

# NIOSH OCCUPATIONAL EXPOSURE BANDING: A NEW TOOL FOR EVALUATING CHEMICAL HAZARDS

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THE FINDINGS AND CONCLUSIONS IN THIS PRESENTATION HAVE NOT BEEN FORMALLY DISSEMINATED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND SHOULD NOT BE CONSTRUED TO REPRESENT ANY AGENCY DETERMINATION OR POLICY.

## DOCUMENT OBJECTIVE

**To create a consistent and documented process to characterize chemical hazards so timely and well-informed risk management decisions can be made for chemicals lacking OELs.**



## IMPORTANT POINT

**An OEB is not meant to replace an OEL, rather it serves as a starting point to inform risk management decisions.**

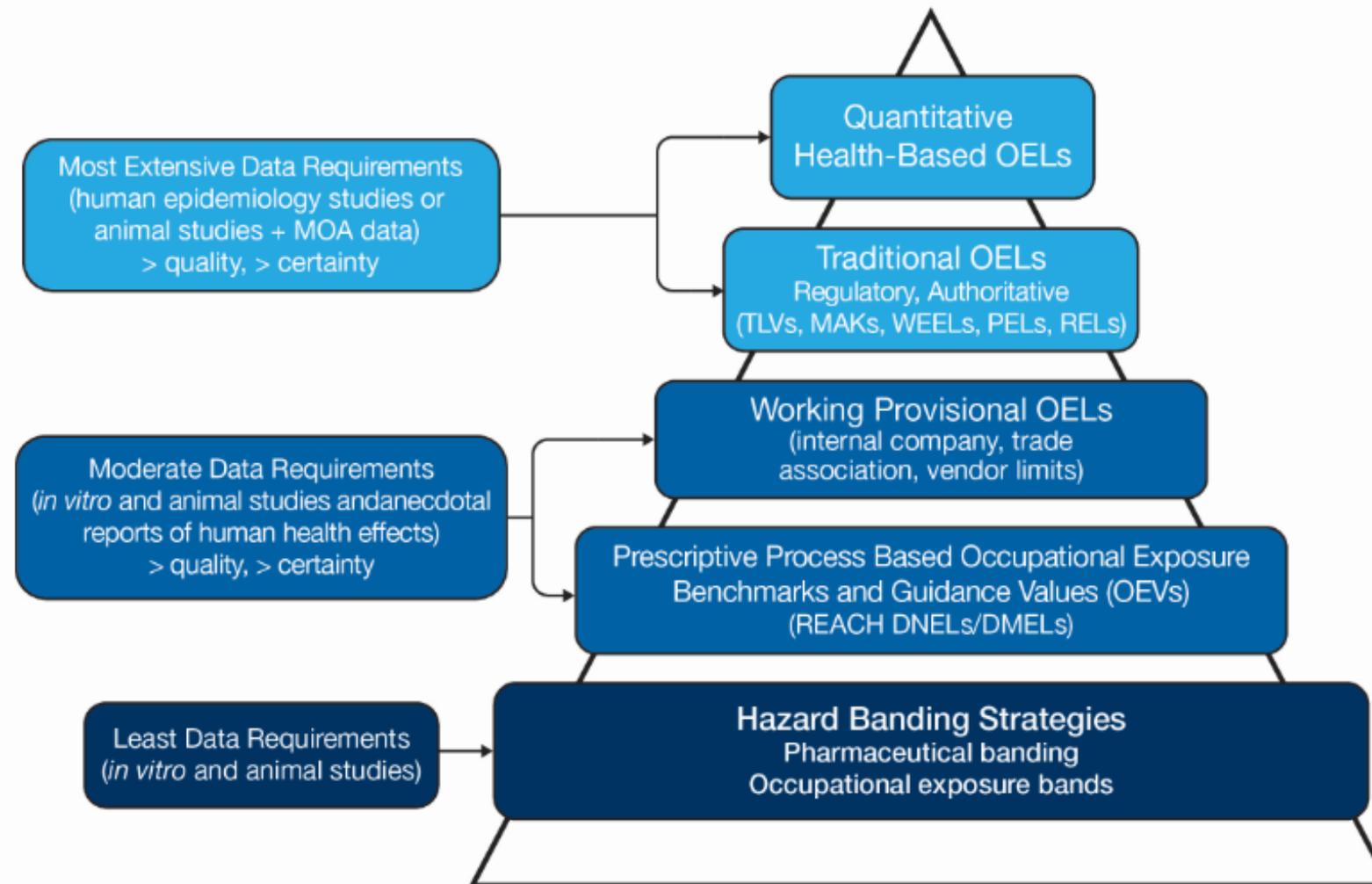


# HISTORY

- One of the best ways to prevent and control occupational injuries, illnesses, and fatalities is to "design out" or minimize hazards and risks.
- NIOSH leads a national initiative called Prevention through Design (PtD).
- PtD encompasses all of the efforts to anticipate and design out hazards to workers in facilities, work methods and operations, processes, equipment, tools, products, new technologies, and the organization of work.
- The Occupational Exposure Banding Initiative emerged from this fundamental philosophy



# HIERARCHY OF OELS

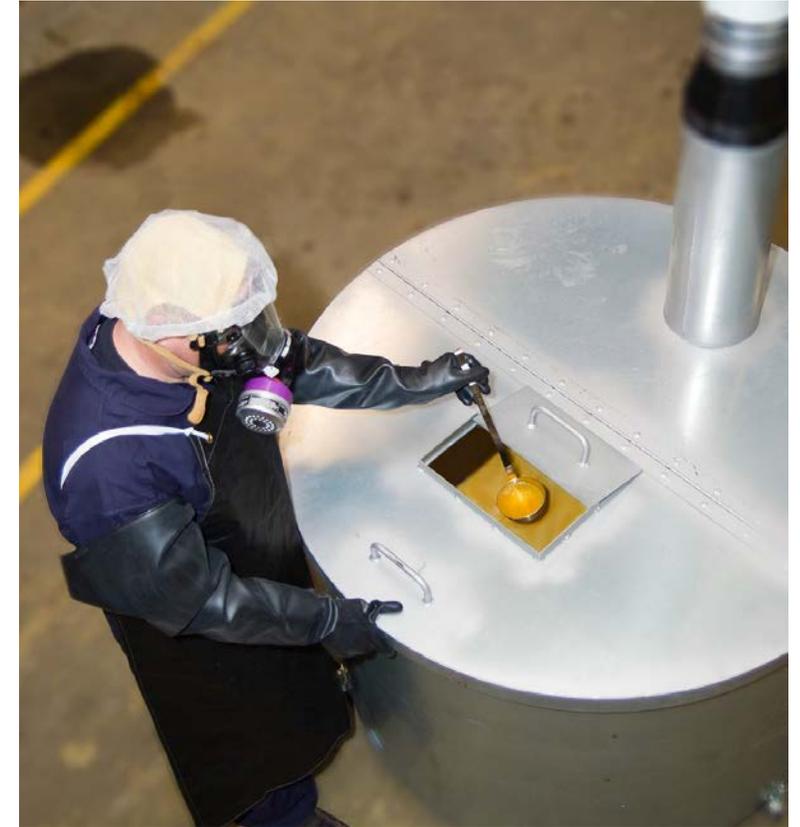


# WHAT IS OCCUPATIONAL EXPOSURE BANDING?

A mechanism to quickly and accurately assign chemicals into “categories” or “bands” based on their health outcomes and potency considerations

	A	B	C	D	E
Particulate/Dust	>10 mg/m <sup>3</sup>	>1 to 10 mg/m <sup>3</sup>	>0.1 to 1 mg/m <sup>3</sup>	>0.01 to 0.1 mg/m <sup>3</sup>	≤0.01 mg/m <sup>3</sup>
Gas/Vapor	>10 ppm	>10 to 100 ppm	>1 to 10 ppm	>0.1 to 1 ppm	≤0.1 ppm

# WHY DO WE NEED OEBs?



## CHEMICALS IN COMMERCE

## OCCUPATIONAL EXPOSURE LIMITS



- Approximately 85,000 chemicals in commerce.

- Approximately 1,000 chemicals with authoritative OELs

# PROPOSED NIOSH OCCUPATIONAL EXPOSURE BANDS

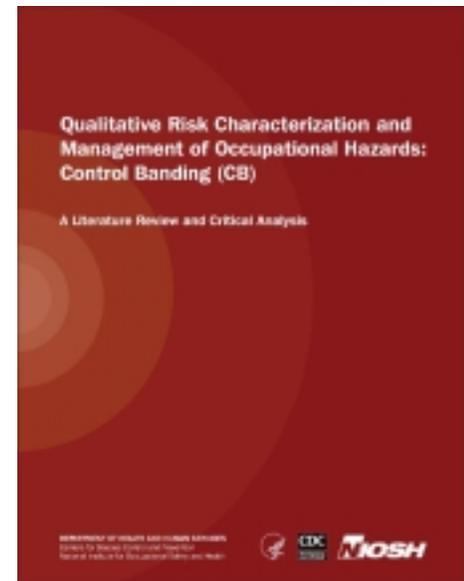
Occupational Exposure Band	Airborne Target Range for Particulate Concentration (mg/m <sup>3</sup> )	Airborne Target Range for Gas or Vapor Concentration (ppm)
<b>A</b>	>10mg/m <sup>3</sup>	>100 ppm
<b>B</b>	>1 to 10 mg/m <sup>3</sup>	>10 to 100 ppm
<b>C</b>	>0.1 to 1 mg/m <sup>3</sup>	>1 to 10 ppm
<b>D</b>	>0.01 to 0.1 mg/m <sup>3</sup>	>0.1 to 1 ppm
<b>E</b>	≤0.01 mg/m <sup>3</sup>	≤0.1 ppm

