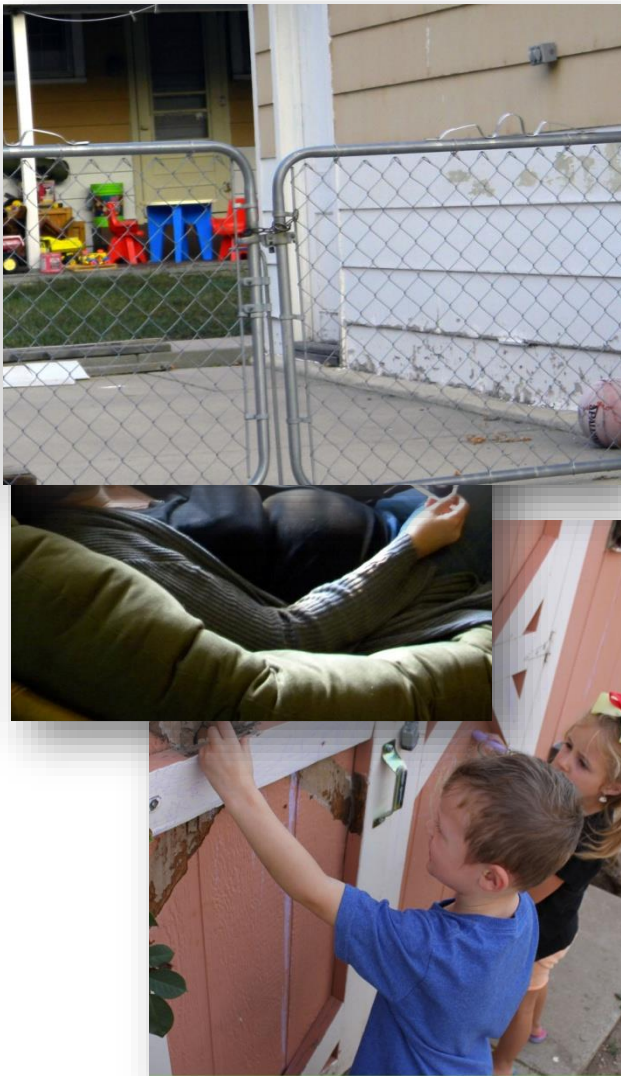


**Case Study:**  
**Effectiveness of ECOBOND® Lead Defender® to Seal and Treat Lead Paint Hazards**

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## EXECUTIVE OVERVIEW

Lead paint is reportedly found in approximately 60% of all structures in the US and increases to over 80% in the major population centers. Lead presents a major hazard and risk to children, families and workers who come in contact with lead based paint. Historically, options for dealing with lead paint have been expensive, complicated and limited to either removal or encapsulation, which is why lead paint remains a major challenge despite its sale being discounted in 1978.

A new option is now available – ECOBOND LBP, LLC (ECOBOND) is dedicated to protecting workers, children, families and the environment with our line of specialty paint products designed to address the hazards of lead dust and lead based paint in an easy to use, safe, and environmentally protective water-based paint formulation.

A comprehensive scientific study was recently conducted to summarize the successful 10-year performance record and provide independent validation ECOBOND® Lead Defender®'s ability to seal and treat lead paint hazards under the wide variety of lead paint remediation activities. Lead paint hazards included lead dust, peeling and chipping lead paint, and multiple layers of lead paint for both interior and exterior applications. The lead paint materials selected for testing were specifically selected for their multiple layers of lead paint and unusually high lead concentrations; proving ECOBOND® Lead Defender®'s robust capabilities.

Testing was conducted by an independent laboratory following US EPA test methods.

This case study provides a summary of typical use scenarios, test results, and conclusions. Section A describes six (6) typical lead paint scenarios. Section B provides independent analytical test data obtained from a US EPA NELAC-certified laboratory; and Section C provides conclusions and recommendations.

