



NATIONAL REPORT

LEAD IN INDONESIA'S NEW ENAMEL  
HOUSEHOLD PAINTS



BALIFOKUS

August 2013



## *National Report*

### *Lead in Indonesia's New Enamel Household Paints*

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## **BALIFOKUS**

*22 August 2013*

*Produced as part of the Asian Lead Paint Elimination Project  
Supported by the European Union's SWITCH Asia Programme*

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BALIFOKUS is a partner organization of the Asia Lead Paint Elimination Project, a project of IPEN. IPEN is an international organization promoting safe chemical policies and practices that protect human health and the environment.



This project is funded by the European Union.

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The European Commission is the EU's executive body.

“The European Union is made up of 27 Member States who have decided to gradually link together their know-how, resources and destinies. Together, during a period of enlargement of 50 years, they have built a zone of stability, democracy and sustainable development, while maintaining cultural diversity, tolerance and individual freedom. The European Union is committed to sharing its achievements and its values with countries and people beyond its borders.”

National Report:  
Lead in Indonesia's New  
Enamel Household Paints

## Abbreviation

APCJ	Asia Pacific Coatings Journal
BLL	Blood Lead Level
CDC	Centers for Disease Control and Prevention
ELPAT	Environmental Lead Proficiency Analytical Testing
EU	European Union
GAELP	Global Alliance to Eliminate Lead Paint
ICCM	International Conference on Chemicals Management
IPEN	International POPs Elimination Network
NGO	Non-Governmental Organization
OKI	Occupational Knowledge International
PAUD	Pendidikan Anak Usia Dini (Early Childhood Education)
PCP	Paint Consumption Per-capita
ppm	part per million
SAICM	Strategic Approach to International Chemicals Management
SNI	Standar Nasional Indonesia
UNEP	United Nation Environmental Programme
WHO	World Health Organization



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# Lead in Indonesia's New Enamel Household Paint

## Foreword

This report presents detailed findings from the most extensive survey of lead content in new enamel decorative paints sold in Indonesia ever undertaken.

In this report, we present new data on the content of household paints for sale on the Indonesian market. We compare those results with results from a more limited previous study. We also review national policy frameworks that are in place in some countries to ban or restrict the national manufacture, import, sale and use of leaded household paints and discuss how changes in the regulatory framework since the previous study may have impacted lead levels in paints.

The report also presents background information on why the use of household paints with high lead content is a source of serious concern, especially to children's health. It also proposes recommendations for taking action to protect children and others from lead in paint.

The report was prepared by BaliFokus with support and assistance from the Asian Lead Paint Elimination Project. The Asian Lead Paint Elimination Project has been established to eliminate lead in paint and raise widespread awareness among business entrepreneurs and consumers about the adverse human health impacts of lead-based decorative paints, particularly on the health of children under six years old.

The Asian Lead Paint Elimination Project is being implemented by IPEN over a period of three years in seven countries (Bangladesh, India, Indonesia, Nepal, Philippines, Sri Lanka, and Thailand) with funding from the European Union (EU) totaling EUR €1.4 million. While this publication has been produced with the assistance of the European Union, the contents of the publication are the sole responsibility of BaliFokus and IPEN, and can in no way be taken to reflect the views of the European Union.

BaliFokus is a non-governmental organization working on environmental management and health issues with various stakeholders, to create a healthy and sustainable living environment. BaliFokus is a Participating Organization of IPEN.

IPEN is an international NGO network of health and environmental organizations from all regions of the world in which BaliFokus participates. IPEN is a leading global organization working to establish and implement safe chemicals policies and practices to protect human health and the environment. Its mission is a toxics-free future for all. IPEN helps build the capacity of its member organizations to implement on-the-ground activities, learn from each other's work, and work at the international level to set priorities and achieve new policies.