# THE PROMISE OF OCCUPATIONAL EXPOSURE BANDING

- Facilitates more rapid evaluation of health risk
- Provides guidance for materials without OELs
- Highlights areas where data are missing
- Provides a screening tool for the development of RELs
- Identifies hazards to be evaluated for elimination or substitution
- Aligned with GHS for hazard communication
- Facilitates the application of Prevention through Design principles

## IS THIS THE SAME AS CONTROL BANDING? NO.

- ***COSHH Essentials*** is a control banding tool that helps small and medium-sized enterprises to do risk assessments for chemicals and mixtures of chemicals
  - identifies the control band (control approach),
  - produces advice on controlling risk from the chemical used in the specified task, and
  - provides written guidance and documentation as a result of the assessment
- NIOSH has reviewed control banding strategies previously



## OCCUPATIONAL EXPOSURE BANDING IS DIFFERENT!

- OEBs derived from toxicology and potency
- OEBs can be used to identify one of many control strategies

Assessment of  
hazard potential  
using Occupational  
Exposure Banding

Assignment of a  
health based OEB

Risk Management  
Strategies

# TOOLS FOR THE OCCUPATIONAL HYGIENIST

**GHS  
classifications**

**Engineering  
Controls**

**Hazard  
Communication**

**PPE**

**Exposure Monitoring**

**Occupational  
Exposure  
Bands**

**Medical Surveillance**

**OELS**

**Quantitative Risk  
Assessments**



## HOW IS THE PROCESS ORGANIZED?

Bands are assigned based on the findings for nine standard toxicological endpoints:

1. Carcinogenicity
2. Reproductive toxicity
3. Specific target organ toxicity resulting from repeated exposure
4. Acute toxicity
5. Genotoxicity
6. Skin corrosion and irritation
7. Respiratory sensitization
8. Skin sensitization
9. Serious eye damage and irritation

## Tier 1 —GHS Hazard Codes

User: Health and safety generalist

A Tier 1 evaluation utilizes GHS Hazard Statements and Categories to identify chemicals that have the potential to cause irreversible health effects.



## Tier 2— Secondary Data Sources

User: Properly trained occupational hygienist

A Tier 2 evaluation produces a more refined OEB, based on point of departure data from reliable sources. Data availability and quality are considered.



## Tier 3—Expert Judgement

User: Toxicologist or experienced occupational hygienist

Tier 3 involves the integration of all available data and determining the degree of conviction of the outcome.

# GLOBALY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELING OF CHEMICALS

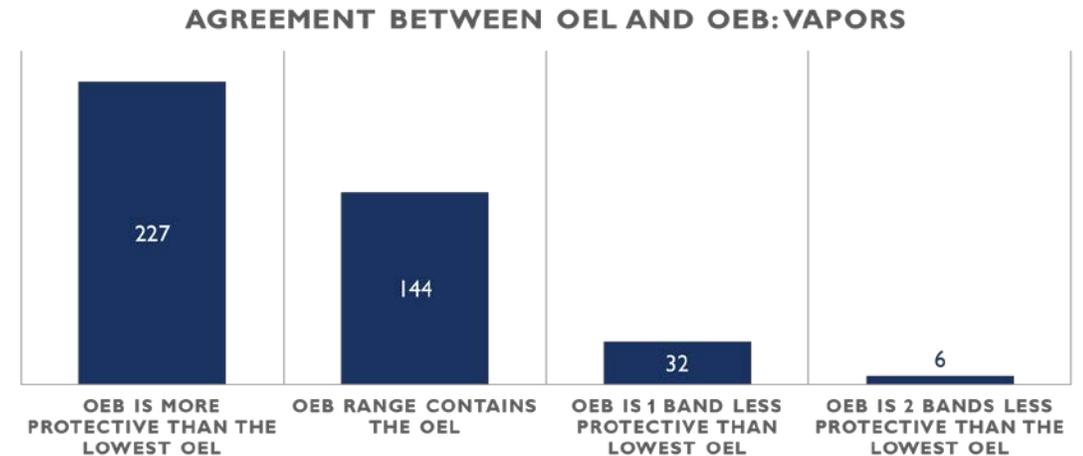
- GHS is a hazard classification system developed by the United Nations to standardize chemical regulations in different countries
  - Within GHS, each physical or health hazard is a **hazard class** (e.g., Carcinogenicity is a hazard class)
  - A hazard class may be sub-divided into several **hazard categories** based on the severity of the hazard
  - GHS uses alphanumeric **hazard codes** to represent these hazards

TIER I Criteria		C	D	E
OEL Ranges	Particle	> 0.1 to ≤ 1 milligrams per cubic meter of air (mg/m <sup>3</sup> )	> 0.01 to ≤ 0.1 mg/m <sup>3</sup>	≤ 0.01 mg/m <sup>3</sup>
	Vapor	> 1 to ≤ 10 parts per million (ppm)	> 0.1 to ≤ 1 ppm	≤ 0.1 ppm
Acute Toxicity	H301 Category 3	H300 Category 2	H300 Category 1	
	H302 Category 4			
	H331 Category 3	H330 Category 2	H330 Category 1	
	H332 Category 4			
	H311 Category 3	H310 Category 2	H310 Category 1	
	H312 Category 4			
	H315 Category 2	H314 Category 1, IA, IB, or IC		
H319 Category 2, 2A or 2B	H318 Category 1			
Respiratory and Skin Sensitization	H317 Category 1B	H317 Category 1 or IA	H334 Category 1 or IA	
	H335 Category 3	H334 Category 1B		
Genotoxicity		H341 Category 2	H340 Category 1, IA or IB	
Carcinogenicity			H350 Category 1, IA, or IB	
			H351 Category 2	
Toxic to Reproduction	H361 Category 2	H360 Category 1B	H360 Category 1 or IA	
Specific Target Organ Toxicity	H371 Category 2		H370 Category 1	
	H373 Category 2		H372 Category 1	

# TIER I EVALUATION

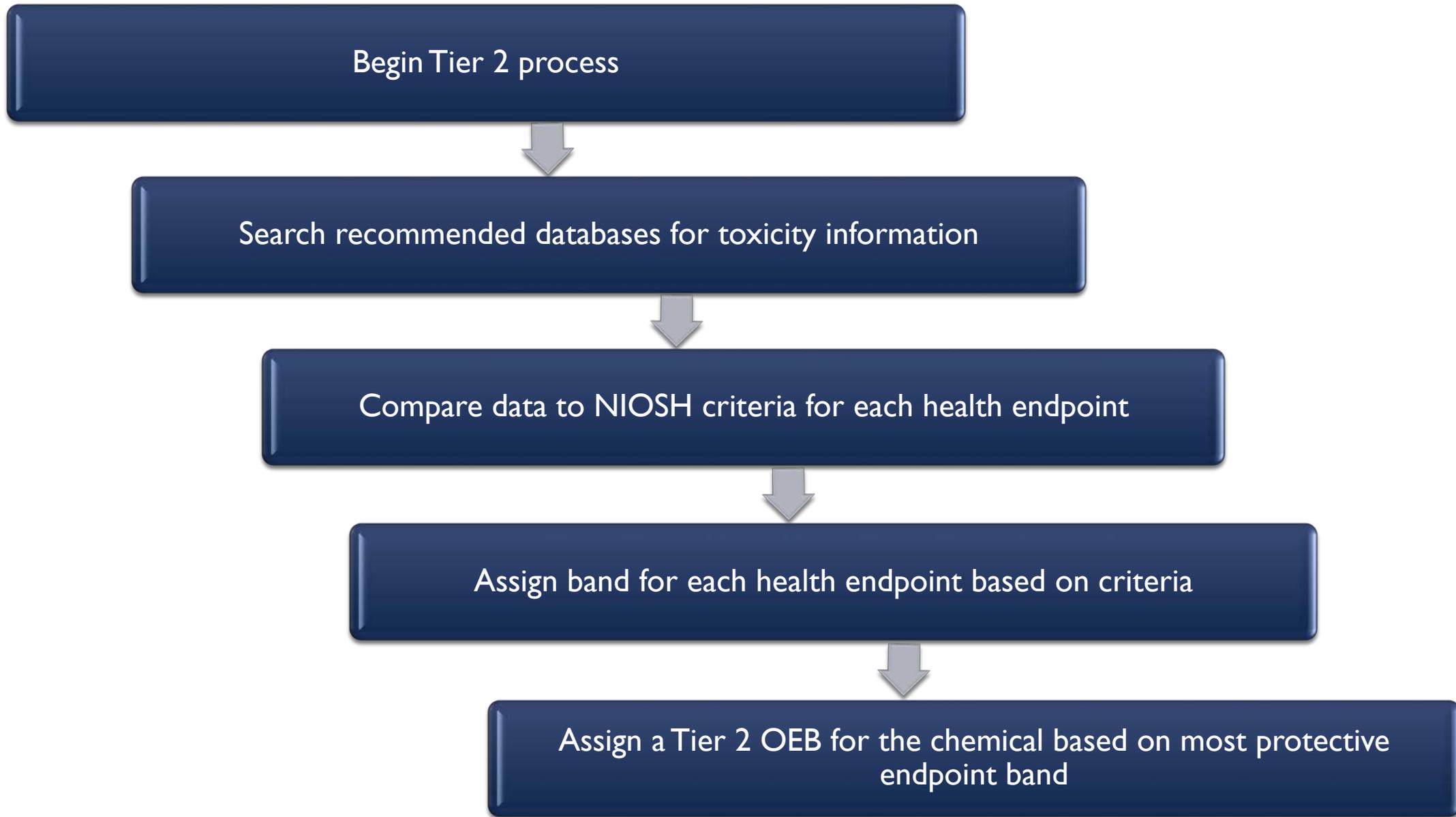
Compared bands obtained from Tier I process for 744 chemicals with full shift OELs from the following authoritative bodies:

