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Toxic Endpoint Analysis PowerPoint Presentation

Madison Michelle Snell, Courtney Jean Pruitt, Kelsey Leigh Forde Curran

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550

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Madison Michelle Snell
Courtney Jean Pruitt
Kelsey Leigh Forde Curran
Safety Basis Department (04126)
Sandia National Laboratories
P.O. Box 5800
Albuquerque, New Mexico 87185-MS0794

Abstract

This presentation, developed in Microsoft PowerPoint®, communicates the results of a Toxic Endpoint Analysis undertaken by the Safety Basis Department (01426) at Sandia National Laboratories/New Mexico.

The purpose of the analysis is to compare the toxic endpoints (e.g., ERPG-2, ERPG-3, AEGL-2 AEGL-3, PAC-2, and PAC-3) at both the 15-minute and the 60-minute release periods against the existing Industrial Facilities Safety Basis (IFSB) Guidance Protocol for classifying facilities at Sandia National Laboratories (SNL). In this analysis, specific toxic chemicals are modeled with exposure limits at 100 meters (m) to understand the impacts on facility hazard classification.



NOMENCLATURE

AEGL	Acute Emergency Guideline Levels
AIHA	American Industrial Hygiene Association
°C	degrees Celsius (temperature)
DOE	Department of Energy
EPA	Environmental Protection Agency
ERPG	Emergency Response Planning Guideline
IFSB	Industrial Facility Safety Basis
min	minutes
NNSA	National Nuclear Security Administration
PAC	Protective Action Criteria
PHS	Primary Hazard Screening
SCAPA	Subcommittee on Consequence Assessment and Protective Action
SNL	Sandia National Laboratories
SNL/NM	Sandia National Laboratories/ New Mexico



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Purpose

- Compare the ERPG-2, ERPG-3, AEGL-2, AEGL-3, PAC-2, and PAC-3 at 15-minute and 60-minute release times to the current classification criteria (i.e., ERPG-3 at 15 minutes)
- Present the potential impacts of the updated protocol on the facility hazard classification.
- Provide a report for further analysis by a qualified analyst.



Toxic Endpoints

AEGLs – Environmental Protection Agency
(EPA)

1. Include susceptible individuals.
2. Level “above which” exposed individuals could experience certain health effects.

ERPGs – American Industrial Hygiene
Association (AIHA)

1. Exclude “sensitive” individuals.
2. Level “below which” exposed individuals are not expected to experience certain health effects.

*PAC Dataset – published in SCAPA



Results

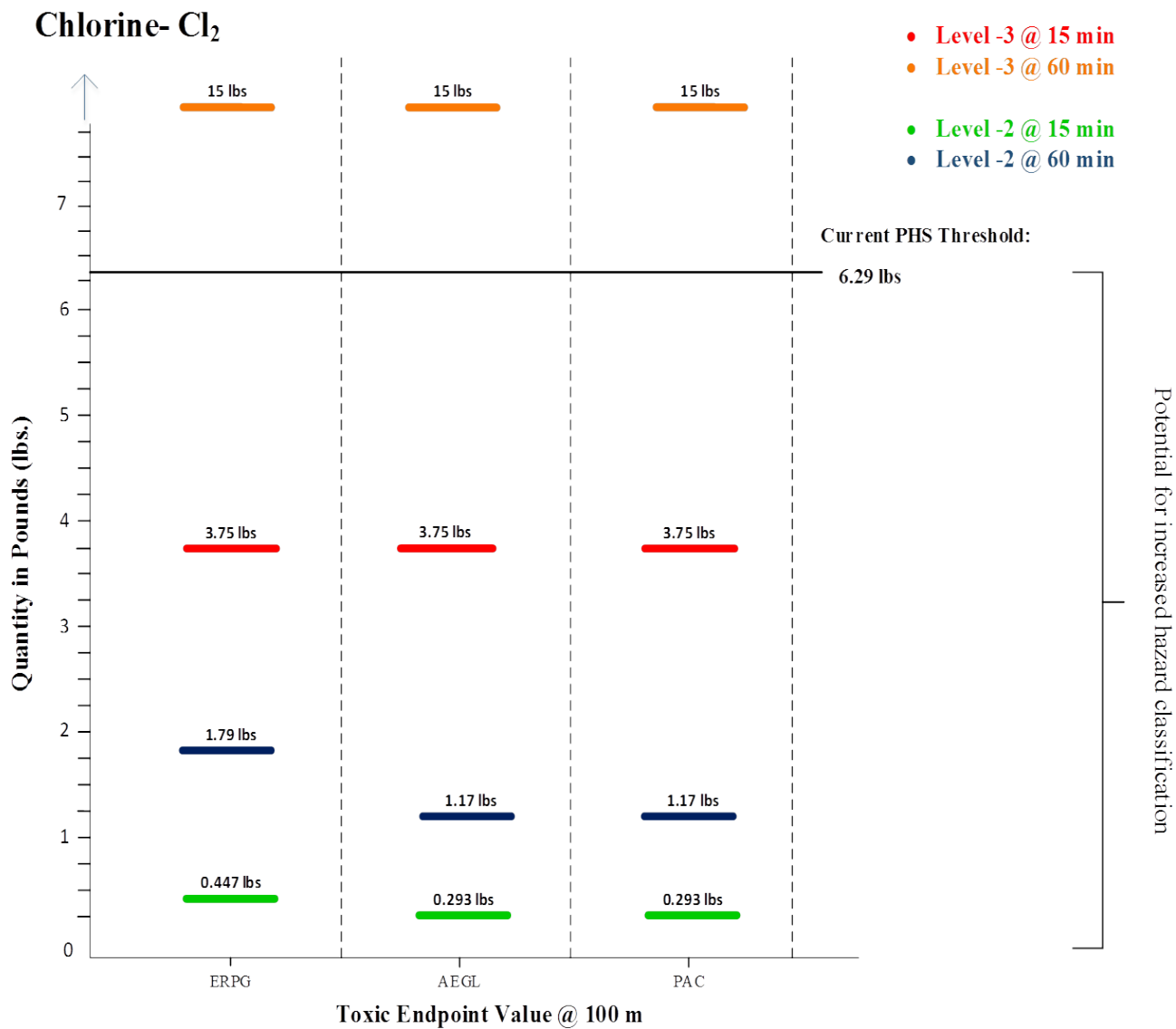
- Currently use ERPG-3 at 15 minutes for the screening threshold.
- PAC-3 at 60 minutes results in no/limited significant change to threshold values.
- Acceptable to use PAC-3 at 60 minutes
 - More accurate per SCAPA
 - Includes the general population, including susceptible receptors.
 - Readily available values



