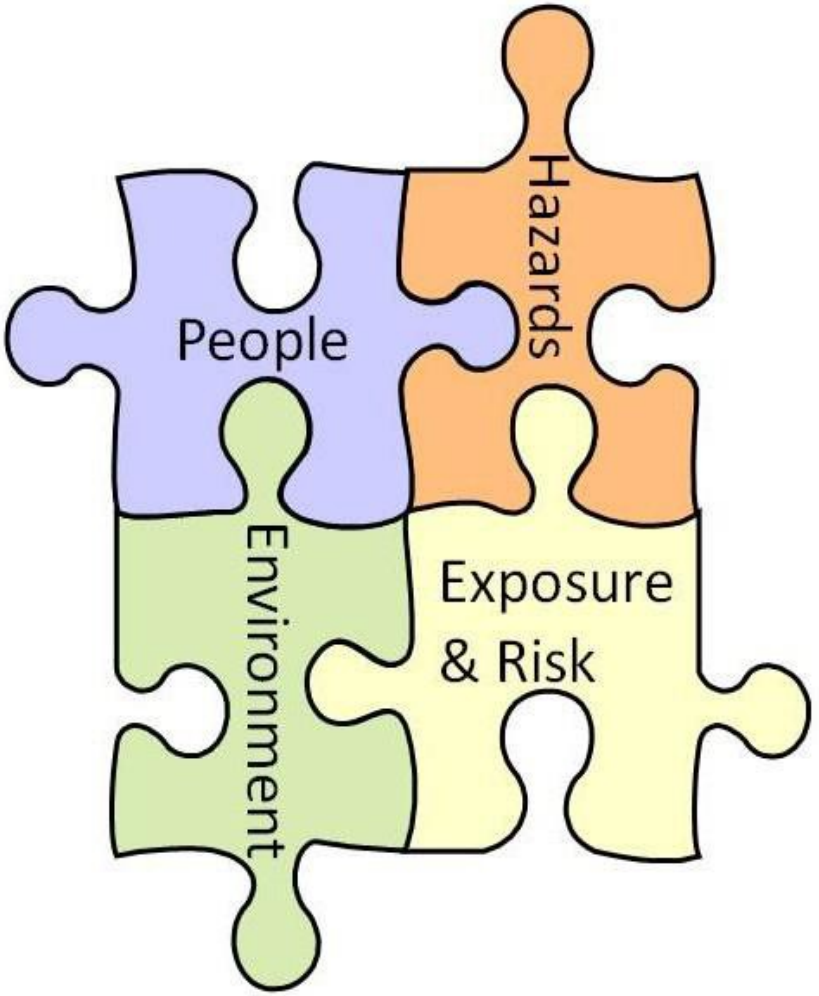


Figure 1.2 — A strategy for assessing and managing occupational exposures.

Exposure Assessment





Exposure Assessment – Exposure Assessment Model

- Purpose: determine central tendency and variation for airborne beryllium levels (PROFILING)

  - Statistical treatments
    - % exceedance (95CI): <1.0 PE of 0.6 μg/m ^{3}
    - GM: generally < 0.08 μg/m ^{3}
  - GSD: <2.5
  - UTL 95/95: <0.6
  - Tasks performed
  - Number/location of operators

Acceptable Exposure

- PE(95CI) of less than one percent of 0.6 μg/m³
- GSD< 2.5
- Stable, predictable process

