

Study on Surface Contamination with Heavy Metals at BNL Laboratory Locations

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Surface Contamination at BNL

The IH Group has been conducting surface wipe sampling for metals throughout BNL over several years.

In the process, we have documented elevated levels in suspect areas. We have also identified some very unexpected results.

Monitored areas include:

- **Laboratories**
- **Weigh Stations**
- **Soldering Stations**
- **Lead Storage locations**
- **Warehouses**
- **Shops**

SHSD Guidance

- OSHA has no quantitative limits, but requires unspecified housekeeping levels to: prevent ***re-entrainment and exceedance of airborne PEL levels***; and limit other entry routes such as ingestion, which increase total ***body burden***.
- SHSD guidance was established by requirements from DOE and adopted from industry
- Two-tiered approach
 - **Lower Level (Release Criteria)** indicating the level below which an area is suitable for public entry/use.
 - **Higher Level (Housekeeping)** indicating levels above release criteria up to a maximum allowable concentration
 - Need worker communication of hazard
 - Need worker training

SHSD Policy Basis

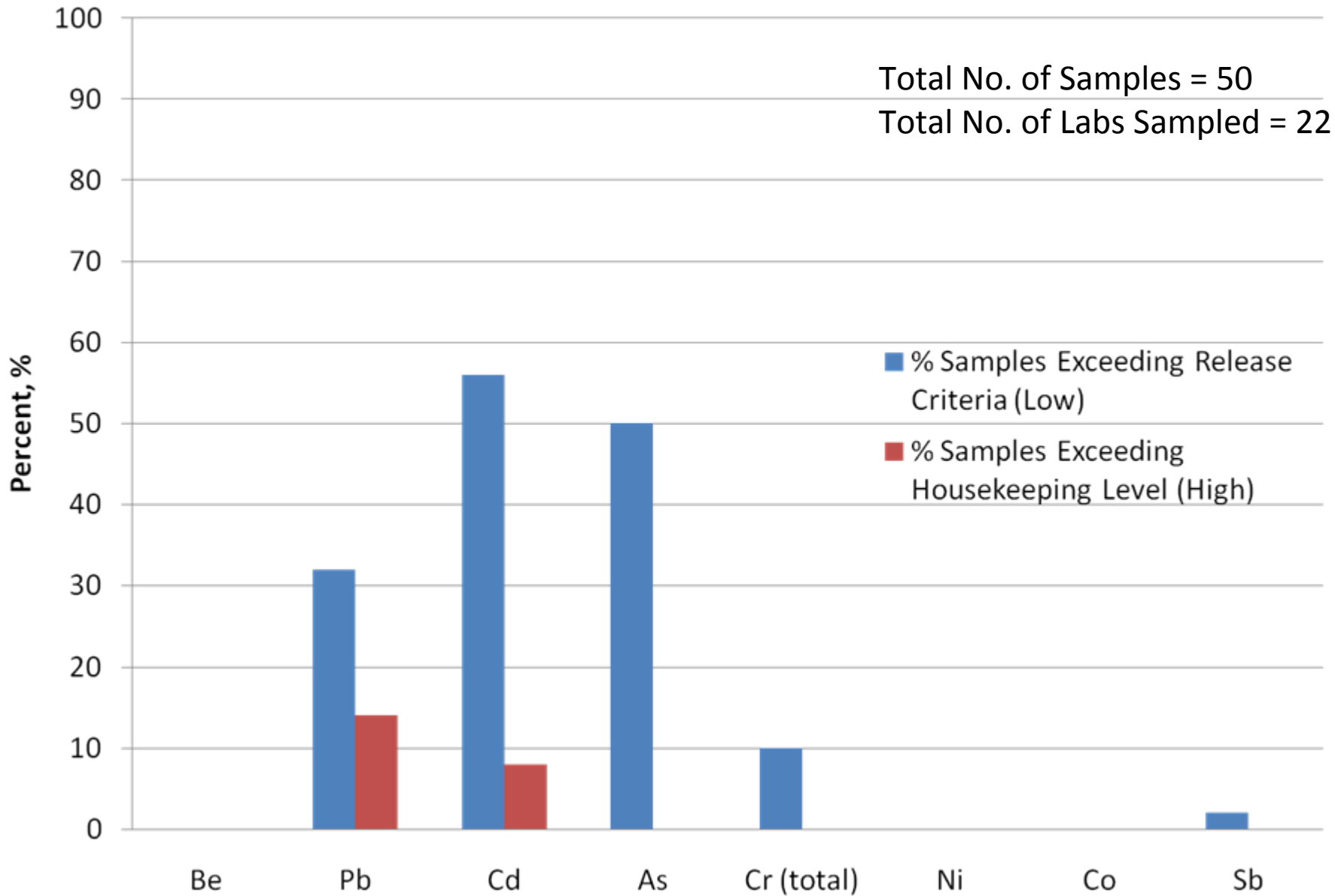
- Beryllium, Mandatory Limits (DOE 10 CFR 850.30, .31)
- Lead, Recommended (HUD/EPA) requirements for protecting workers in public housing, lead abatement industry; prevents triggering OSHA lead standard, stringent regulated area rules, prevents workers from developing high lead levels in blood.
- Arsenic, Cadmium, Chromium (III/ VI), Cobalt, Nickel- Recommended surface levels *calculated* based on airborne exposure (TLV or PEL) and DOE Be standard