- NIOSH Recommended Exposure Limits (RELs)
- OSHA – Permissible Exposure Limits (PELs)
- ACGIH– Threshold Limit Values (TLVs)
- AIHA – Workplace Environmental Exposure Levels (WEELs)
- California OSHA Program (Cal/OSHA) – PELs
- German Maximale Arbeitsplatz-Konzentration (MAK)



\*\* Greater than 80% of Tier I bands at least as protective as the OEL

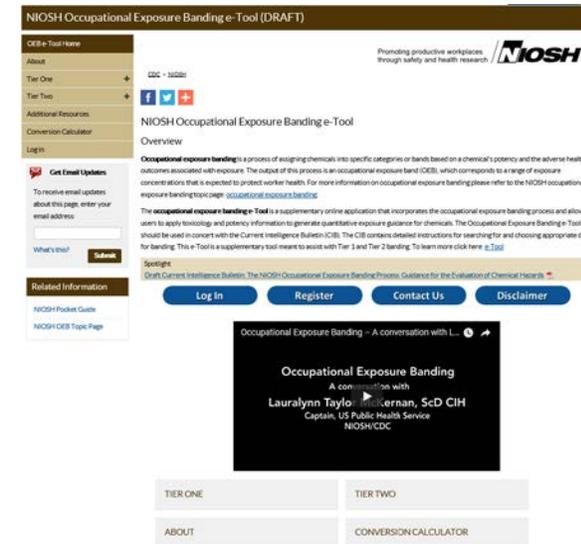
# TIER 2 OVERVIEW



# HOW TO COMPLETE THE OEB PROCESS



Pencil and Paper



Online using  
draft NIOSH OEB e-tool

# NIOSH OEB E-TOOL

NIOSH Occupational Exposure Banding e-Tool (DRAFT)

OEB e-Tool Home

About

Tier One +

Tier Two +

Additional Resources

Conversion Calculator

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What's this? **Submit**

Related Information

NIOSH Pocket Guide

NIOSH OEB Topic Page

Promoting productive workplaces through safety and health research **NIOSH**

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## NIOSH Occupational Exposure Banding e-Tool

### Overview

**Occupational exposure banding** is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that is expected to protect worker health. For more information on occupational exposure banding please refer to the NIOSH occupational exposure banding topic page: [occupational exposure banding](#).

The **occupational exposure banding e-Tool** is a supplementary online application that incorporates the occupational exposure banding process and allows users to apply toxicology and potency information to generate quantitative exposure guidance for chemicals. The Occupational Exposure Banding e-Tool should be used in concert with the Current Intelligence Bulletin (CIB). The CIB contains detailed instructions for searching for and choosing appropriate data for banding. This e-Tool is a supplementary tool meant to assist with Tier 1 and Tier 2 banding. To learn more click here: [e-Tool](#)

Spotlight

[Draft Current Intelligence Bulletin: The NIOSH Occupational Exposure Banding Process: Guidance for the Evaluation of Chemical Hazards](#)

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Occupational Exposure Banding – A conversation with L...

**Occupational Exposure Banding**  
A conversation with  
**Lauralynn Taylor McKernan, ScD CIH**  
Captain, US Public Health Service  
NIOSH/CDC

TIER ONE

TIER TWO

ABOUT

CONVERSION CALCULATOR

- Requires expertise in toxicology
- Requires intensive review and evaluation of primary data
- Is required when insufficient data for Tier 2 banding
- Completed when no detailed guidance is available

# TIER 1 OVERVIEW AND EXAMPLE



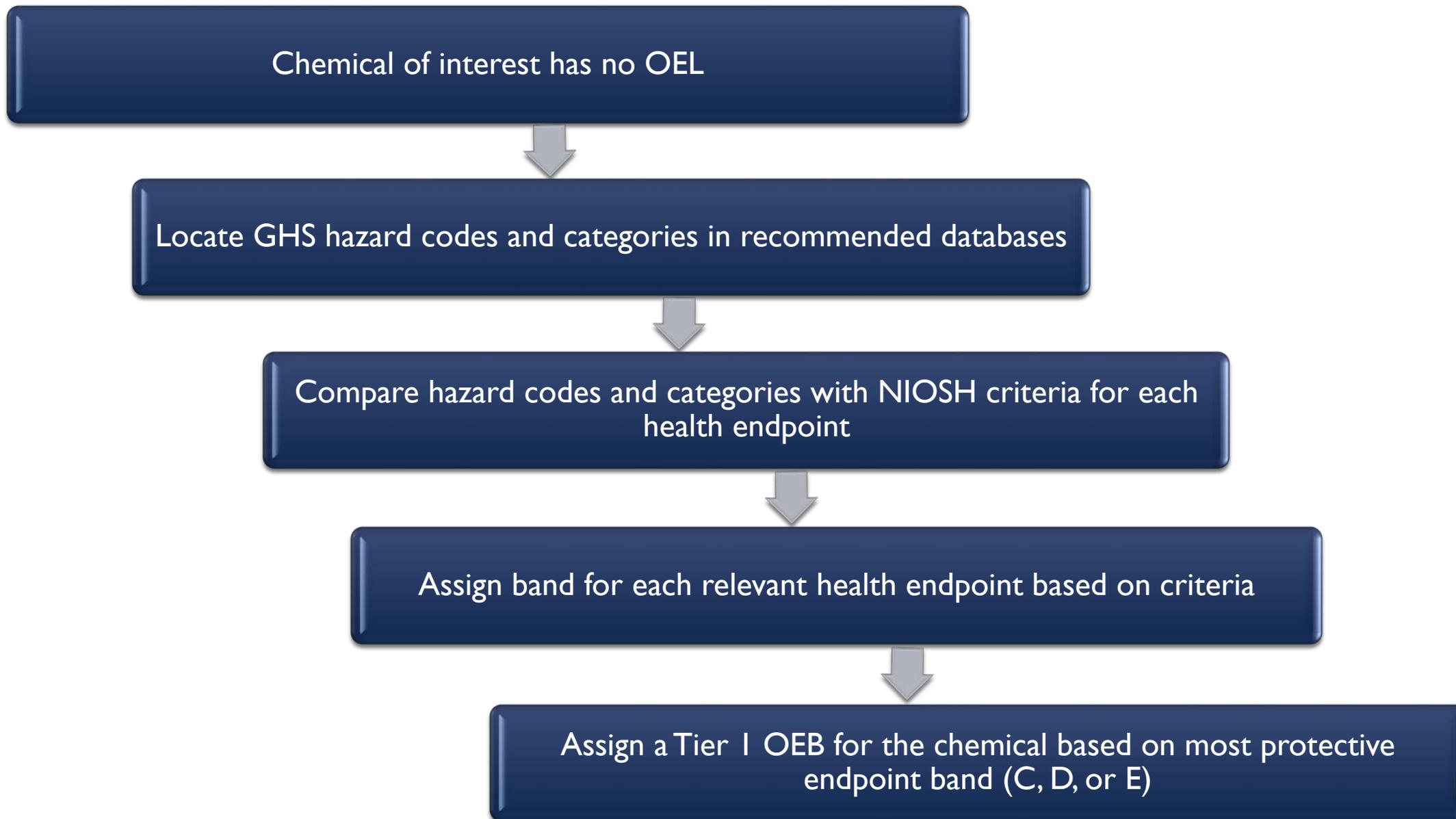
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## TIER 1 PROCESS

- GHS hazard codes and categories provide the basis for Tier 1 criteria
- Relatively low data requirements
- Chemicals can be banded in bands C, D, and E
- Chemicals are assigned Tier 1 OEBs based on severity and reversibility of effects
- Tier 1 is useful as a screening tool, but Tier 2 is recommended if data and expertise are available

# PROPOSED NIOSH OCCUPATIONAL EXPOSURE BANDS

Occupational Exposure Band	Airborne Target Range for Particulate Concentration (mg/m <sup>3</sup> )	Airborne Target Range for Gas or Vapor Concentration (ppm)
<b>A</b>	>10mg/m <sup>3</sup>	>100 ppm
<b>B</b>	>1 to 10 mg/m <sup>3</sup>	>10 to 100 ppm
<b>C</b>	>0.1 to 1 mg/m <sup>3</sup>	>1 to 10 ppm
<b>D</b>	>0.01 to 0.1 mg/m <sup>3</sup>	>0.1 to 1 ppm
<b>E</b>	≤0.01 mg/m <sup>3</sup>	≤0.1 ppm