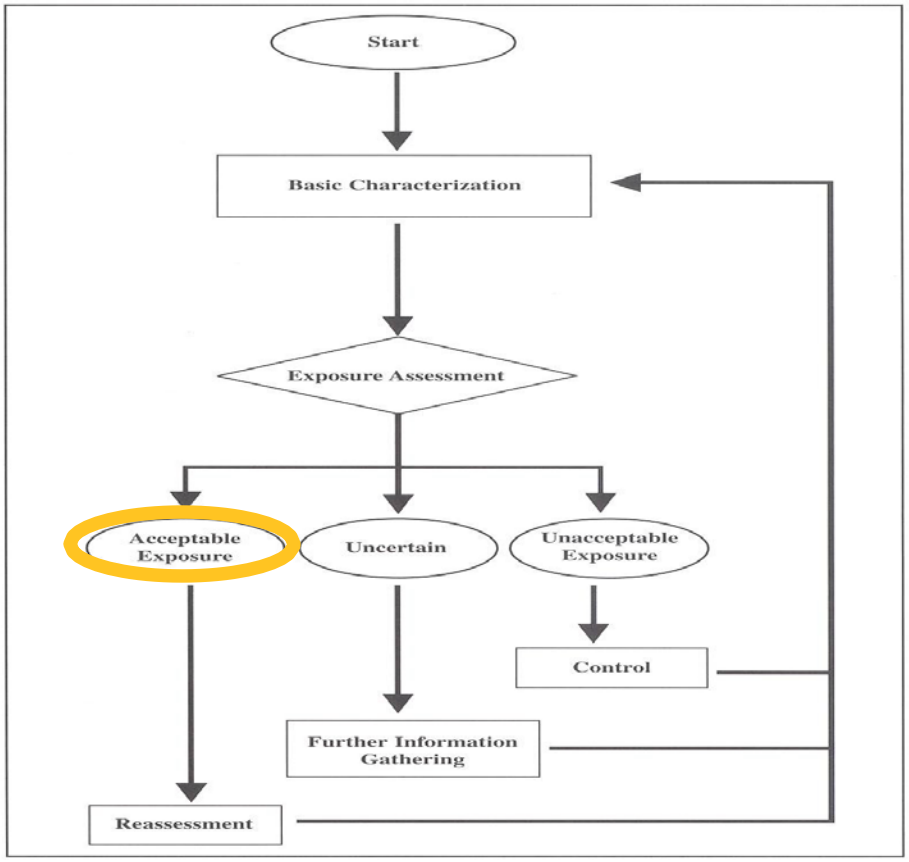


Figure 1.2 — A strategy for assessing and managing occupational exposures.

Reassessment

- Change in the process that could increase exposure
- Frequency varies depending on variability and percent exceedance

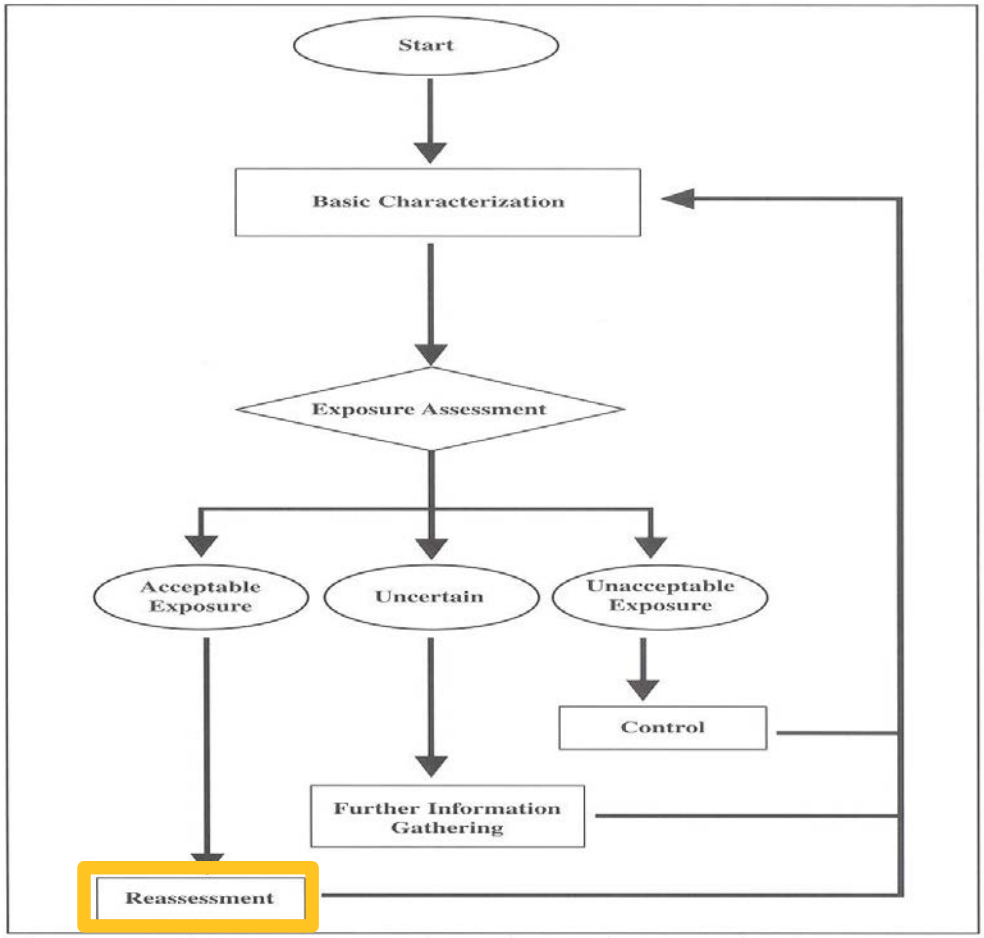


Figure 1.2 — A strategy for assessing and managing occupational exposures.