## OVERVIEW

### Health Effects of Lead

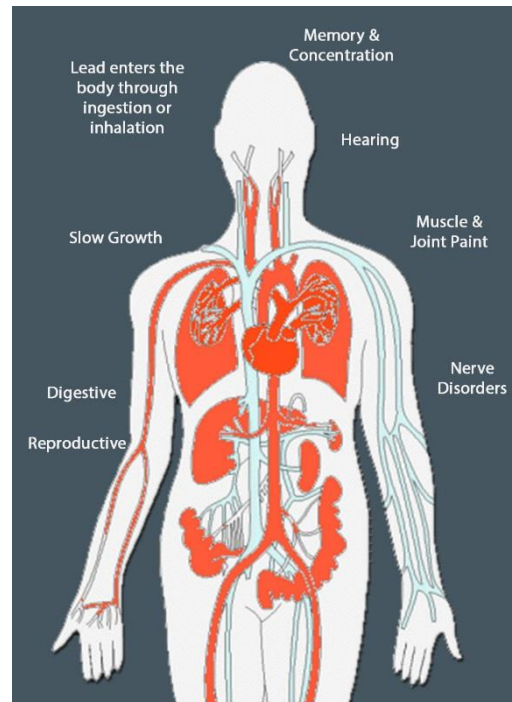
Lead affects the body in many ways. It is important to know that even exposure to low levels of lead can severely harm children. In children, exposure to lead can cause:

- Nervous system and kidney damage
- Learning disabilities, attention deficit disorder, and decreased intelligence
- Speech, language, and behavior problems
- Poor muscle coordination
- Decreased muscle and bone growth
- Hearing damage

While low-lead exposure is most common, exposure to high amounts of lead can have devastating effects on children, including seizures, unconsciousness, and, in some cases, death.

Although children are especially susceptible to lead exposure, lead can be dangerous for adults, too. In adults, exposure to lead can cause:

- Harm to a developing fetus
- Increased chance of high blood pressure during pregnancy
- Fertility problems (in men and women)
- High blood pressure
- Digestive problems
- Nerve disorders
- Memory and concentration problems
- Muscle and joint pain



### Solution

Lead paint is reportedly found in approximately 60% of all structures in the US and increases to over 80% in the major population centers. Lead presents a major hazard and risk to children, families and workers who come in contact with lead based paint. Historically, options for dealing with lead paint have been expensive, complicated and limited to either removal or encapsulation, which is why lead paint remains a major challenge despite its sale being discounted in 1978.

A new option is now available – ECOBOND LBP, LLC (ECOBOND) is dedicated to protecting workers, children, families and the environment with our line of specialty paint products designed to address the hazards of lead dust and lead based paint in an easy to use, safe, and environmentally protective water-based paint formulation.

This case study provides an overview of ECOBOND® Lead Defender®, summary of typical uses, test results, and conclusions. Section A describes five (5) typical lead paint scenarios. Section B provides independent analytical test data obtained from a US EPA NELAC-certified laboratory; and Section C provides Conclusions and Recommendations.

## WHAT IS ECOBOND® Lead Defender®?

ECOBOND® Lead Defender is a patented specialty paint product that combines a high quality acrylic latex paint formula with natural lead treatment reagents and safe proprietary paint softeners and penetrator (to enhance adhesion and permeation) to form an easy-to-use, save, and environmentally protect product that seals and treats lead paint hazards



ECOBOND® Lead Defender® is a specialty paint product formulated to seal and treat the hazards of lead based paint. It is so versatile it is used by homeowners, residential, commercial and industrial contractors, and is specified by numerous government agencies.

**Uses of ECOBOND® Lead Defender®:** Not only is ECOBOND® Lead Defender® preferred by a wide variety of users, but it is also a multi-purpose product applicable for a wide range of lead based paint projects such as:

### **Remodeling, Renovation and Painting (RRP)** (Residential and Commercial Structures)

- Interior primer and tintable topcoat (walls, doors, cabinets, and trim)
- Exterior primer (siding, trim, and exterior structures)

### **Renovation, Maintenance and Demolition** (Industrial Buildings, Bridges, Tanks, etc.)

- Prevent the spread of lead dust, treat lead dust
- Treat lead in lead paint for non-hazardous disposal

### **Prior to Lead Paint Component Removal**

- Use ECOBOND® Lead Defender® to seal and treat lead dust and lead paint prior to component removal. Through proper application of ECOBOND® Lead Defender®, removed and collected solid waste will typically provide eco-friendly disposal as non-hazardous for lead.