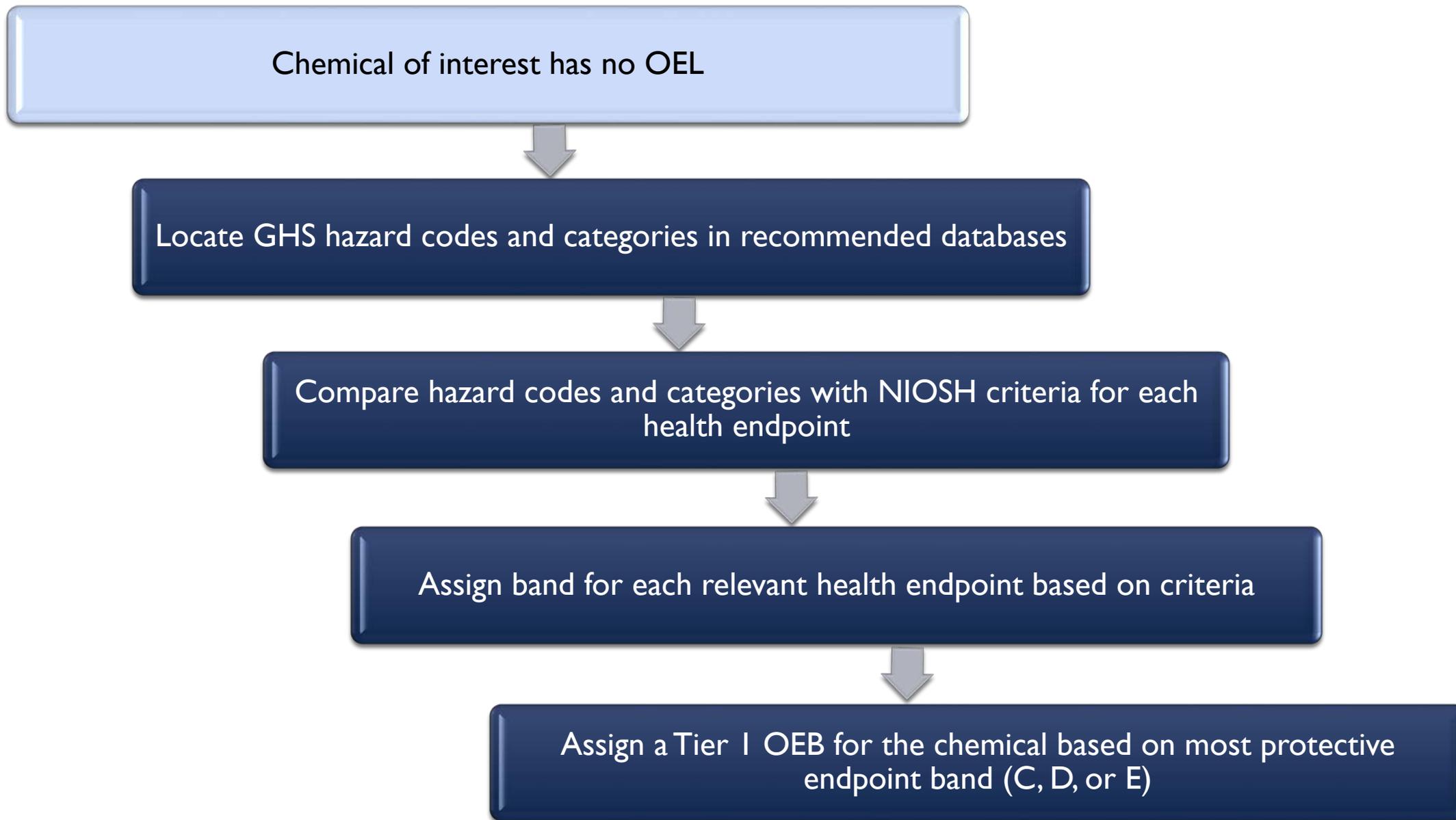
TIER I Criteria		C	D	E
OEL Ranges	Particle	> 0.1 to ≤ 1 milligrams per cubic meter of air (mg/m <sup>3</sup> )	> 0.01 to ≤ 0.1 mg/m <sup>3</sup>	≤ 0.01 mg/m <sup>3</sup>
	Vapor	> 1 to ≤ 10 parts per million (ppm)	> 0.1 to ≤ 1 ppm	≤ 0.1 ppm
Acute Toxicity	H301 Category 3	H300 Category 2	H300 Category 1	
	H302 Category 4			
	H331 Category 3	H330 Category 2	H330 Category 1	
	H332 Category 4			
	H311 Category 3	H310 Category 2	H310 Category 1	
	H312 Category 4			
	H315 Category 2	H314 Category 1, IA, IB, or IC		
	H319 Category 2, 2A or 2B	H318 Category 1		
H317 Category 1B	H317 Category 1 or IA			
Respiratory and Skin Sensitization	H335 Category 3	H334 Category 1B	H334 Category 1 or IA	
	Genotoxicity	H341 Category 2	H340 Category 1, IA or IB	
Carcinogenicity		H350 Category 1, IA, or IB		
			H351 Category 2	
Toxic to Reproduction	H361 Category 2	H360 Category 1B		
	Specific Target Organ Toxicity	H370 Category 1		
H372 Category 1				
H373 Category 2				

TIER I Criteria	C	D	E	
OEL Ranges	Particle	> 0.1 to ≤ 1 milligrams per cubic meter of air (mg/m <sup>3</sup> )	> 0.01 to ≤ 0.1 mg/m <sup>3</sup>	≤ 0.01 mg/m <sup>3</sup>
	Vapor	> 1 to ≤ 10 parts per million (ppm)	> 0.1 to ≤ 1 ppm	≤ 0.1 ppm
Acute Toxicity	H301 Category 3	H300 Category 2	H300 Category 1	
	H302 Category 4			
	H331 Category 3	H330 Category 2	H330 Category 1	
	H332 Category 4			
	H311 Category 3	H310 Category 2	H310 Category 1	
	H312 Category 4			
Skin Corrosion/ Irritation	H315 Category 2		H314 Category 1, IA, IB, or IC	
Serious Eye Damage/ Eye irritation	H319 Category 2, 2A or 2B		H318 Category 1	
Respiratory and Skin Sensitization	H317 Category 1B	H317 Category 1 or IA		
	H335 Category 3	H334 Category 1B	H334 Category 1 or IA	
Genotoxicity		H341 Category 2	H340 Category 1, IA or IB	
Carcinogenicity			H350 Category 1, IA, or IB	
			H351 Category 2	
Toxic to Reproduction	H361 Category 2	H360 Category 1B	H360 Category 1 or IA	
Specific Target Organ Toxicity	H371 Category 2		H370 Category 1	
	H373 Category 2		H372 Category 1	

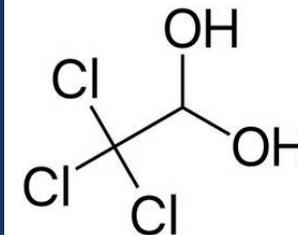
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	H331 Category 3	H330 Category 2	H330 Category 1	
	H332 Category 4			
	H311 Category 3	H310 Category 2	H310 Category 1	
	H312 Category 4			
	H315 Category 2	H314 Category 1, IA, IB, or IC		
H319 Category 2, 2A or 2B	H318 Category 1			
Respiratory and Skin Sensitization	H317 Category 1B	H317 Category 1 or IA	H334 Category 1 or IA	
	H335 Category 3			
Genotoxicity		H341 Category 2	H340 Category 1, IA or IB	
			H350 Category 1, IA, or IB	
Carcinogenicity			H351 Category 2	
Reproductive Toxicity	H361 Category 2	H360 Category 1B	H360 Category 1 or IA	
Specific Target Organ Toxicity	H371 Category 2		H370 Category 1	
	H373 Category 2		H372 Category 1	

# GHS CODES NOT USED IN BANDING

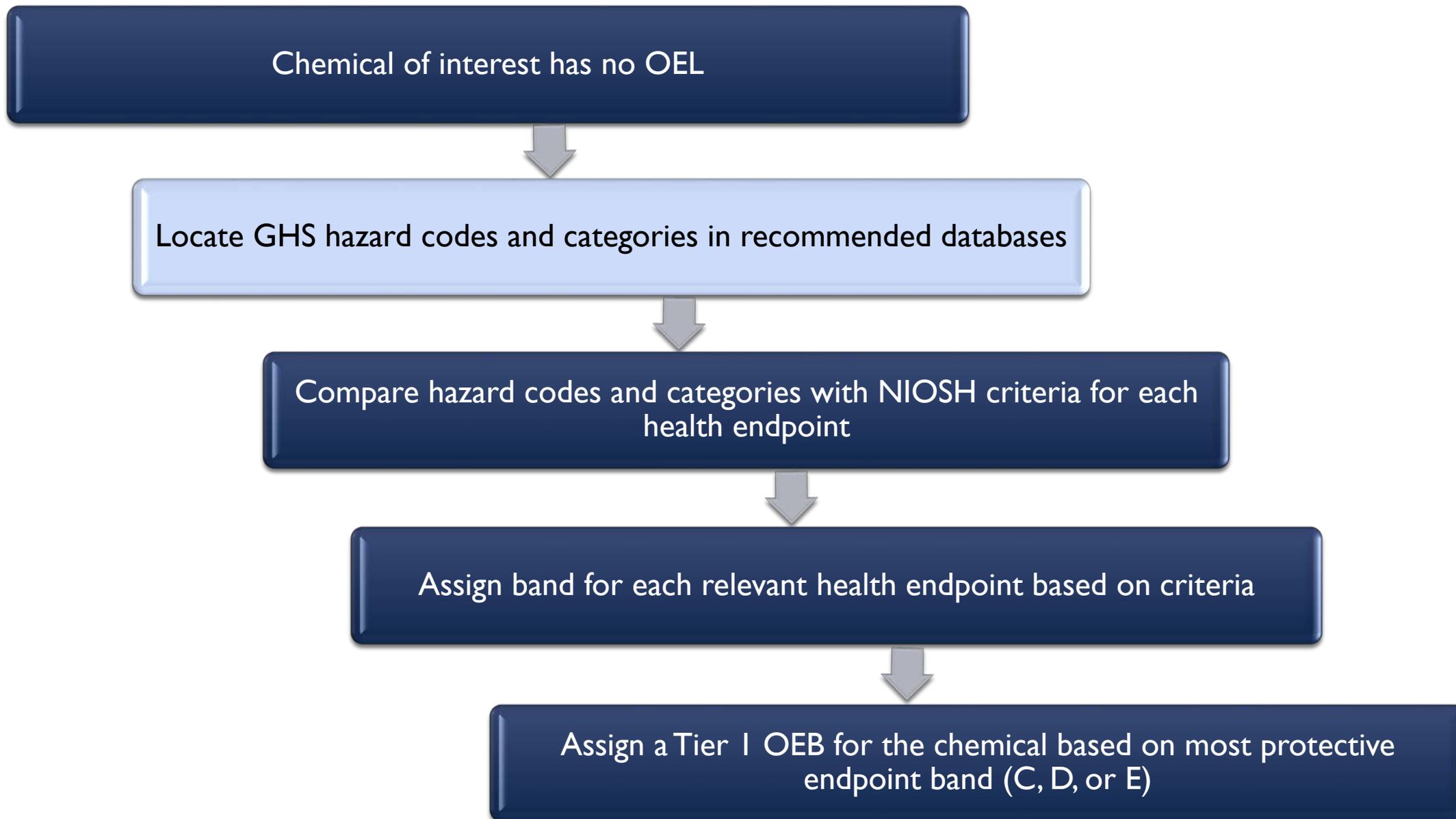
- H200 codes (physical hazards)
- H400 codes (ecological hazards)
- H303, H304, H305, H313, H316, H320, H333, H336, H362
  - Not occupationally relevant, OR
  - Not sufficient to affect the result of Tier 1 banding