Toxic Endpoint Values for Selected Materials



Figure 1. Chlorine





Hydrogen Bromide - HBr

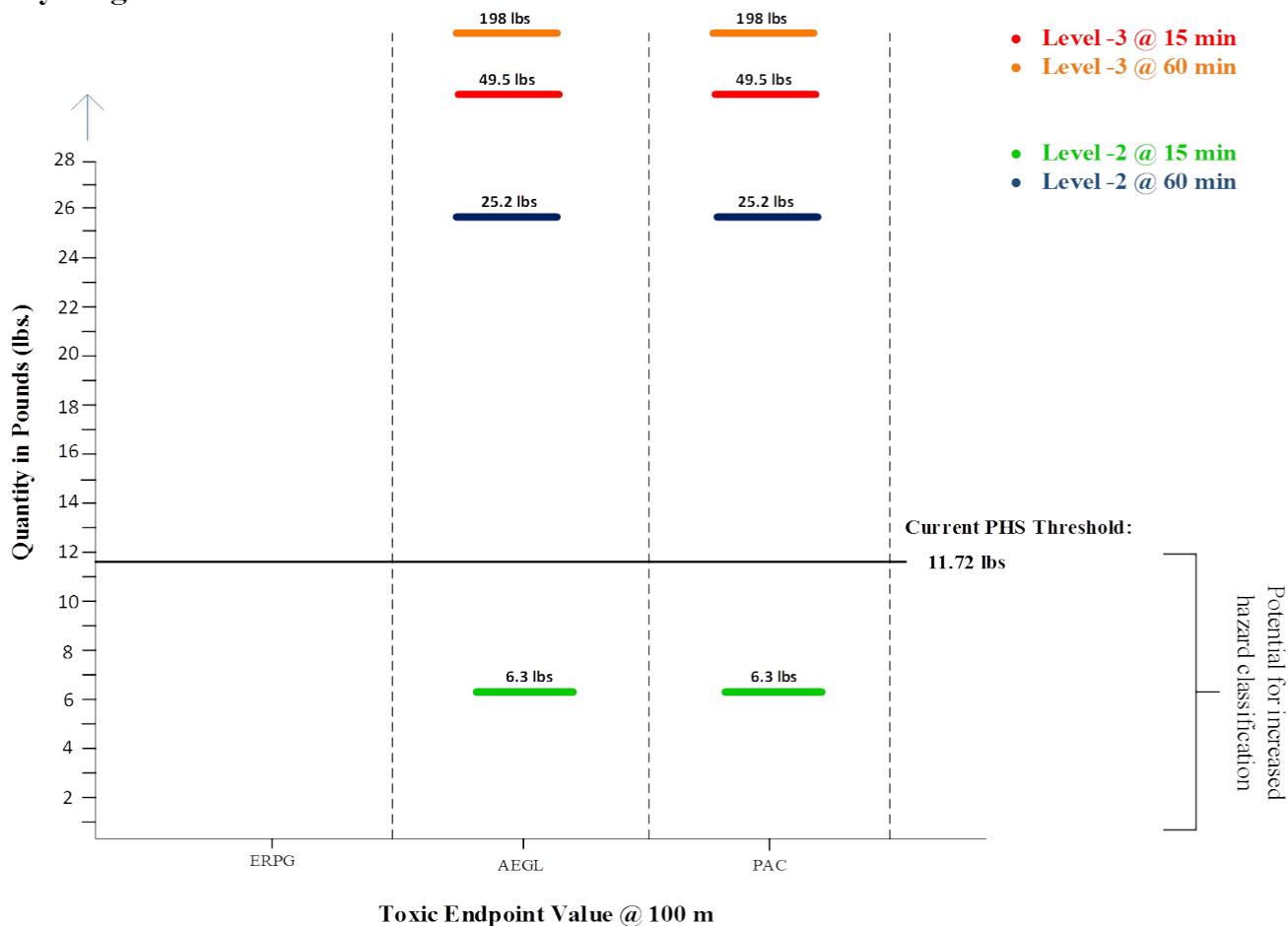


Figure 2. Hydrogen Bromide



Boron Trichloride – BCl_3

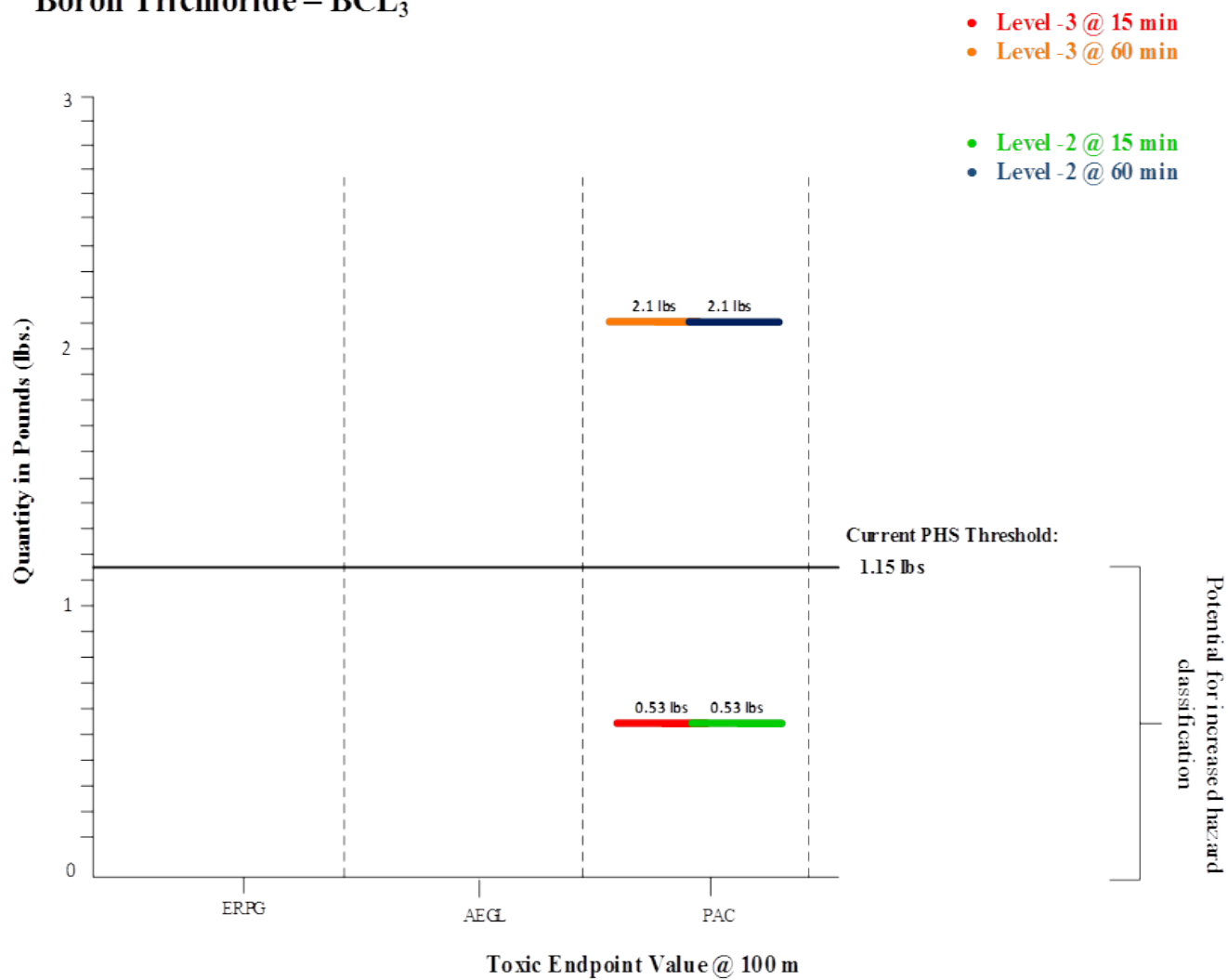


Figure 3. Boron Trichloride