### **Interim Control**

- ECOBOND® Lead Defender® is allowed for use in all 50 states as [Lead Paint Interim Control](#) (42 USC 63A 4851b(13))

### **Lead Dust and Lead Paint Treatment**

- ECOBOND® Lead Defender® is specially formulated to address lead dust and lead paint issues. Its patented formula chemically converts lead in lead paint and lead dust to provide stabilization that virtually eliminates leaching of lead to the environment allowing for lower cost non-hazardous, eco-friendly waste disposal; reduces lead hazards up to 95%; and improves worker/occupant safety

Section A: Typical Lead Paint Scenarios

**Use #1 Interior Primer and Topcoat All-in-One**

**Material** Interior Door Frame coated with two layers of lead based paint (blue over white), light peeling/chipping

**Lead Levels** Up to 80,000 mg/kg (ppm)  
38.5 mg/L (TCLP)

**Application Tested** Effectiveness of ECOBOND® Lead Defender® as an **interior primer and topcoat in one**

**Application Method** One coat of ECOBOND® Lead Defender® was applied by brush, no primer was required

**Application Thickness** Allowed to dry 12 hours  
8 mil wet: 2 coats – 4 mil + 4 mil



**Use #2 Exterior Primer with Name Brand Topcoat**

**Material** Exterior Slot Siding coated with three layers of paint: one layer of white latex over lead based paint (green over yellow)

**Lead Levels** Over 100,000 mg/kg (ppm)  
28.5 mg/L (TCLP)

**Application Tested** Effectiveness of ECOBOND® Lead Defender®'s as an **exterior primer** prior to topcoat of exterior semi-gloss latex paint

**Application Method** One coat of ECOBOND® Lead Defender® was applied by roller

**Application Thickness** Allowed to dry 12 hours  
Applied one coat of exterior latex paint topcoat  
ECOBOND® Lead Defender®: 8 mil wet: 2 coats – 6 mil + 2 mil  
Name Brand Exterior Latex Topcoat: 4 mil wet



**Use #3 Primer Prior to Standard Epoxy Encapsulation**

**Material** Interior Wood Paneling coated with two layers of lead paint (white over yellow)

**Lead Levels** Up to 60,000 mg/kg (ppm)  
15.8 mg/L (TCLP)

**Application Tested** Effectiveness of ECOBOND® as an **interior primer** prior to application of standard epoxy encapsulant product

**Application Method** One coat of ECOBOND® Lead Defender® was applied by brush

**Application Thickness** Allowed to dry 12 hours  
Applied two coats of encapsulant, per product instructions  
ECOBOND® Lead Defender®: 8 mils wet: 2 coats – 6 mil + 2 mil  
Encapsulant: 14 mil wet: 2 coats – 7 mil + 7 mil



Section A: Typical Lead Paint Scenarios

**Use #4 Commercial: Seal and Treat Lead Dust and Lead Paint Prior to Demolition and Disposal**

**Material** Exterior wood siding and concrete coated with multiple layers of lead paint

**Lead Levels** Up to 114,000 mg/kg (ppm)  
72.4 mg/L (TCLP)

**Application Tested** Effectiveness of ECOBOND® Lead Defender® to **seal and treat lead dust and lead paint** prior to building **demolition** and waste disposal

**Application Method** One coat of ECOBOND® Lead Defender® was applied by commercial paint sprayer, no primer was required

Allowed to dry 12-24 hours

**Application Thickness** 10 – 12 mil wet



**Use #5 Industrial: Seal and treat lead paint chips prior to disposal**

**Material** Lead paint chips

**Lead Levels** Over 100,000 kg/mg (ppm)  
52.9 mg/L (TCLP)

**Application Tested** Effectiveness of ECOBOND® Lead Defender® to **seal and treat lead paint chips** prior to disposal

**Application Method** One coat of ECOBOND® Lead Defender® was applied by commercial paint sprayer, no primer was required

Allowed to dry 12 hours

**Application Thickness** 10 mil wet



**Use #6 Industrial: Lead dust/paint sealant and treatment prior to demolition**

**Material** Wood, cinder block, concrete, ceramic tile, and sheet rock

**Lead Levels** Over 100,000 kg/mg (ppm)  
52.9 mg/L (TCLP)

**Application Tested** Effectiveness of ECOBOND® Lead Defender® to **seal and treat lead dust & lead paint** prior to demolition