Denpasar, 15 August 2013  
Yuyun Ismawati  
Project Supervisor  
BaliFokus Foundation

## **Executive Summary**

### **Lead in Indonesia's New Enamel Household Paint**

The Indonesian paint market is one of the fastest growing markets in the world. Indonesia's paint and coating market grew 10% from 2011 to 2012 after a previous average annual growth of 8% between 2006 and 2011. The potential of increased growth is high for the coming years due to Indonesia's high population and high economic growth rates.

In 2012-2013, BaliFokus purchased 78 cans of oil-based (enamel) decorative paint and had them analyzed for lead content. This is the first-ever, large scale study of lead content in new paints available for purchase in Indonesia's stores. The paints included in the study are intended for use in homes and in other locations where young children are present. Leaded paint can represent a major health hazard when the paint deteriorates or becomes loose through use and weathering and when the painted surfaces are prepared for repainting.

#### **Early childhood exposure**

Children are particularly vulnerable to lead paint hazards. The major pathway of exposure is usually through the ingestion of lead-contaminated dust and soil through normal hand to mouth activity common in young children. Children also absorb more of the ingested lead than adults and their developing neurological systems are particularly vulnerable to the effects of lead exposure.

The World Health Organization (WHO) has cited the dangers of lead exposure, saying: "Children are particularly vulnerable to the neurotoxic effects of lead, and even relatively low levels of exposure can cause serious and, in some cases, irreversible neurological damage."

Today, approximately 15 million Indonesian children between the ages of 0-6 currently participate in child care programs at facilities that are painted in red, yellow and other bright colors of paint – the paints with the greatest likelihood of containing high levels of lead. The number of children in these programs is expected to grow dramatically in the coming years. We risk serious damage to our families' and our nation's most precious resource – our children – if we do not act soon to address the problem of lead in paint in Indonesia.

## Study Results

***The majority of sampled paints sold in Indonesia would not be permitted for sale in the U.S. or most other highly industrialized countries and more than a third of the samples could be considered highly dangerous.***

- More than three-quarter of the samples (77% or 60 samples) had lead content greater than 90 parts per million (ppm), and would not be permitted for sale or use in the United States.
- 48 samples (61%) had lead content greater than 600 parts per million lead and would not be permitted for sale or use in most highly industrial countries.
- 26 samples (33%) had lead content greater than 10,000 parts per million lead, which can be considered to be particularly hazardous.

***All the samples from nearly two-thirds of the 43 brands in the study would not be permitted for sale in the United States and all 78 samples from nearly half of the brands analyzed (44%) would not be permitted for sale in most industrialized countries.***

- All samples from 29 of the brands analyzed were above 90 ppm.
- All samples from 19 of the brands analyzed were above 600 ppm.
- All samples from 3 of the brands analyzed were above 10,000 ppm.

***For more than half of the brands sampled (25 out of 43), at least one of the paints analyzed had dangerously high lead levels of 10,000 ppm or greater.***

- The most dangerous levels of lead tended to be in yellow and orange color paints.

***The technology is available in Indonesia to produce unleaded decorative paints, but change is needed from both transnational and Indonesian headquartered paint companies.***

- Nearly one third (13 out of 43) paint brands analyzed sold at least one paint with a lead concentration below 90 ppm, suggesting that it is feasible to produce paint without lead in Indonesia.
- Some transnational and some Indonesian headquartered paint companies manufacture paints with high lead content and some of both manufacture paints with high and low lead content.

## Conclusions & Recommendations

Because there is no safe level for lead exposure in children, the high lead levels found overall and the high percentage of samples above IPEN's recommended level of 90 ppm is quite alarming, especially since the Indonesian paint market is one of the fastest growing markets in the world and will continue to grow along with the population and our high economic growth.

However, the fact that nearly a quarter of the analyzed paints have lead content below 90 ppm and are mostly manufactured by Indonesian companies, suggests that the technology and the lead-free pigments and other paint ingredients are available in Indonesia at an affordable price and are feasible to implement.

For decades, household paints produced for sale in highly industrial countries have not contained lead compounds as pigments, drying agents or for other purposes. Most paint manufacturers that produce paints for sale in the developing world know the reasons why lead should not be used. It is unfortunate that lead paints for household use are still being produced, sold and used in Indonesia. This practice must now end.