Sources of Surface Contamination

- **Soldering Stations (Lead)**
 - Sampling of 54 locations (Fall 07) showed that ~40% of the stations had lead levels higher than Housekeeping L.
- **Analytical Balances**
 - Bldg 703W (25%) exceeded Low Levels for cobalt, nickel, antimony
 - Bldg 463 exceeded High Level for Arsenic
 - Bldg 555 (25%) near or exceeding High L. for Lead
- **Materials Research Labs (480, 815)- refer to charts**
 - Legacy, poor housekeeping practices
- **Hallway outside of shop area (703)**

Characterization of R&D Labs for Metals - Building 480

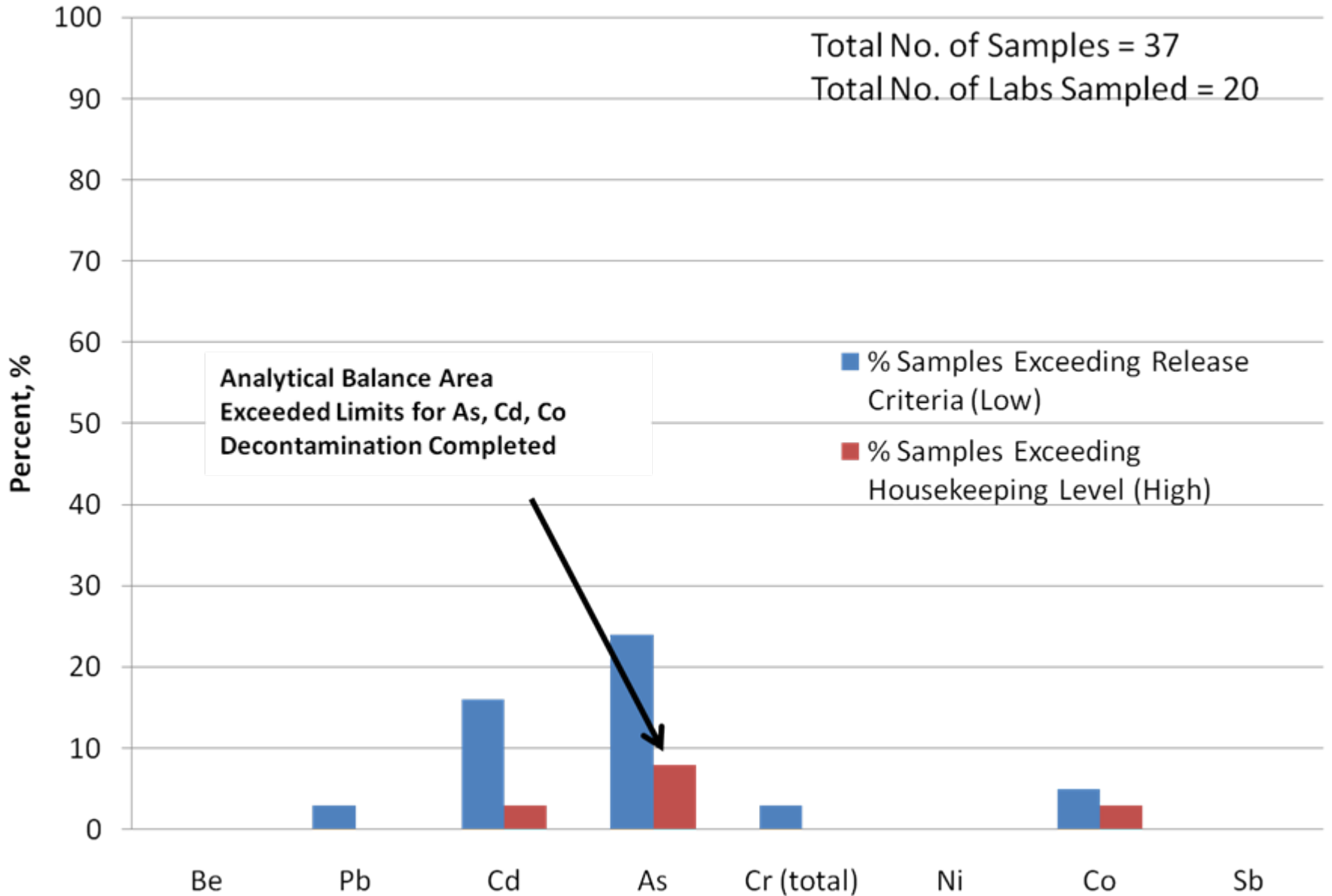
Total No. of Samples = 50
Total No. of Labs Sampled = 22