Surveillance Frequencies [1,2]

Percent Exceedance	GSD	Frequency
<0.01	<2.5	Never
0.01- <0.1	<2.5	Every 5 years
0.1- 0.5	<2.5	Every 2 years
0.1- 0.5	2.5-3.0	Annually
0.5- 1.0	2.5	Biannually
>1.0	2.5 or greater	Quarterly

1 Assumes stationary process
2 Increase frequency when approaching RPF

Exposure Assessment Strategy

Focus on prospective air sampling efforts on:

- SEGs with >1% exceedance of 0.6 μg/m³ (95CI)
- higher risk operations
- Operations that have low process control
- Operations that require numerous work practice interventions to control exposure
- Process surveillance monitoring on processes with

Uncertain

- PE nearing 1.0
- GSD 2.5- 3.0
- Unstable or unpredictable process
- More samples needed

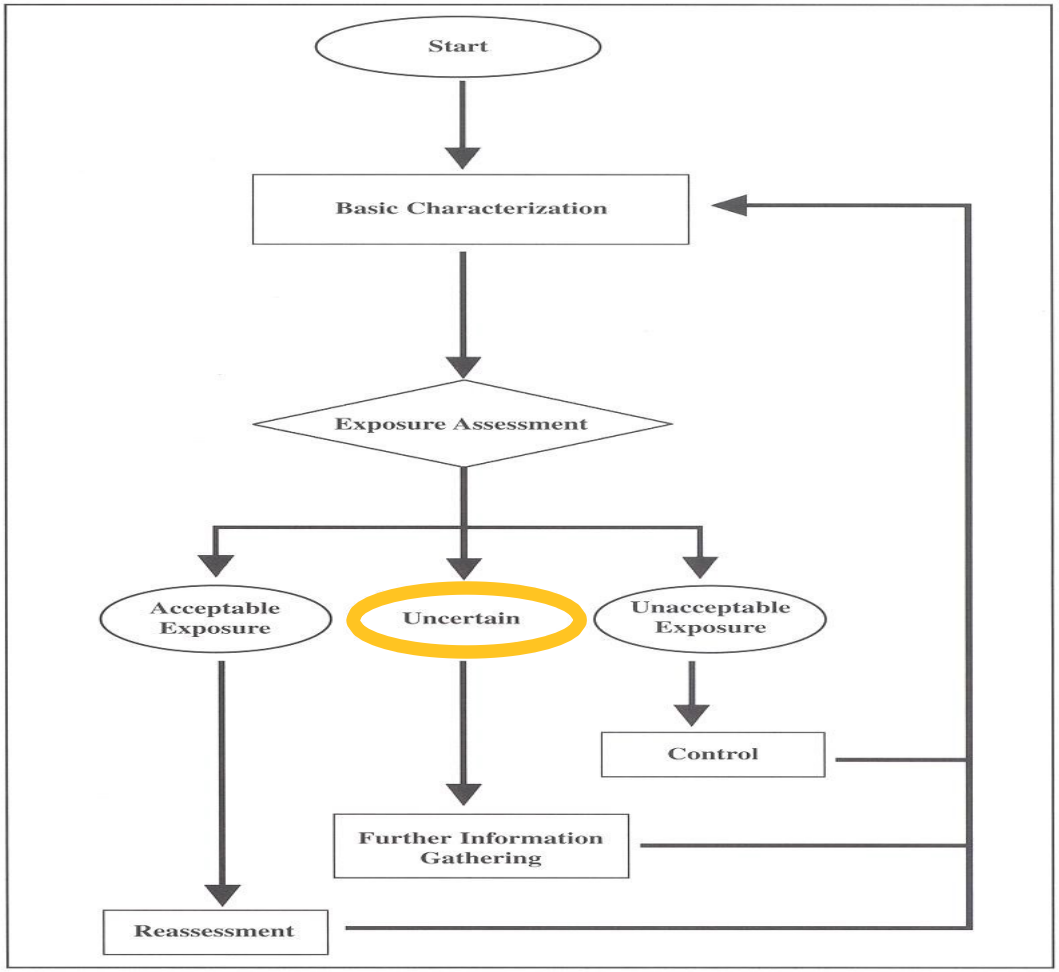


Figure 1.2 — A strategy for assessing and managing occupational exposures.