BaliFokus recommends:

- For government and relevant agencies:  
Regulate the lead content of paint imports, manufacturing and sale to a maximum of 90 parts per million (ppm) total lead content dry weight. Paint can labels should be required to alert users to the hazards of lead-contaminated dust and other materials when previously painted surfaces are scraped or sanded in preparation for repainting.
- For the private sector:  
We strongly recommend a switch to safer non-lead alternatives for paint ingredients. These substitute materials are available in the market at an affordable price.
- For consumers and individuals as well as organizations:  
Choose unleaded paints in your purchases to protect the health of the children and all the members of the family.
- For all stakeholders:  
Cooperate in establishing a reliable third-party certification system of lead in paint to ensure the paints sold in the market meet the acceptable limit of 90 ppm.

## Introduction and Background to the Lead Paint Issue

Lead is a toxic metal, which can be found in paints when a paint manufacturer intentionally adds one or more lead compounds to the paint for some purpose. The lead compounds most commonly added to paint are pigments that give the paint its color. Lead compounds commonly used as paint pigments include: lead chromates, lead oxides, lead molybdates, and lead sulfates. These are added to produce bright colors such as yellow, red and green. Lead compounds may also be added to paint to serve as drying agents and catalysts in oil-based paints. These make the paint dry faster and more evenly. Lead-based corrosion resistance agents are sometimes added to paints that are used on metal surfaces in order to inhibit rust and corrosion. The most common of these is lead tetroxide, sometimes called red lead or *minium*. Non-lead corrosion resistant compounds are also available.

Good, cost-effective substitutes for all lead compounds used in making household paints have been widely available since before the 1980s. Any paint manufacturer currently producing household paints with added lead compounds can easily reformulate its paints using these substitutes with very little (if any) impact on the characteristics of the paints they produce or on the price. There is no good reason for a paint manufacturer to continue producing paints with added lead compounds, especially since the childhood health hazards associated with lead paint are very serious and well-documented.

When a paint manufacturer does not intentionally add lead compounds in the formulation of its paints, the lead content of the paint will be very low – almost always less than 90 parts per million (ppm) (total lead by dry weight) and frequently much lower. If a paint manufacturer is careful in selecting ingredients that do not contain lead as a contaminant, the lead content of the paint will often be as low as 10 parts per million or less.

BaliFokus and IPEN recommend 90 ppm as an achievable and protective goal for lead in paint worldwide. While international health organizations generally believe that no level of lead exposure is safe, 90 ppm is the current standard for household paints in the U.S. and Canada, and would ensure that a manufacturer can sell their paint anywhere in the world.

In almost all cases where recent studies have been made, water-based paints (sometimes called latex or acrylic paints) do not contain added lead. On the other hand, in most developing countries and countries with economies in transition where paints have recently been analyzed for their lead content, many of the oil-based paints (commonly marketed as enamel paints) contain high lead content. For this reason, the current study, *Lead in Indonesia's New Enamel Household Paints*, was designed to only analyze enamel paints for lead content.

## Lead Compounds Used in Paints

Lead-based decorative paints (for homes, schools and commercial buildings) have not been sold or used for more than thirty years in virtually all highly industrial countries because of toxicity concerns. Some lead based paints and coatings are still used for certain industrial applications, but these uses too are being phased out, and the world's largest paint and coatings manufacturer, Akzo Nobel, announced last year that it has eliminated the use of lead pigments from all the industrial paints and coatings it produces.<sup>1</sup>

Lead compounds are sometimes used in paints as:

- **Pigments** to give the paint a desired color and brightness, to make the paint opaque, to protect the underlying sub-surface from the harmful effects of ultraviolet light, and to help resist wearing and weathering of the paint.
- **Driers** (sometimes called “drying catalysts”), used in oil-based paints to speed up polymerization of the paint film and make the paint dry more quickly, evenly or smoothly.
- **Anti-corrosive agents**, used in metal primer paints to prevent rusting or corrosion.