## TIER 1 EXAMPLE: ABIETIC ACID



- CAS# 514-10-3
- Organic compound that occurs naturally in trees
- Extracted from tree rosin, used for
  - Caulking ships
  - Treating bows on musical instruments
  - Depackaging integrated circuits from epoxy coatings
- Known to be an allergen
- Some qualitative and quantitative data exist, but...
- **No OEL exists**



# RELIABLE SOURCES FOR TIER 1

- **GESTIS Substance Database**
  - [www.dguv.de/ifa/gestis-database](http://www.dguv.de/ifa/gestis-database)
- **ECHA Annex VI to CLP**
- **Safety Data Sheets**

# LOCATE GHS H-CODES AND CATEGORIES FROM RECOMMENDED DATABASES

**IFA**  
Institute for Occupational Safety and Health  
of the German Social Accident Insurance

## GESTIS Substance Database

514-10-3    Powered by

**SEARCH FORM** **RESULTS** **DOCUMENT** **WORKING STATE**

Prev Hit Doc Next Hit Doc Prev Hit Match Next Hit Match Clear Highlights Set Bookmark Print/PDF

**IFA** **GESTIS Substance database**

**Abietic acid** **Search by name or CASN**



Identification | Characterisation | Formula | Toxicology / Ecotoxicology | Physical and chemical properties | Occupational health and first aid | Safe handling | **Regulations** | Links | Literature register

**IDENTIFICATION**

**Abietic acid**  
**13-Isopropylpodocarpa-7,13-dien-15-oic acid**

**ZVG No:** 20590  
**CAS No:** 514-10-3  
**EC No:** 208-178-3

**CHARACTERISATION**

**Abietic acid**

- IDENTIFICATION
- CHARACTERISATION
- FORMULA
- TOXICOLOGY / ECOTOXICOLOGY
- PHYSICAL AND CHEMICAL PROPERTIES
- OCCUPATIONAL HEALTH AND FIRST AID
- SAFE HANDLING
- REGULATIONS
- LINKS
- REFERENCES

**Usage advice**

- Contents of GESTIS substance database
- Legal aspects of usage
- Contact
- Legal information

**Substance list**

- A
- B
- C
- D
- E
- F

# LOCATE GHS H-CODES AND CATEGORIES FROM RECOMMENDED DATABASES

## REGULATIONS

[GHS Classification/Labeling](#) | [Workplace labelling](#) | [Air quality control](#) | [Transport Regulations](#) | [MAK recommendations](#) | [Seveso III](#) | [Further regulations](#)

## EUROPEAN GHS CLASSIFICATION AND LABELLING

### Classification:

Skin irritation, Category 2; H315

Eye irritation, Category 2; H319

Specific Target Organ Toxicity (single exposure), Category 3; H335

Hazardous to the aquatic environment, Acute Category 1; H400

Skin irritation, Category 2; H315

Eye irritation, Category 2; H319

Specific Target Organ Toxicity (single exposure), Category 3; H335

~~Hazardous to the aquatic environment, Acute Category 1; H400~~

H319: Causes serious eye irritation.

H335: May cause respiratory irritation.

H400: Very toxic to aquatic life.

### Precautionary Statement - P-phrases:

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if

# TIER I EXAMPLE: ABIETIC ACID

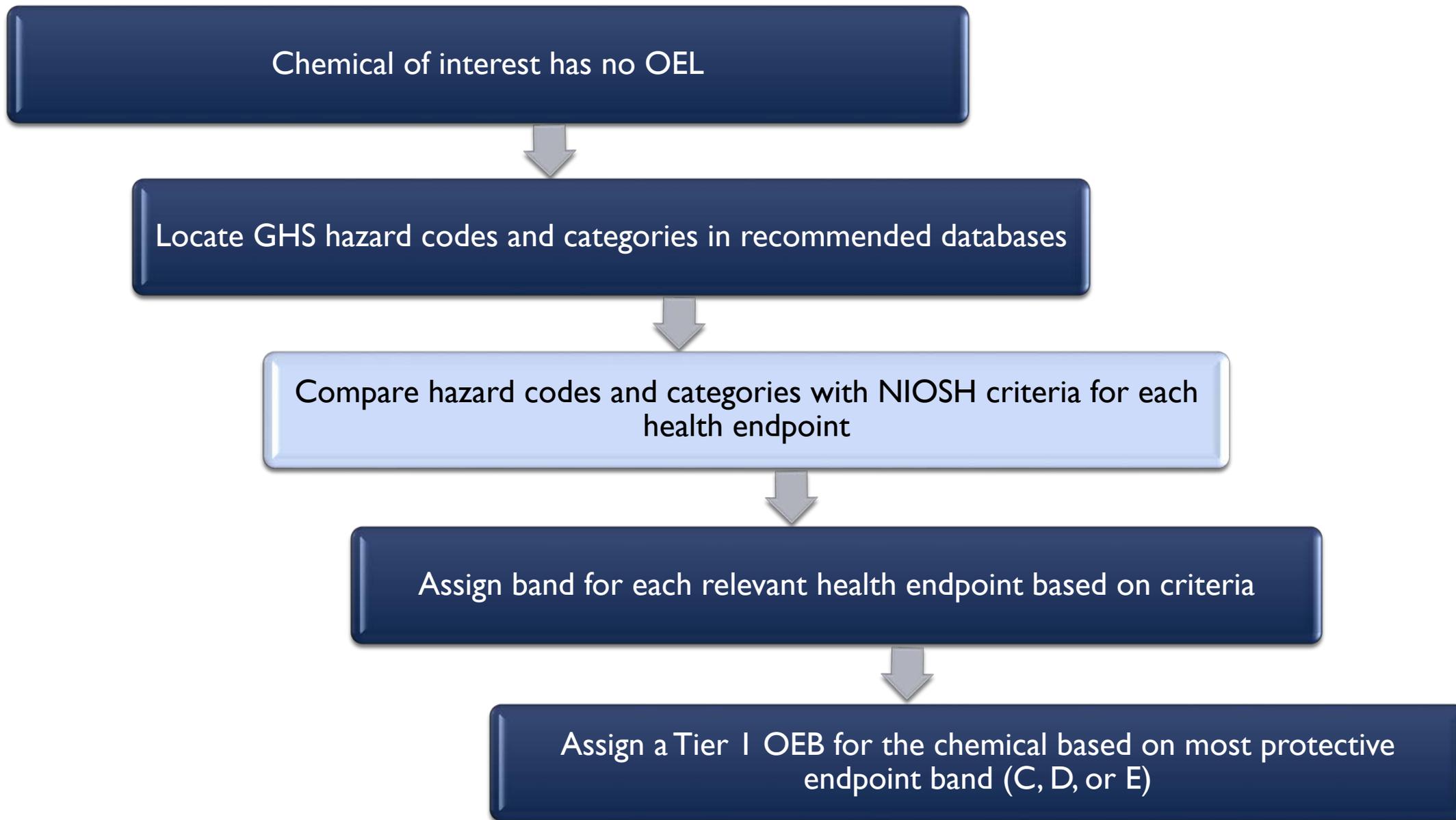
- Locate GHS H-codes and categories from recommended databases

Abietic Acid CAS: 514-10-3				
Health Endpoint	Hazard Code	Hazard Category	H-code source	Endpoint Band
Acute Toxicity				
Skin Corrosion/Irritation				
Serious Eye Damage/ Eye Irritation				
Respiratory and Skin Sensitization				
Germ Cell Mutagenicity				
Carcinogenicity				
Toxic to Reproduction				
Specific Target Organ Toxicity				

## TIER I EXAMPLE: ABIETIC ACID

- Locate GHS H-codes and categories from recommended databases

Abietic Acid CAS: 514-10-3				
Health Endpoint	Hazard Code	Hazard Category	H-code source	Endpoint Band
Acute Toxicity				
Skin Corrosion/Irritation	H315	2	GESTIS	
Serious Eye Damage/ Eye Irritation	H319	2	GESTIS	
Respiratory and Skin Sensitization				
Germ Cell Mutagenicity				
Carcinogenicity				
Toxic to Reproduction				
Specific Target Organ Toxicity	H335	3	GESTIS	