Characterization of R&D Labs for Metals - Building 463

Total No. of Samples = 37

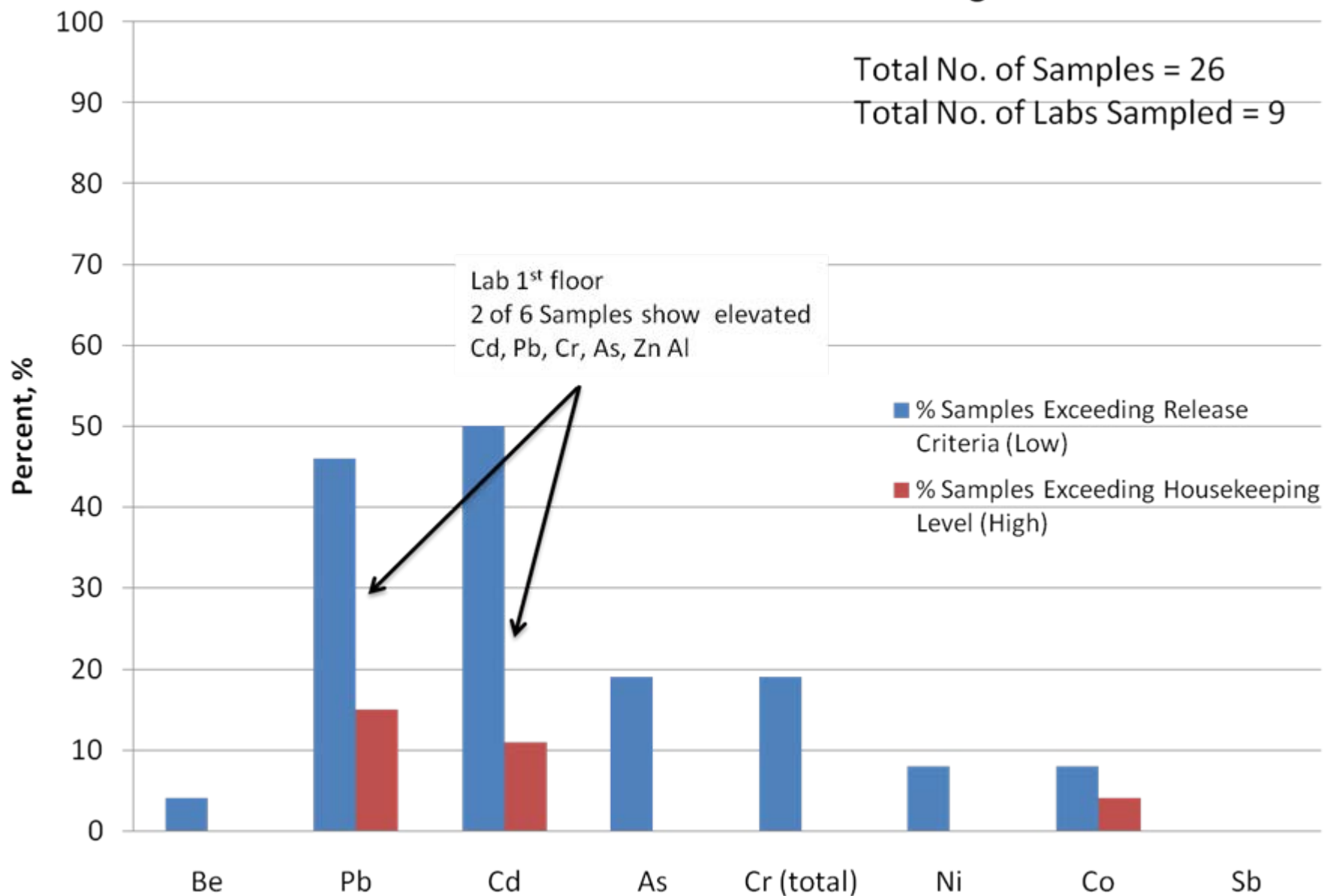
Total No. of Labs Sampled = 20



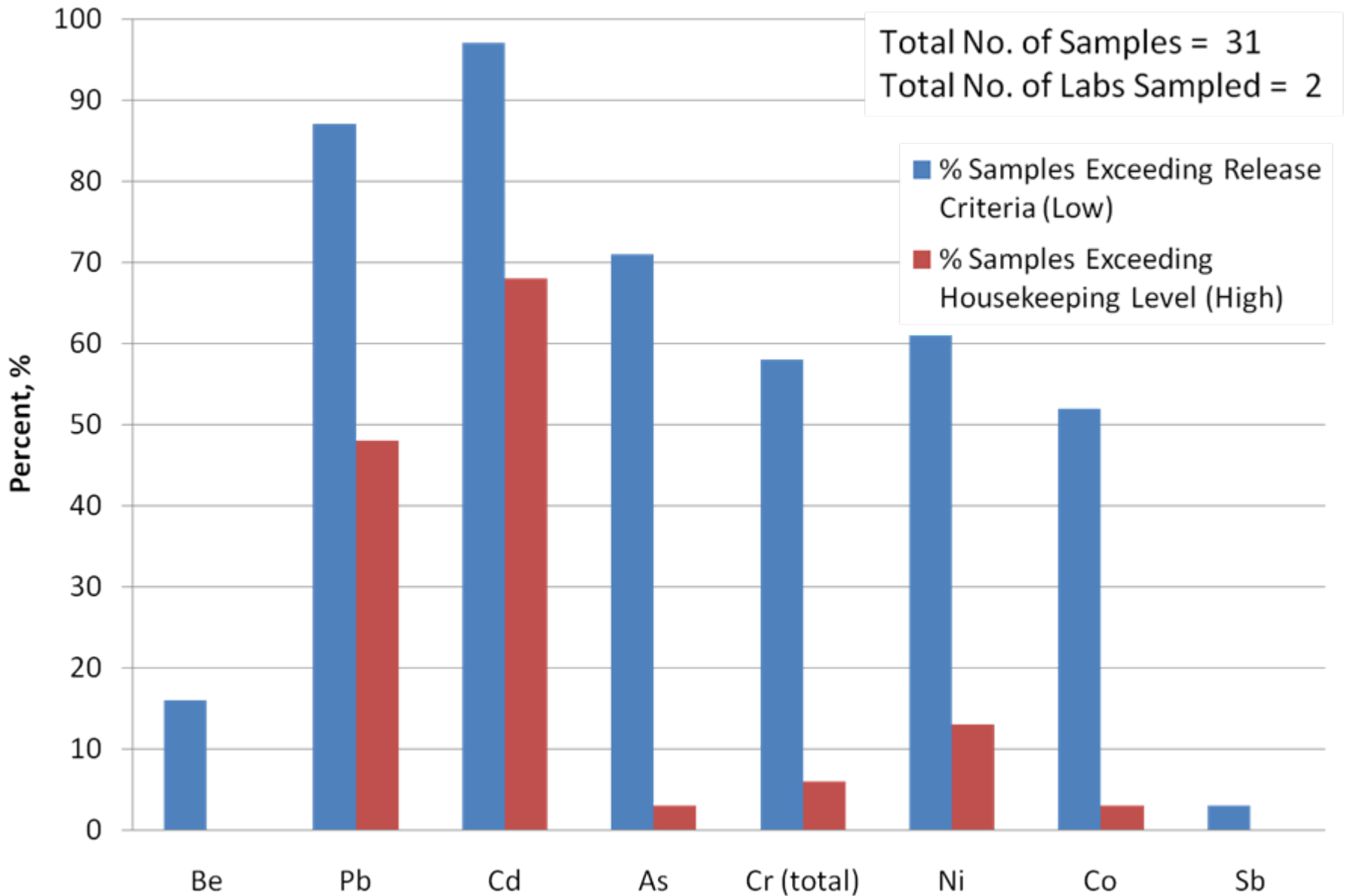
Characterization of R&D Labs for Metals - Building 555

Total No. of Samples = 26

Total No. of Labs Sampled = 9



Characterization of R&D Labs for Metals - Building 815 D-wing



Decontamination Projects (2007-08)

Lead, Cadmium

- Lab decommissioning, equipment decon at the end of experiment due to extensive contamination
 - Exceeded Pb 2-10 x High Level, Cd 3-18 x HL
- Lab/machine shop
 - Cd exceeded 20-30 x High Level, Pb 2-37 x HL
- Experimental process, ongoing
 - Cd exceeded 200 x High Level, periodic resurveys indicate reasonable reduction levels

Lab Renovations (2009)/ Existing Labs

- Bldg 815 D-wing, Bldg 480 East lab renovations—metals exceeding Release & Housekeeping Levels
Work planning to address contamination to toxic metals and carcinogens; clean areas prior to renovation activities to minimize exposure to support staff and contractors
- C-wing representative labs – Pb, Cr, Ni, Co exceeding Housekeeping levels
Minimize exposure by addressing appropriate PPE, improved lab practices, hand washing, no eating or drinking in labs.

Conclusion

Follow existing lab rules such as:

- All soldering operations that use leaded solder, weigh stations, need to observe good housekeeping, conduct periodic surface decontamination or use disposable blotter paper/ foil
- Machine shops and materials research labs, in addition, consider step-off pads for containing contamination to within immediate areas (remediation)
- PPE: lab coat, safety glasses, long pants, enclosed shoes
- Wash hands prior to smoking, eating or drinking
- Legacy contamination must be considered in demolition, renovations of laboratories
- Segregation of lab/work and office spaces