**Application Method** One coat of ECOBOND® Lead Defender® was applied by commercial paint sprayer, no primer was required

Allowed to dry 12 hours

**Application Thickness** 12 mil wet







Section B: EPA Test Procedure Analytical Results – ECOBOND® Lead Defender®

ECOBOND® Lead Defender® has been used for nearly 10 years on thousands of commercial and heavy industrial projects and more recently for residential properties. The ability of ECOBOND® Lead Defender® to seal and treat lead dust and lead in paint, including peeling and chipping paint as well as prior to lead paint component removal has been extensively tested utilizing EPA test methods (EPA 1311). The following table presents test results from this study examining multiple use scenarios for various lead paint coated materials for lead treatment and relative lead bioavailability (EPA 9200.1-86).

Note: To test the robust treatment capabilities of ECOBOND® Lead Defender®, test material selected contained extremely high lead levels of 60,000 – 100,000 mg/kg; typical residential lead levels average 10,000 – 40,000 mg/kg. Also provided below is an example of ECOBOND® Lead Defender® treatment results for typical residential lead levels with application of one coat of ECOBOND® Lead Defender® at 8 mils wet; confirming ECOBOND® Lead Defender® treatment results well below RCRA TCLP limit of 5.0 mg/l.

**Example: ECOBOND® Lead Defender® Test Results – Typical Residential Lead Levels**

Use	Application (Base Material)	Total Lead Levels (mg/kg)	Before As-Is (mg/L)	After ECOBOND® Treatment (mg/L)	% Reduction
1	<b>Primer &amp; Topcoat</b> (Interior Wood Trim)	37,000	7.3	1.2	84%

**ECOBOND® Lead Defender® Test Results – High Level Lead Treatment (TCLP)**

Use	Application (Base Material)	RCRA TCLP Limit (mg/L)	Before As-Is (mg/L)	After ECOBOND® Treatment (mg/L)	% Reduction
1	<b>Primer &amp; Topcoat</b> (Interior Wood Trim)	5.0	38.5	2.79	93%
2	<b>Primer + Name Brand Latex Paint</b> (Exterior Wood Siding)	5.0	28.5	1.22	96%
3	<b>Primer + Standard Poly Encapsulant</b> (Interior Wood Paneling)	5.0	15.8	1.58	90%
4	<b>Sealant &amp; Treatment Prior to Demolition &amp; Disposal</b> (Exterior Wood Siding/Concrete)	5.0	72.3	2.4	97%
5	<b>Prior to Disposal</b> (Paint Chips)	5.0	52.9	1.49	97%
6	<b>Sealant &amp; Treatment of Lead Dust/Paint Prior to Demolition</b> (Wood, Cinder Block, Concrete, Ceramic Tile, Sheet Rock)	5.0	~53.0	<0.60	99%

**ECOBOND® Lead Defender® Test Results – Relative Lead Bioavailability (EPA 9200.1-86)**

Use	Application (Base Material)	Before As-Is (mg/L)	After ECOBOND® Treatment (mg/L)	% Reduction
1	<b>Primer &amp; Topcoat</b> (Interior Wood Trim)	371	179	52%
2	<b>Primer + Name Brand Latex Paint</b> (Exterior Wood Siding)	1,040	320	69%
3	<b>Primer + Standard Poly Encapsulant</b> (Interior Wood Paneling)	338	133	61%
5	<b>Prior to Disposal</b> (Paint Chips)	451	185	59%

One coat of ECOBOND® Lead Defender®, 6-12 mil wet; at non-fasting pH 2.2 modified

Section C: Concussions and Recommendations

The following table summarizes the observations and test results from the study’s five application uses of ECOBOND® Lead Defender® as well as test criteria and results. Testing confirmed that ECOBOND® Lead Defender® is applicable for use on a variety of interior and exterior materials as well as multiple lead paint remediation activities.