# TIER I EXAMPLE: ABIETIC ACID

- Compare codes and categories with NIOSH Tier 1 OEB Criteria Chart

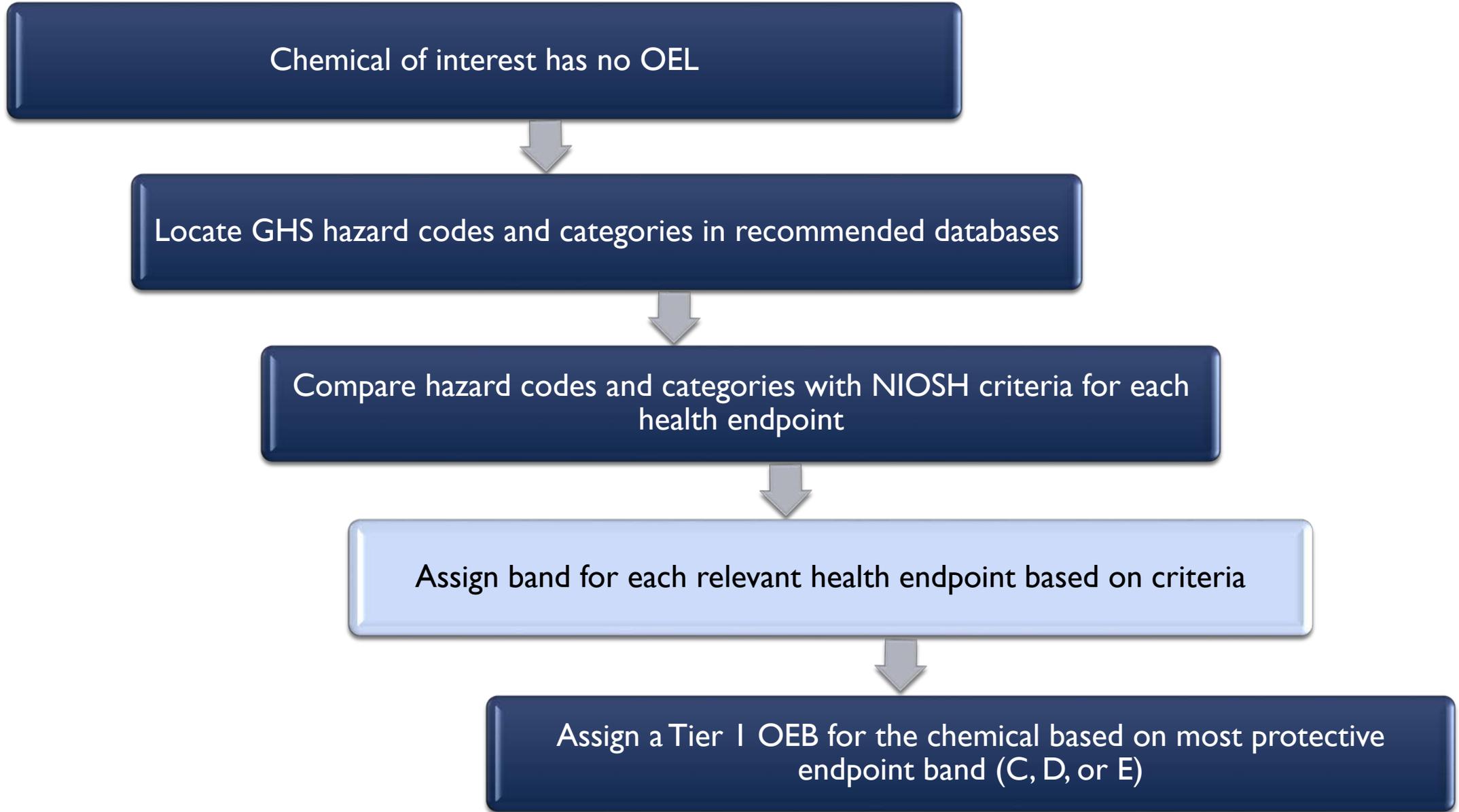
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		H319 Category 2, 2A or 2B		H318 Category 1
Respiratory and Skin Sensitization		H317 Category 1B	H317 Category 1 or 1A	
		H335 Category 3	H334 Category 1B	H334 Category 1 or 1A

# TIER I EXAMPLE: ABIETIC ACID

- Locate GHS H-codes and categories from recommended databases

Abietic Acid CAS: 514-10-3				
Health Endpoint	Hazard Code	Hazard Category	H-code source	Endpoint Band
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Skin Corrosion/Irritation	H315	2	GESTIS	<b>C</b>
Serious Eye Damage/ Eye Irritation	H319	2	GESTIS	
Respiratory and Skin Sensitization				
Germ Cell Mutagenicity				
Carcinogenicity				
Toxic to Reproduction				
Specific Target Organ Toxicity	H335	3	GESTIS	

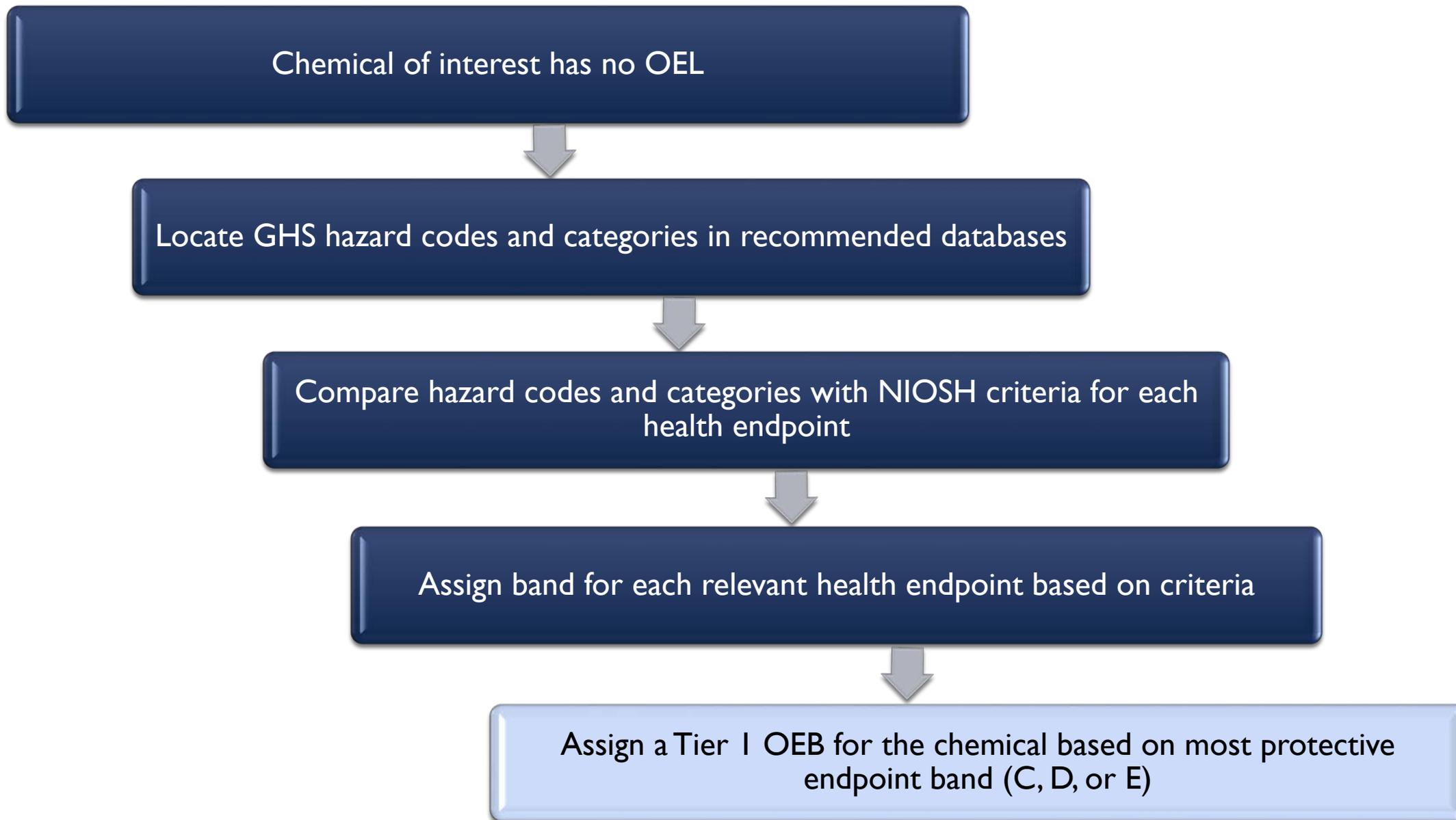
# TIER 1 OVERVIEW



## TIER I EXAMPLE: ABIETIC ACID

- Locate GHS H-codes and categories from recommended databases

Abietic Acid CAS: 514-10-3				
Health Endpoint	Hazard Code	Hazard Category	H-code source	Endpoint Band
Acute Toxicity				
Skin Corrosion/Irritation	H315	2	GESTIS	<b>C</b>
Serious Eye Damage/ Eye Irritation	H319	2	GESTIS	<b>C</b>
Respiratory and Skin Sensitization				
Germ Cell Mutagenicity				
Carcinogenicity				
Toxic to Reproduction				
Specific Target Organ Toxicity	H335	3	GESTIS	<b>No Band</b>



# TIER I EXAMPLE: ABIETIC ACID

- Locate GHS H-codes and categories from recommended databases

Abietic Acid CAS: 514-10-3				
Health Endpoint	Hazard Code	Hazard Category	H-code source	Endpoint Band
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Respiratory and Skin Sensitization				
Germ Cell Mutagenicity				
Carcinogenicity				
Toxic to Reproduction				
Specific Target Organ Toxicity	H335	3	GESTIS	No Band

**Most protective band:  
Band C**

## TIER 1 RESULT

- Based upon the Tier 1 banding process, the chemical should be in **Band C**.
- Tier 2 is recommended.

