Use of Treated Wood & Alternative Materials for Building Overwater & Waterfront Structures

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Outline

- Protection of overwater & waterfront structures
  - Treated wood & alternative materials
  - Coatings & wrappings
- Use of treated wood
  - Recommended preservative types
  - Preservative retention level
  - Design features to minimize abrasion

Aluminum gangway & railings

Outline, continued

- Where to avoid treated wood
- Preservative risk assessment
- Best Management Practices
  - Construction-phase
  - Post-construction

Treated wood decking, piles, & framework

Overwater & Waterfront Structures

- Overwater structures
  - Pier, wharf, dock, boat launch, or bridge
  - In-water & above-water components
- Waterfront structures
  - Bulkhead, esplanade, or boardwalk

Treated wood boat launch

Treated wood dock

Threats to Building Materials in Aquatic Environments

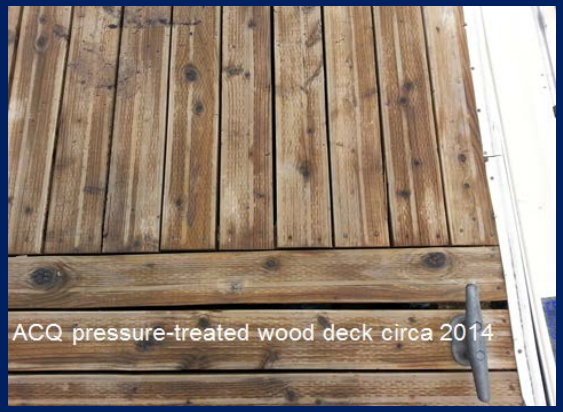
- Protect against:
  - Insects (termites)
  - Rot (fungus)
  - Rust (if steel)
  - Impacts & stresses
  - Marine borers
  - Corrosive saltwater

Creosote-treated wood piles

Protection of Building Materials in Aquatic Environments

- Pressure-treated wood preservatives
- Alternative materials
- Coatings & wrappings
- Design features

Plastic-wrapped steel-encased concrete piles



Treated wood decking

Water Quality Impacts of Treated Wood

- Leach toxic pollutants
  - Copper, arsenic, zinc – from copper-based
  - PAHs (hydrocarbons) – from creosote
  - Dioxins – from pentachlorophenol
- Aquatic impacts
  - Water column & sediment
  - Bioaccumulate in aquatic life
  - Low concentrations may impact fish & invertebrates

Creosote- treated piles

Alternatives to Treated Wood Piles

- Concrete, steel, or fiber-reinforced polymer composites, or combos of materials

✓ Recommend: Construct piles of alternative materials unless engineering reason for treated wood

Pre-cast concrete piles

Fiberglass polymer piles

Alternatives to Treated Wood Decking

- Concrete, fiberglass, metal, plastic, wood-plastic composites (Trex), or naturally decay-resistant wood (redwood, red cedar, ipe, greenheart, maybe Douglas fir?)

✓ Recommend: Prioritize use of alternative materials for decking, where feasible

Composite decking on redwood framework

Metal grating in foreground, plastic decking in background

Pile Wrappings & Coatings

- Wrappings & sleeves:
  - Plastic (HDPE, PVC), fiberglass
- Coatings:
  - Polyurea, polyurethane, epoxy
- Jackets (epoxy or concrete fill):
  - Fiberglass, PVC, nylon

✓ Recommend: Seal treated wood piles with inert wrapping or coating
  - Below waterline to above high-water

✓ Recommend: Coating or wrapping on steel or concrete piles must be inert

HDPE-wrapped treated wood pile

Pile repair using epoxy-filled fiberglass jacket

Sealer on Treated Wood Decking

- Penetrating sealer (semi-transparent stain)
  - Toxic-free, water-based
- Durable epoxy sealer

✓ Recommend: Consider applying penetrating sealer to treated wood decking

✓ Recommend: During maintenance, minimize leaching & release of treated wood particles

