



# Chromium Ore Processing Residue (COPR)

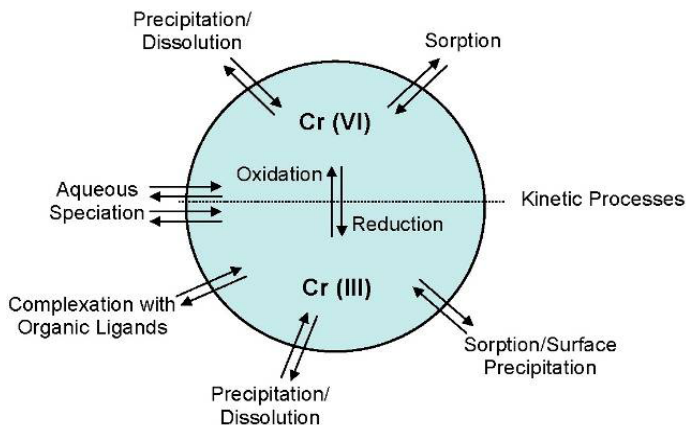
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## Overview

- ❑ **COPR:** Industrial byproduct used worldwide as structural fill.
- ❑ **Chromium:** There are concerns regarding environmental fate of Cr and the transport of hazardous Cr(VI).
- ❑ **Site:** Research focuses on material deposited at Dundalk Marine Terminal in Baltimore, Maryland.

## Complex Cr Geochemistry



## COPR Characteristics

**Gray Black (GB):** deposited state of COPR; a loose, granular, poorly-graded sand.

**Hard Brown (HB):** weathered state of COPR; a very dense, cemented material.



Expansion

Infrastructure  
Damage



## Research Objectives

### Chemical:

- ❑ Chromium leaching behavior.
- ❑ Vadose zone transport mechanisms of Cr(VI).

### Physical:

- ❑ Geotechnical properties.
- ❑ Particle size effects on weathering process.
- ❑ Expansion mechanism associated with GB to HB transformation

### Mineralogical:

- ❑ Quantification of mineral phases.
- ❑ Determination of amorphous phase composition.

## Current Tests

**Chemical:** TCLP, SPLP, acid/alkaline digestions.

**Physical:** specific gravity, compaction, hydraulic conductivity, water retention, wet/dry pressure plate weathering.

**Mineralogical:** X-ray powder diffraction, x-ray fluorescence.

## Future Experiments

### Wet/Dry Columns:

1. Long term leaching study.
2. Vadose zone Cr(VI) transport.
3. Flexible wall expansion quantification.

### Swell Tests:

- ❑ Quantify free/confined swell.

### Pressure Plates:

- ❑ Laboratory GB to HB conversion.