# TIER I EVALUATION

- Compared bands obtained from Tier I process for 744 chemicals with full shift OELs from the following authoritative bodies:
  - NIOSH Recommended Exposure Limits (RELs)
  - OSHA – Permissible Exposure Limits (PELs)
  - ACGIH– Threshold Limit Values (TLVs)
  - AIHA – Workplace Environmental Exposure Levels (WEELs)
  - California OSHA Program (Cal/OSHA) – PELs
  - German Maximale Arbeitsplatz-Konzentration (MAK)
- The overall rate of Tier I bands being at least as protective as the OEL was 91.5% (combined vapor and particulate).
- This exceeds our original goal of 80%.
- It is recommended to proceed to Tier 2
  - GHS hazard codes may not be as up-to-date as the literature.
  - Some H-codes (e.g., Cancer codes) automatically lead to band E

## MORE THAN A BAND

- Identify potential health effects and target organs
- Identify health risks to improve health communication
- Inform implementation of control interventions
- Inform medical surveillance decisions
- Provide critical information in a timely fashion



# DISSEMINATION

- Occupational safety and health professionals who serve small- and medium-sized businesses
- Stakeholders from multiple organizations, including organized labor, industry safety and health professionals, and government agencies
  - Feedback is overwhelmingly positive
  - Confirmed need for a banding approach and tool
  - Suggestions for improvement – simplicity and training



# GUIDANCE

## The National Institute for Occupational Safety and Health (NIOSH)

Workplace Safety and Health Topics

**Occupational Exposure Banding**

Purpose of Occupational Exposure Banding

Approach to Occupational Exposure Banding

Differences between Control Banding and Occupational Exposure Banding

Resources

References

Related Topics

- Control Banding
- Occupational Exposure Banding e-Tool
- Prevention through Design

Promoting productive workplaces through safety and health research



### OCCUPATIONAL EXPOSURE BANDING



#### Overview

**Occupational exposure banding**, also known as **hazard banding**, is a process intended to quickly and accurately assign chemicals into specific categories (bands), which correspond to a range of exposure concentrations designed to protect worker health. These bands are assigned based on a chemical's toxicological potency and the adverse health effects associated with exposure to the chemical [McKernan et al. 2016]. The output of this process is an **occupational exposure band (OEB)**. Occupational exposure banding has been used by the pharmaceutical sector and by some major chemical companies over the past several decades to establish exposure control limits or ranges for new or existing chemicals that do not have formal **Occupational Exposure Limits (OELs)** [Naumann et al. 1996]. The **National Institute for Occupational Safety and Health (NIOSH)** has proposed a process that could be used to apply occupational exposure banding to a broader spectrum of chemicals used in occupational settings. The proposed NIOSH occupational exposure banding process utilizes available, but often limited, toxicological data to determine a potential range of chemical exposure levels that can be used as targets for exposure controls to reduce risk among workers [McKernan and Seaton 2014]. Through multiple phases of evaluation of the occupational exposure banding process, NIOSH has ensured the accuracy and reliability of the OEBs.



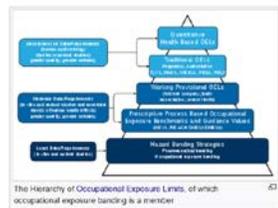
## Occupational exposure banding

From Wikipedia, the free encyclopedia

**Occupational exposure banding**, also known as **hazard banding**, is a process intended to quickly and accurately assign chemicals into specific categories (bands), each corresponding to a range of exposure concentrations designed to protect worker health. These bands are assigned based on a chemical's toxicological potency and the adverse health effects associated with exposure to the chemical.<sup>[1]</sup> The output of this process is an **occupational exposure band (OEB)**. Occupational exposure banding has been used by the pharmaceutical sector and by some major chemical companies over the past several decades to establish exposure control limits or ranges for new or existing chemicals that do not have formal OELs.<sup>[2]</sup> Furthermore, occupational exposure banding has become an important component of the hierarchy of Occupational Exposure Limits (OELs).<sup>[3]</sup>

The U.S. National Institute for Occupational Safety and Health (NIOSH) has proposed a process that could be used to apply occupational exposure banding to a broader spectrum of occupational settings. The proposed NIOSH occupational exposure banding process utilizes available, but often limited, toxicological data to determine a potential range of chemical exposure levels that can be used as targets for exposure controls to reduce risk among workers.<sup>[4]</sup> An OEB is not meant to replace an OEL, rather it serves as a starting point to inform risk management decisions.<sup>[5]</sup>

- Contents** [hide]
- Purpose
  - Assignment process
  - Limitations
  - Control banding versus exposure banding
  - References
  - External links



Occupational Exposure Banding – A conversation with Lauralynn Taylor McKernan, ScD, CIH

NIOSH

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Published on Mar 30, 2017  
 Lauralynn Taylor McKernan (CAPT), explains the new proposed NIOSH occupational exposure banding methodology and the impact it could have on the occupational safety and health field. Occupational exposure banding is a process of quickly and accurately assigning chemicals into specific categories (bands). These bands are assigned based on a chemical's potency and the adverse health effects associated with

## Draft Current Intelligence Bulletin: The Occupational Exposure Banding Process: Guidance for the Evaluation of Chemical Hazards; Notice of Public Meeting; Request for Comments

A Notice by the Centers for Disease Control and Prevention on 03/15/2017

This document was corrected by an document published on 03/30/2017. [VIEW CORRECTION](#)

**PUBLISHED DOCUMENT**

**AGENCY:**  
 National Institute for Occupational Safety and Health (NIOSH) of the Centers for Disease Control and Prevention (CDC), Department of Health and Human Services (HHS).

**ACTION:**  
 Notice of public meeting and availability of draft document for public comment.

**SUMMARY:**  
 The National Institute for Occupational Safety and Health (NIOSH) of the Centers for Disease Control and Prevention (CDC) announces the availability of a draft Current Intelligence Bulletin entitled *The Occupational Exposure Banding Process: Guidance for the Evaluation of Chemical Hazards* for public comment. NIOSH is seeking comments on the draft document and plans to have a public meeting to discuss the document. The draft document can be found at [www.regulations.gov](http://www.regulations.gov) by entering CDC-2017-0028 in the search field and clicking "Search."

**DOCUMENT DETAILS**

Printed version: PDF

Publication Date: 03/15/2017

Agencies: Centers for Disease Control and Prevention

Dates: A public meeting will be held on Tuesday, May 23, 2017, from 9:00 a.m. to 3:00 p.m. Eastern Time, or until the last public presenter has spoken, whichever occurs first. Please note that public comments may not be received before the time indicated following the last call for comments. Members of the public who wish to provide public comments should plan to attend the meeting at the start-time listed. Electronic or written comments must be received by June 13, 2017.

## NIOSH Occupational Exposure Banding e-Tool (DRAFT)

Promoting productive workplaces through safety and health research



CDC - NIOSH - OEB e-Tool Home - Tier One

**Tier One** [Log Off](#)

Please note that the following hazard codes will not be used for Tier 1 Banding: H200's (physical hazards), H303, H305, H313, H316, H320, H333, H335, H336, H362, and H400's (environmental hazards). If a chemical has been assigned any of these codes, they will not contribute to the Tier 1 band assignment.

**Chemical Information**

Chemical Name:

CAS Number:

Physical State:

- Liquid/Vapor
- Particles
- Liquid/Vapor & Particles

**Acute Tox** **Skin Corr/Irr** **Eye Damage** **Resour/Skin Sensitization** **Germ Cell Mut.** **Carcinogenicity** **Reproductive Tox** **STDT**

**Skin Corrosion/Irritation** [Clear Selection](#)

Select	Hazard Category	Hazard Code
<input type="radio"/>	1	314
<input type="radio"/>	1a	314
<input type="radio"/>	1b	314
<input type="radio"/>	1c	314
<input type="radio"/>	2	315

[Submit Tier One](#)

**Related Information**

- NIOSH Pocket Guide
- NIOSH OEB Topic Page



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## Tier One

Log Off

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[Acute Tox](#)

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### Acute Toxicity

Select	Hazard Category	Hazard Code	
<input type="checkbox"/>	1	300	Oral
<input type="checkbox"/>	2	300	Oral
<input type="checkbox"/>	3	301	Oral
<input type="checkbox"/>	4	302	Oral

## PROJECTED SUCCESS

- Automating the e-Tool and finalizing banding guidance
- Overcoming the public health challenge of protecting workers from the myriad chemicals lacking guidance
- Partnering with AIHA and ASSP for initial dissemination and continuing widespread use in the occupational safety and health community

## PARTNERSHIP ACTIVITIES

- AIHA Body of Knowledge Occupational Exposure Banding Workgroup Meeting (October 2017)
- Presentations at AIHA Fall Conference (October 2017)
- AIHA Exposure and Control Banding Committee
- AIHA OEB User Workgroup?
- Synergist Article (May 2018)
- IOHA (September 2018)

# SUMMARY

- Innovative approach to provide guidance prescriptive enough to be used by small- and medium-sized establishments
- Draft Occupational Exposure Banding process to provide guidance for chemicals without OELs
- Accompanying electronic tool (e-Tool) also created

FEDERAL REGISTER  
The Daily Journal of the United States Government

Notice

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NIOSH Occupational Exposure Banding e-Tool (DRAFT)

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What's New?