Further Information Gathering

- Ensure all tasks have been characterized within the job
- Ensure job was representative of their normal duties (safety meetings)
- Evaluate process stability
- Enough samples?

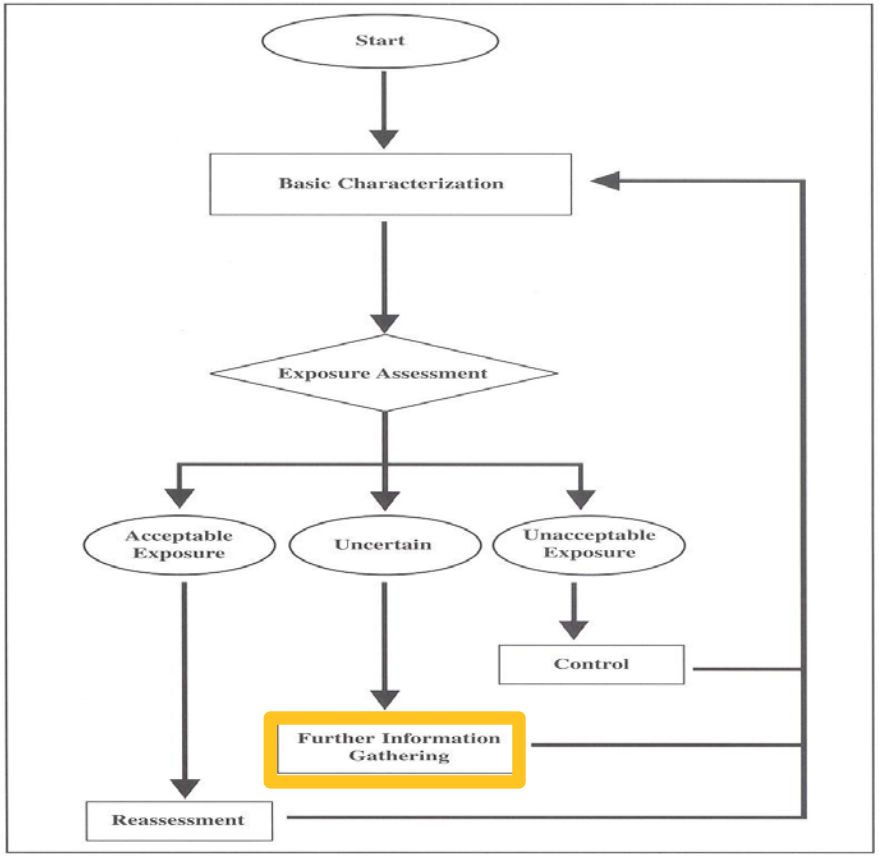


Figure 1.2 — A strategy for assessing and managing occupational exposures.

Unacceptable Exposure

- Percent exceedance (95CI) of more than one percent of 0.6 μg./m^3
- GSD > 3.0
- Unstable or unpredictable process