Lead is also sometimes present as an unintentional contaminant in other paint ingredients such as natural resins, fillers or binders.

Substitute pigments, driers and anti-corrosive agents that do not contain lead compounds and that perform well are available. In some cases, the non-lead substitutes may be more costly than lead-based pigments, driers and anti-corrosive agents. However, based on informal discussions with paint manufactures in other Asian countries that have recently reformulated their paints using non-lead substitutes, the added cost was usually no more than 1% or 2% of their total cost of production. Paint resins, fillers and binders that are not significantly lead contaminated are also readily available, usually at little or no cost premium.

The most common lead pigments currently in use include lead chromate ( $\text{PbCrO}_4$ ), lead chromate molybdate ( $\text{Cr}_2\text{Mo}_2\text{O}_{11}\text{Pb}_2$ ) and lead sulfate ( $\text{PbSO}_4$ ). Lead chromate is produced with different crystal structures that yield different colors. These include “chrome yellow” (dark yellow), “middle chrome” (reddish yellow), and “orange chrome” (orange). Lead chromate molybdate produces a bright red pigment. Mixtures of lead chromate with lead sulfate and other compounds produce numerous pigments such as “primrose chrome” (pale, greenish yellow), “lemon chrome” (a redder greenish yellow), and “chrome green (a mixture of lead chromate and iron blue). The substitutes include organic pigments as well as inorganic pigments that contain no lead compounds.

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<sup>1</sup> PaintSquare. (2012). International Paint Drops Lead Chromate. August 8, 2012, <http://www.paintsquare.com/news/?fuseaction=view&id=8186>

Lead carbonate,  $(2\text{PbCO}_3 \cdot \text{Pb}(\text{OH})_2)$ , also called “white lead,” was once a widely used white pigment. White lead, however, has been almost universally replaced with titanium dioxide ( $\text{TiO}_2$ ) pigments, also called “titanium white.” These are relatively inexpensive, are very bright white, have a very high refractive index, are highly opaque, and have other excellent pigment properties.

The most common lead compounds used as driers include: lead naphthenate  $2(\text{C}_{11}\text{H}_7\text{O}_2) \cdot \text{Pb}$ , lead(II) acetate  $(\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2)$  and lead octoate  $(\text{C}_{16}\text{H}_{30}\text{O}_4\text{Pb})$ . Satisfactory and cost-effective non-lead driers are available. Those paint manufacturers using leaded driers often combine them with non-lead driers.

A common, lead-based, anti-corrosive agent is triplumbic tetroxide ( $\text{Pb}_3\text{O}_4$ ), usually called “red lead” or “minium.” The dry film of red lead metal primer paints often contain more than 20% lead by weight, and can be highly hazardous to workers and when used in locations where children may be present. Lead chromate pigments also have anti-corrosive properties and are sometimes used for that purpose.

There are many alternative well-performing anti-corrosive agents and alternative approaches to metal coatings that are now available and are replacing red lead and other lead-based anti-corrosive agents for virtually all uses. Primer paints based on metal salts such as zinc phosphate  $(\text{Zn}_3(\text{PO}_4)_2)$  have replaced red lead for many applications.

Another family of widely used non-lead metal primers is marketed under the name “red oxide” primers. The ingredients are often proprietary, but apparently include ingredients such as naphtha, methylene chloride and methyl ethyl ketone (which may have their own toxicity concerns, especially related to inhalation).



## Lead Exposure to Children and Its Health Effects

Children are not generally exposed to lead from paint while the paint is still in the can or even when the paint is being newly applied to a previously unpainted or uncoated surface. Rather, the lead exposure generally occurs after the lead paint has already dried on the wall or on the article that has been painted.