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Chemical Information  
Chemical Name:  #and  
CAS Number:  Presentation:

Physical State  
 Liquid/Vapor  
 Particle  
 Liquid/Vapor & Particles

Skin Corrosion/Irritation

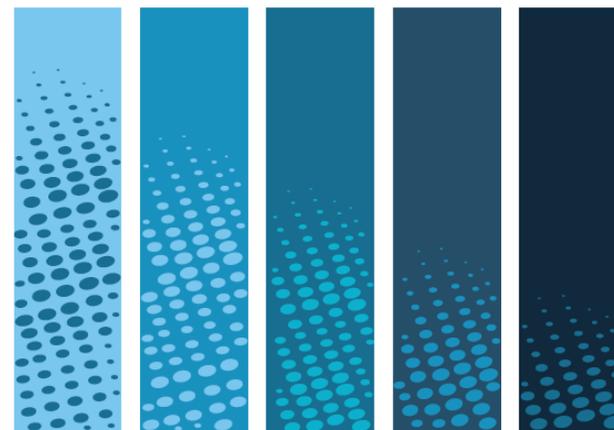
Select	Hazard Category	Hazard Code
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<input type="radio"/>	1a	314
<input type="radio"/>	1b	314
<input type="radio"/>	1c	314
<input type="radio"/>	2	315

# OEB TEAM MEMBERS

- Jane Chen, M.S.
- Stephen J. Gilbert, M.S.
- Thomas J. Lentz, Ph.D.
- Andy Maier, Ph.D., CIH, DABT
- Lauralynn Taylor McKernan, Sc.D., CIH,
- Pranav Rane, M.P.H
- Melissa Seaton, M.S.
- Christine Whittaker, Ph.D.

TECHNICAL REPORT

The NIOSH Occupational Exposure  
Banding Process for Chemical Risk  
Management



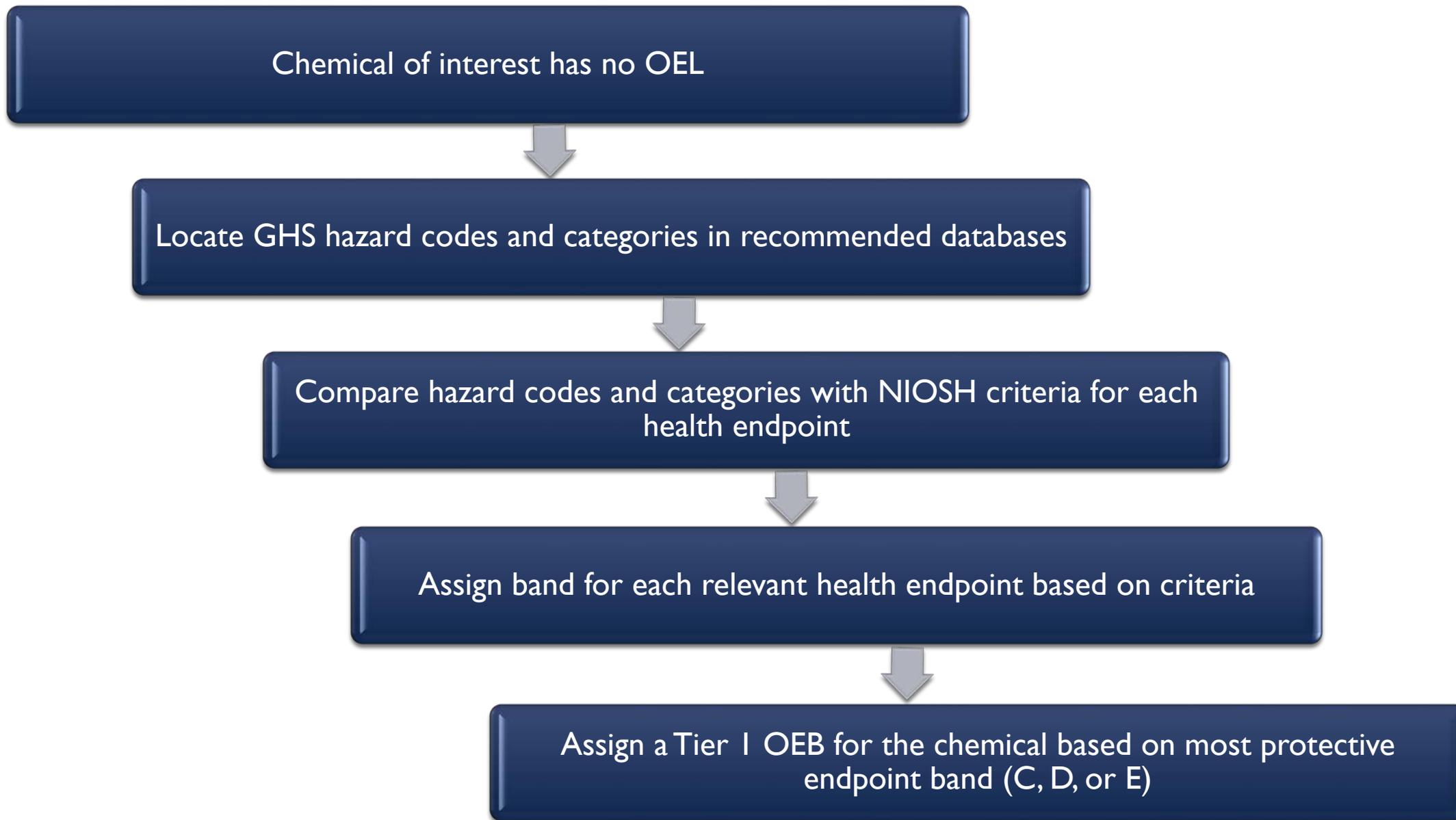
## QUESTIONS FOR THE BOARD OF SCIENTIFIC COUNSELORS

- What additional dissemination strategies should NIOSH consider to promote occupational exposure banding?
- Is there value in exploring additional applications for occupational exposure banding (e.g., emergency response, dermal exposures)?
- Are there other groups who could benefit from or assist NIOSH with research efforts with occupational exposure banding?

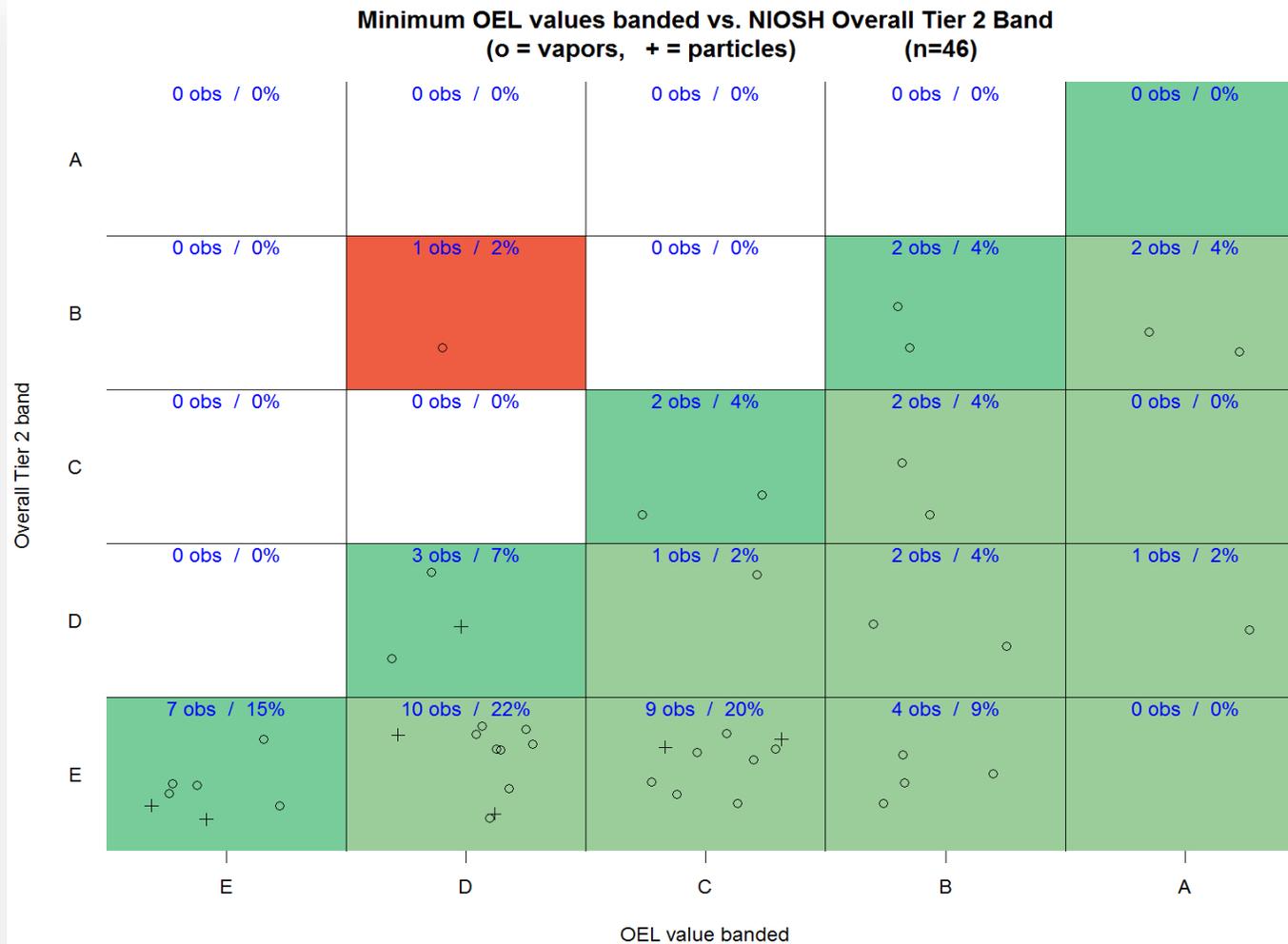
# SUPPLEMENTARY SLIDES



THE FINDINGS AND CONCLUSIONS IN THIS PRESENTATION HAVE NOT BEEN FORMALLY DISSEMINATED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND SHOULD NOT BE CONSTRUED TO REPRESENT ANY AGENCY DETERMINATION OR POLICY.



# TIER 2 EVALUATION



# EXPECTED PROJECT OUTPUTS

- NIOSH guidance document
- Sources of Information Summary
- Tools to facilitate finding and evaluating hazard data and assign chemicals to hazard bands
- Electronic tools to help users create OEB online