Use	Application (Base Material)	% Reduction Lead Hazard (EPA 1311)	% Reduction Relative Pb Bioavailability (EPA 9001-9004)	Application (mils wet)	Application Method	Peeling/Chipping Paint	Conclusions
1	<b>Primer &amp; Topcoat</b> (Interior Wood Trim)	93%	52%	8	Brush	4	<ul style="list-style-type: none"> <li>• Good final paint quality, tintable coloring</li> <li>• Addressed peeling/chipping paint</li> <li>• Addressed two layers of lead paint</li> <li>• Sealed and treated lead based paint and lead dust</li> </ul>
2	<b>Primer + Name Brand Latex Paint</b> (Exterior Wood Siding)	96%	69%	6	Roller	4	<ul style="list-style-type: none"> <li>• Proven primer quality</li> <li>• Compatible with name brand exterior latex topcoat</li> <li>• Addressed three layers of lead paint</li> <li>• Sealed and treated lead based paint</li> </ul>
3	<b>Primer + Standard Poly Encapsulant</b> (Interior Wood Paneling)	90%	61%	8	Brush	4	<ul style="list-style-type: none"> <li>• Good primer quality</li> <li>• Compatible with standard encapsulant</li> <li>• Addressed two layers of lead paint</li> <li>• Treated lead based paint along with encapsulant top coat</li> </ul>
4	<b>Sealant &amp; Treatment Prior to Demolition &amp; Disposal</b> (Exterior Wood Siding/Concrete)	97%	N/A	10-12	Sprayer	4	<ul style="list-style-type: none"> <li>• Effective sealant</li> <li>• Addressed multiple layers of lead paint</li> <li>• Prevents spread of lead based paint chips and dust</li> <li>• Treated lead based paint for demolition and non-hazardous disposal</li> </ul>
5	<b>Prior to Disposal</b> (Paint Chips)	97%	59%	10	Sprayer	4	<ul style="list-style-type: none"> <li>• Effective dust sealant</li> <li>• Supports worker protection</li> <li>• Treated lead based paint for disposal</li> </ul>
6	<b>Sealant &amp; Treatment of Lead Dust/Paint Prior to Demolition</b> (Wood, Cinder Block, Concrete, Ceramic Tile, Sheet Rock)	99%	N/A	12	Sprayer	4	<ul style="list-style-type: none"> <li>• Effective sealant</li> <li>• Addressed multiple layers of lead paint</li> <li>• Prevents spread of lead dust and paint chips</li> <li>• Treated lead based paint prior to demolition</li> </ul>

## Conclusions and Recommendations

- Typical Use #1      When used as an **All-In-One Primer and Topcoat**, ECOBOND® Lead Defender® is highly effective in sealing and treating lead in lead dust and lead paint for interior wood surfaces with high lead levels and multiple layers of peeling and chipping lead based paint.
- Typical Use #2      When used as an **Exterior Primer** prior to application of a standard exterior latex topcoat, ECOBOND Lead Defender® is highly effective in sealing and treating lead in lead paint and lead dust for exterior surface with high lead levels and multiple coats of lead based paint.
- Typical Use #3      When used **Prior to Standard Epoxy Encapsulation** ECOBOND® Lead Defender® is highly effective in sealing and treating lead dust and lead for interior surfaces with medium lead levels and multiple layers of lead based paint.
- Typical Use #4      When used **Prior to Demolition and Disposal**, ECOBOND® Lead Defender® is highly effective in sealing and treating lead dust and lead paint for exterior surfaces with high lead levels and multiple layers of lead based paint.
- Typical Use #5      When used **Prior to Disposal**, ECOBOND® Lead Defender® is highly effective in sealing and treating lead dust and lead paint for lead paint chips removed from various surfaces generating a non-hazardous solid waste.
- Typical Use #6      When used **Prior to Demolition**, ECOBOND® Lead Defender® is highly effective in sealing and treating lead dust and lead paint for multiple substrate materials (wood, cinder block, concrete, ceramic tile, sheet rock) with multiple layers of lead paint and high lead levels.

ECOBOND® Lead Defender® is also tested to:

1. Reduce lead paint hazards up to 95% (EPA Method 1311)
2. Reduce airborne lead dust up to 99% (ASTM E1613-12)
3. Reduce relative lead bioavailability up to 75% (EPA 9200.1-86)
4. Mold and mildew resistant (ASTM D5590-00 modified)
5. Fire resistant (ASTM E84) Flame spread 0, Smoke developed 0 NFPA/IBC Class A Coating