Painted surfaces age, weather, and chip with time. Any lead that is in the paint then enters indoor and outdoor dusts and soils in and around the painted home or building. Children have an innate curiosity to explore their world and engage in developmentally appropriate hand-to-mouth behavior. When playing in lead contaminated environments, the dust and soil that they ingest will carry lead. This is especially true for children in the six years and under age group, the group most easily harmed by exposure to lead. For example, a typical one to six year old child ingests approximately 100 milligrams of house dust and soil each day.<sup>2</sup>

Paint chips can be especially harmful since their lead content can be much higher than what is typically found in dust and soils. In some cases, children may pick up paint chips and put them into their mouth. In addition, when toys or other articles are painted with lead paint, children may chew on them and directly ingest the lead-contaminated dried paint. However, the most common way in which children ingest lead is thought to be through lead-containing dust.

Children and workers are especially at risk when surfaces that were previously painted with lead paint are repainted or disturbed by construction or other activities. Workmen may sand, dry scrape, grind, or in other ways disturb the old painted surface and produce large quantities of dust with very high lead content.

Exposure to lead is much more harmful to children than adults, and the health effects are generally irreversible and can have a lifelong impact.<sup>3</sup> The younger the child, the more harmful exposure to lead can be. The human fetus is the most vulnerable and a pregnant woman can transfer lead that has accumulated in her body to that of her developing child. That means that lead can poison several generations, and not only one person during active exposure.

Children are more biologically susceptible to lead than adults for several reasons including:

- A child's brain undergoes very rapid growth, development and differentiation and lead interferes with this process. Brain damage caused by chronic, low-level exposure to lead during early years is irreversible and untreatable.

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<sup>2</sup> WHO. (2010). *Childhood Lead Poisoning*, p.18. <http://www.who.int/ceh/publications/leadguidance.pdf>

<sup>3</sup> *Ibid*, p.12.

- Exposure to lead early in life can reprogram genes, which can lead to altered gene expression and an associated increased risk of disease later in life.
- Gastrointestinal absorption of lead is enhanced in childhood. Up to 50 percent of ingested lead is absorbed by children, as compared with 10 percent in adults. (Pregnant women may also absorb more ingested lead than other adults). In those children who suffer from nutritional deficiencies, ingested lead is absorbed at an even greater rate.

Evidence of reduced intelligence caused by childhood exposure to lead has led the World Health Organization (WHO) to list “lead caused mental retardation” as a recognized disease. WHO also lists it as one of the top ten diseases whose health burden among children is due to modifiable environmental factors.<sup>4</sup>

In recent years, medical researchers have been documenting significant health impacts on children from lower and lower lead exposures.<sup>5</sup> In response, the U.S. Centers for Disease Control and Prevention (CDC) and other authorities have concluded that there is no known acceptable lead exposure level for children.<sup>6</sup>

WHO has also cited the dangers of lead exposure, saying: “*Children are particularly vulnerable to the neurotoxic effects of lead, and even relatively low levels of exposure can cause serious and, in some cases, irreversible neurological damage.*”<sup>7</sup>

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<sup>4</sup> WHO. (2006). *Preventing disease through healthy environments*, p. 6. [http://www.who.int/quantifying\\_ehimpacts/publications/preventingdisease.pdf](http://www.who.int/quantifying_ehimpacts/publications/preventingdisease.pdf)

<sup>5</sup> Needleman, H. (2004). *Lead Poisoning*. *Annu. Rev. Med.* 55, 209–22. [http://www.rachel.org/files/document/Lead\\_Poisoning.pdf](http://www.rachel.org/files/document/Lead_Poisoning.pdf)

<sup>6</sup> EFSA Panel on Contaminants in the Food Chain (CONTAM), (2013). *Scientific Opinion on Lead in Food*. *EFSA Journal*. <http://www.efsa.europa.eu/en/efsajournal/doc/1570.pdf>

<sup>7</sup> WHO. (2010). *Exposure to Lead: A Major Public Health Concern*, p. 1 <http://www.who.int/ipcs/features/lead..pdf>  
Lead in Indonesia's New Enamel Household Paints

## International Context

The use of lead in household paints is a matter of global concern. At the International Conference on Chemicals Management (ICCM) held in 2009, lead paints were identified by consensus to be an international priority issue of concern. Representatives of the Government of Indonesia participated in this conference and its decisions.