Epoxy sealer


Treated wood decking

Wood Preservatives for Saltwater or Brackish Water Immersion

✓ Recommend:

Metal-arsenate preservatives:

✓ ACZA: Ammoniacal Copper Zinc Arsenate

- More common, treats Douglas fir

✓ CCA: Chromated Copper Arsenate

- Commercial & industrial uses only; can't treat Douglas fir

X Avoid:

X Creosote: Avoid in new structures

✓ Creosote: OK if replacing a few wood piles in copper-impaired waterway, & piles wrapped

Wood Preservatives for In/Over Freshwater, or Saltwater Splash

- ✓ Recommend if wood NOT in human contact:

  Metal-arsenate preservatives: (leach less copper)

  - ✓ ACZA: Treats Douglas fir – special order?
  - ✓ CCA: Commercial & industrial only; can't treat Douglas fir

- ✓ Recommend ONLY if frequent human contact:

  Arsenic-free preservatives: (leach more copper)

  - ✓ ACQ: Alkaline Copper Quaternary – most common
  - ✓ CA: Copper Azole – not for freshwater piles
  - ✓ CuN: Copper Naphthenate – oil-based

Wood Preservatives to Avoid In/Over Freshwater, or Saltwater Splash

X Avoid: (high toxicity of nanocopper)

Micronized arsenic-free preservatives (can't treat Douglas fir)

- X MCQ: Micronized Alkaline Copper Quaternary
- X MCA: Micronized Copper Azole

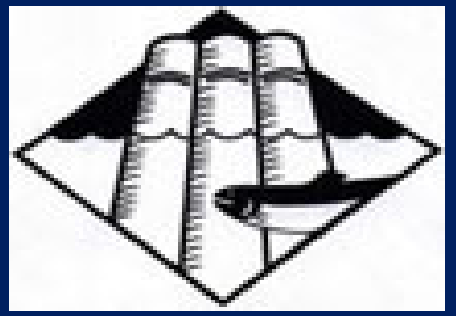
X Avoid: (toxicity & environmental persistence)

- X Pentachlorophenol: leaches dioxins
- X Creosote: leaches PAHs (hydrocarbons)

✓ Recommend: Use alternatives to treated wood in/over freshwater, or saltwater splash, where feasible

Other Treated Wood Use Tips

- Preservative retention level – Important!
  - Use lowest appropriate Use Category/retention level
    - Saltwater immersion vs. splash or freshwater
    - Difficult to replace & critical to structure
- Treated wood BMP-certified for aquatic use
  - Where available
- Design features to minimize abrasion
  - Bumpers or protective wear surface



BMP Quality Mark

Where to Avoid use of Treated Wood

- Low water circulation or flow rate
  - Typically 0.3 ft./sec. or less
- Especially copper-sensitive aquatic life
  - Salmon, trout, herring, Dungeness crab, blue mussels, abalone, oysters, sea urchins

Juvenile Chinook salmon

- Waterway impaired by preservative chemicals
  - Copper, other metals

Preservative Risk Assessment

- Screening assessment tables (WWPI):
  - Amount of treated wood (piles & decking) with various preservatives, saltwater vs. freshwater
  - Predicted to not exceed EPA's Acute Water Quality criteria at various flow rates
- Site-specific intermediate risk assessment:
  - If screening raises toxicity concern; or
  - If >30 piles and/or 3,000 ft^2 above-water treated wood
  - Provide info on expanded environmental parameters
  - On-line modeling tool (Oregon State Univ.)

Best Management Practices

- Construction-phase:
  - Include BMPs specific to treated wood:
    - Contain sawdust & wood fragments
    - Careful use of field-applied topical preservatives
- Post-construction:

  Long-term use, repair, monitoring, & maintenance
  - Include BMPs specific to treated wood:
    - Avoid sanding, scraping, & pressure-washing
    - Avoid deck cleaners & brighteners
  - Monitor & replace wrappings & coatings if damaged

Contact Information

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