Carbon Monoxide - CO

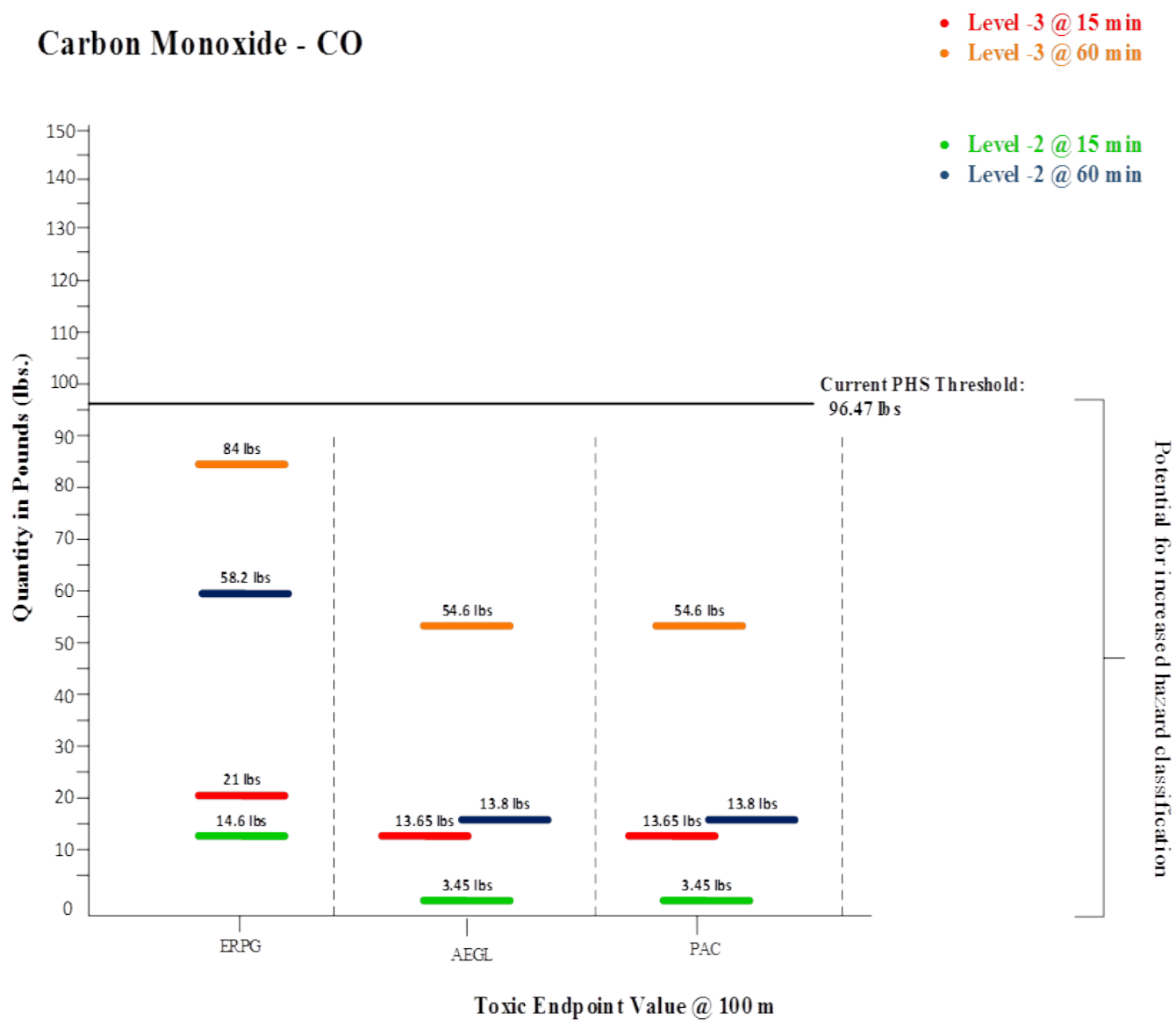


Figure 4. Carbon Monoxide



Recommendations

- Use PAC-3 at 60 minutes.
- Evaluate all listed toxics at PAC-3, 60 minutes.
- Run CIS toxic endpoint reports using the new threshold values.
- Complete the hazard classification analysis based on CIS data, and using the new threshold values.
- Engage a qualified analyst to make the final decision.



Follow-up Questions

- F-stability class
- Importance of inversion height
- Co-located worker < 100 m



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