In response to the ICCM decision, the United Nations Environmental Programme (UNEP) and the World Health Organization (WHO) jointly initiated a global partnership to eliminate the use of lead compounds in paints to protect public health and the environment. This partnership is called the Global Alliance to Eliminate Lead Paint (GAELP). Its overall goal is to prevent children's exposure to lead via paints containing lead and to minimize occupational exposures to lead in paint. GAELP's broad objective is to phase out the manufacture and sale of paints containing lead and, eventually, to eliminate the risks from such paint.

At the third ICCM meeting in 2012, at which the representative of the Government of Indonesia also participated, the Conference agreed by consensus to call upon governments, civil society organizations, and the private sector to help:

- Raise awareness about the toxicity to human health from lead in paint including for young children, paint users, and the workers in paint production facilities;
- Fill information gaps by testing paints for their lead content in countries where little or no data is available;
- Promote national regulatory frameworks, as appropriate, to stop the manufacture, import, export, sale and use of lead paints and products coated with lead paints;
- Encourage paint manufacturing companies to substitute lead compounds added to paint with safer alternatives; and
- Establish prevention programs to reduce exposure in and around housing, childcare facilities, schools and other buildings where lead paint has been used in the past.

### Other countries experiences and trends

Studies of lead levels in commonly available household paints have been performed in approximately 25 developing countries and countries with economies in transition (Weinberg and Clark, 2012). In most countries, there still appears to be no publicly available data on the lead content of paints for sale on the national market, including baseline information against which progress could be measured. The national data that does exist is incomplete, since it e.g. does not list all the brands for sale and usually covers only a small number of the paint colors or textures for any single brand. Additionally, in most cases, the available data comes

from paint sampling and analysis undertaken only one time, which makes it difficult to evaluate progress over time.

Table 2 below shows the lead content in paints of several countries from international studies.

**Table 1. Lead content in paints from international studies<sup>8</sup>**

<b>Country</b>	<b>No. of Samples</b>	<b>Average</b>	<b>% ≥ 90 ppm</b>	<b>% ≥ 600 ppm</b>
China	64	15,070	44	33
Ecuador	10	31,960	70	60
Egypt	20	26,200	65	65
India	72	29,660	88	82
Indonesia	11	14,770	82	73
Malaysia	72	24,510	60	50
Nigeria	25	15,750	96	96
Peru	10	11,550	90	80
Seychelles	28	24,880	68	61
Singapore	41	7,000	44	37
Thailand	18	19,410	100	89
<b>Total / Average</b>	<b>371</b>	<b>NA</b>	<b>74</b>	<b>66</b>

The best measure of real progress toward global lead paint elimination is based on extensive, periodic paint sampling and analysis in countries of all regions. This is because even after a country adopts a national law or regulation to prohibit lead decorative paints, these paints might remain widely available for sale on the national market if compliance is lax.

<sup>8</sup> Clark, C.S. et.al. (2009). *Lead levels in new enamel household paints from Asia, Africa and South America. Environ. Res.* Lead in Indonesia's New Enamel Household Paints

## Indonesia's Framework for Eliminating Lead Paint

### Regulations

Most highly industrial countries enacted laws, regulations or mandatory standards to protect the health of their people from lead in paint in the 1970's and 1980's. These laws generally prohibit the manufacture, import, sale or use of lead paint for interiors or exteriors of homes, schools and commercial buildings. In some cases, these regulations have become increasingly stringent in recent years. The standard adopted by the United States imposes an upper limit of 90 parts per million (ppm) on total lead (dry weight) for decorative paints and many other paint categories. Other countries have adopted mandatory limits in the range of 90 to 600 ppm total lead (dry weight). BaliFokus and other non-governmental Organizations (NGOs) associated with the IPEN network generally promote the 90 ppm total lead limit standard as one that is fully achievable and useful in reducing exposure.

Several regulations in Indonesia are relevant to lead and/or heavy metals, but they do not specifically set the level of lead concentration in any products or processes.