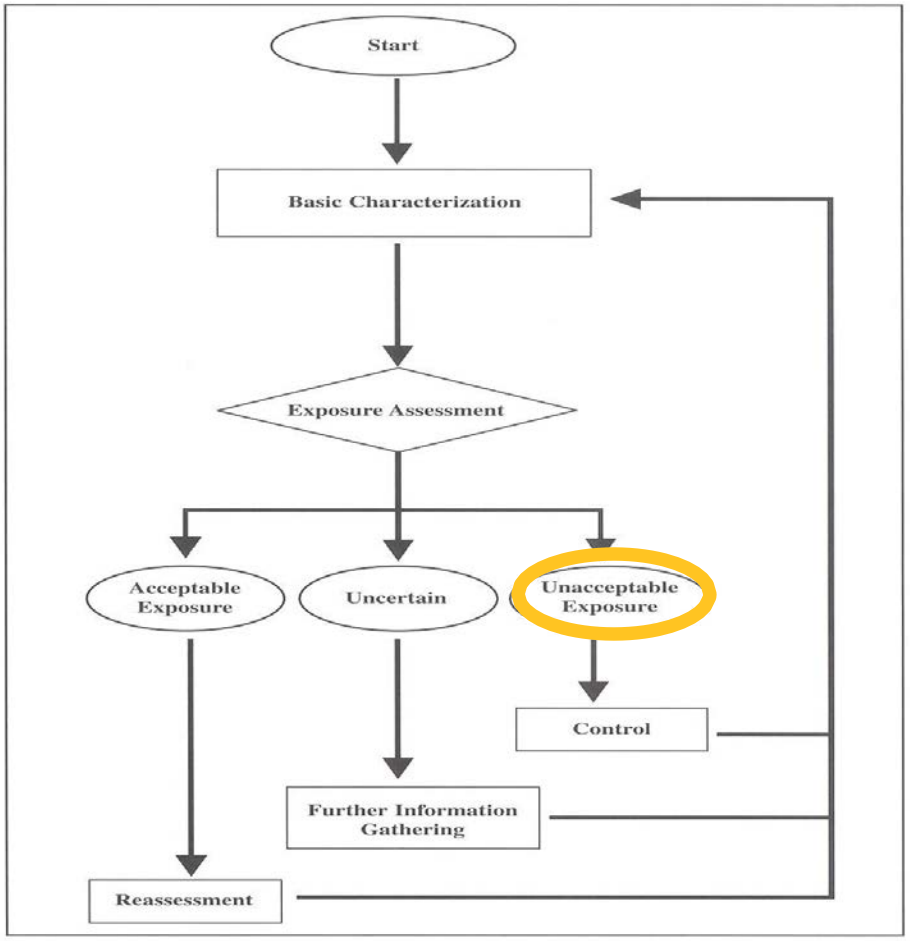


Figure 1.2 — A strategy for assessing and managing occupational exposures.

Control

- Place employees in RP.
- Conduct qualitative exposure assessment (QEA) on job
- Use QEA to rank order tasks
- Quantify task exposure if needed
- Evaluate work practices
- Evaluate engineering controls
- Intervene

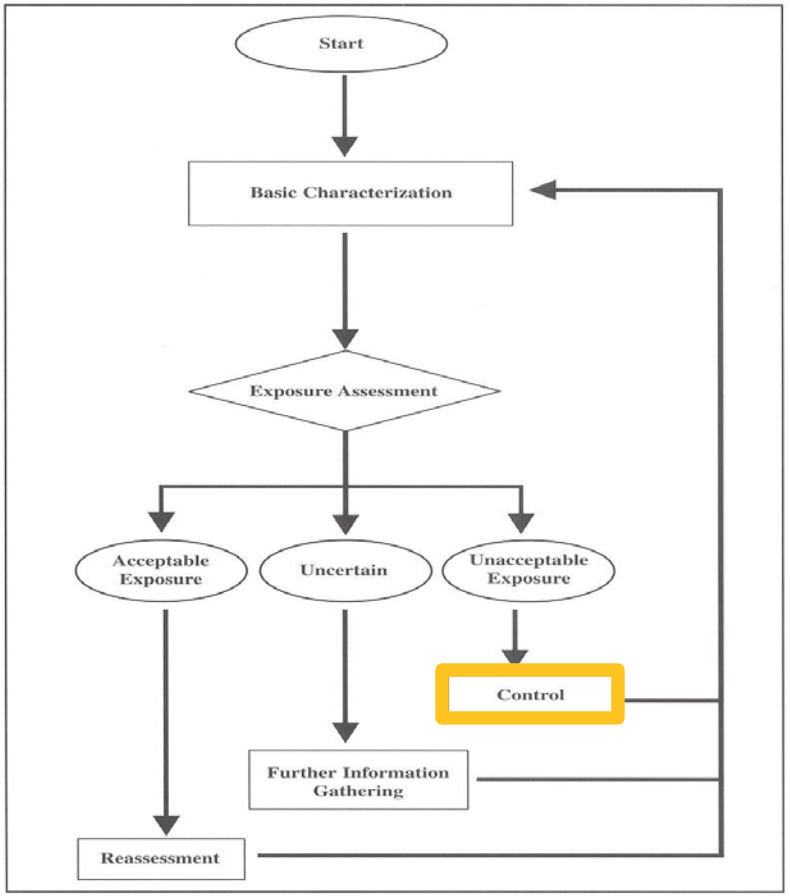


Figure 1.2 — A strategy for assessing and managing occupational exposures.