Table 2 shows several relevant regulations related to lead.

**Table 2. Indonesian regulations related to lead**

Regulation	Rule
Ministry of Public Works Decree No. 441/KPTS/1998 regarding Technical Requirement for Buildings	Painting of wooden constructions must adhere to SNI 2407:2008.
Ministry of Health Decree No. 1204/MENKES/SK/X/2004 regarding the Environmental Requirements for Hospitals	No use of paints containing heavy metals.
Ministry of Industry Regulation No. 24/M-IND/PER/4/2013 regarding Mandatory Implementation of Indonesian National Standard for Toys	Mandatory implementation of a set of standards for toys produced and sold in Indonesia. Specification for migration of certain elements (including lead). 2 certification laboratories are appointed.

Technical regulatory processes are usually based on voluntary standards established as *Standard Nasional Indonesia* (SNI). Standards can be made mandatory at the national or in particular strategic projects to ensure consistent quality of works and results are performed all over the country. Figure 1 shows the technical regulation implementation process.



**Figure 1. Technical regulation implementation process**

Specific regulation on lead in paint does not exist in Indonesia, but a national standard<sup>9</sup> has been set to limit lead content in toys to less than 90 ppm. The standard has been made mandatory and will come into force after 12 October 2013, covering both toys manufactured in Indonesia or imported.<sup>10</sup> This regulation aims to protect children from the harmful effect of chemical exposures from toys, but it is worth noting that children also interact and may be exposed to certain chemicals from dust and other painted surfaces such as doors, windows, walls, floors, and furniture.

In recent years, paint consumption has increased rapidly in Indonesia, further increasing the risk of poisoning from leaded paints, especially to children. In 2011, there were over 32 million Indonesian children at the golden age of development (0-6 years old). Participation rate in *Pendidikan Anak Usia Dini* (PAUD) programs (early childhood education) in 2008 was 50.6% (approximately 15.1 million children), and has been projected to increase by 72.6% in the next 5 years, reaching approximately 22.1 million children (Ministry of Education and Culture, 2013).<sup>11</sup>

Currently, there is no specific regulation or guidance for procurement of paints used in early childhood education facilities. As early childhood education facilities are commonly painted in bright colors, which may contain lead, approximately 32 million Indonesian children are potentially at risk, especially in older facilities. In the last 10 years, many PAUD facilities were built in a new setting or located in old buildings. Some of these sites have regular maintenance but many have no training in lead-safe work practices.

<sup>9</sup> SNI ISO 8124-3:2010, *Toy Safety - Part 3: Specification for migration of certain elements*

<sup>10</sup> Indonesian Ministry of Industry Regulation No. 24/M-IND/PER/4/2013

<sup>11</sup> Kementerian Pendidikan dan Kebudayaan Indonesia. (2013). <http://paud.kemdiknas.go.id/index.php/home/bukaLinkBeritaRSS/1>



**Figure 2. Early childhood education facilities in Indonesia.**

Table 3 in the following page shows several standards related to lead paint.

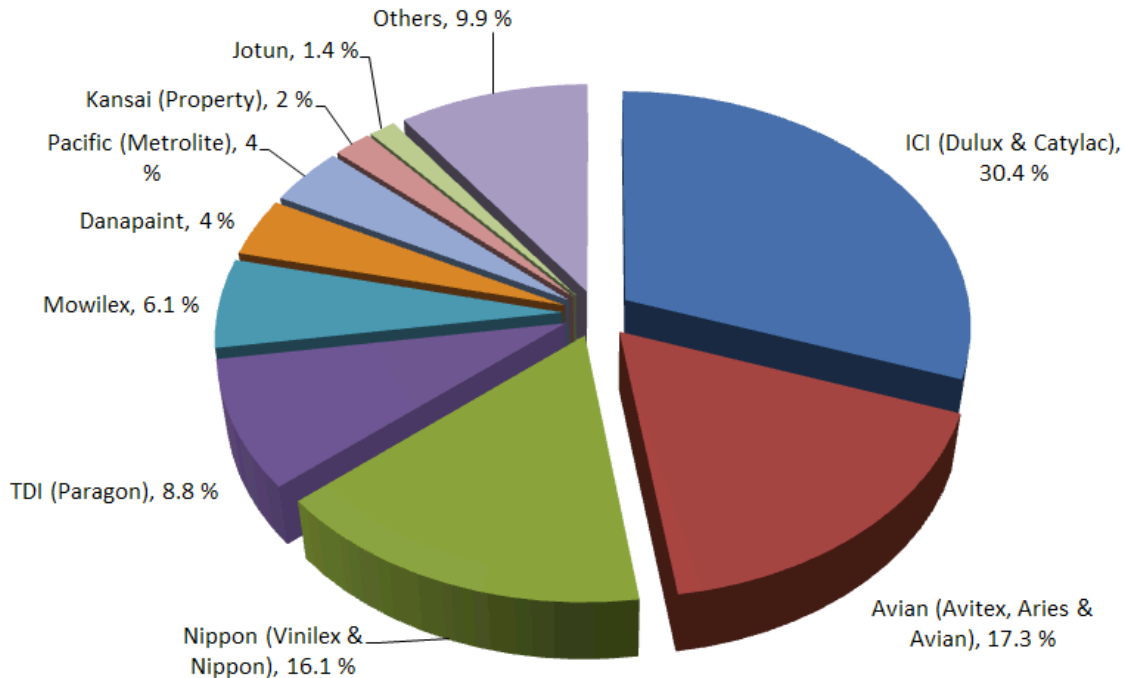
**Table 3. Indonesian Standards Related to Lead Paint**

Standard	Compliance	Content
SNI 06-0347-1989 on Specification of Putty for wood	Voluntary	Using lead white pigment.
SNI 06-1450-1989 on Roofing tile paint	Voluntary	No specification on lead.
SNI 06-4827-1998 on Specification of Ready-Mixed Oil-Based Paint	Mandatory for buildings (refer to SNI 2407:2008) Ministry of Public Works Decree No. 441/KPTS/1998)	Maximum allowable total lead* content is 0.06% based on the total weight of the non-volatile portion of the paint. *Indonesian language says "timah" (tin) instead of "timah hitam" (lead), refers to AASHTO M. 70-90 standard.
SNI 06-3685.1-2000 on Specification for red lead ready-mixed paint	Mandatory for buildings (SNI 2407:2008 based on Ministry of Public Works Decree No. 441/KPTS/1998)	Prescribes the use of red lead ( $Pb_3O_4$ ) primer for base coat, top coat, or maintenance coat on surface of bridges and other steel structures. Cautions not to use on surfaces of facilities accessible to children or other public places.
SNI 2407:2008 on Code of conduct for wood painting for houses and buildings	Mandatory for buildings (Ministry of Public Works Decree No. 441/KPTS/1998)	Wood primer refer to SNI 06-3685.1-2000 Wood paint refer to SNI 06-4827-1998 and not containing mercury and lead.
SNI ISO 8124-3:2010 Toy Safety - Part 3: Specification for migration of certain elements	Mandatory; come into force 6 months after 12 April 2013 (Ministry of Industry Regulation No. 24/M-IND/PER/4/2013)	Pb < 90 mg/kg Recall of non-compliant product
SNI 3564: 2009 on Emulsion Wall Paint	Voluntary	Heavy metals (Pb, Cu, Hg, Cd, $Cr^{6+}$ ) undetected by ASTM D 5702 test.
SNI 7188.6: 2010 on Ecolabel Criteria: Part 6 - Wall Paint Product Category	Voluntary	Allowable content: Pb < 90 mg/kg. Test method: ISO 3856-1 or ASTM D 3335 on red, blue, white, yellow and black paint as base for other colors.
SNI 06-4825-1998 on Specification of ready mixed white and yellow traffic paints	Voluntary	Specifying titanium oxide pigment for white paint, lead chromate pigment on yellow paint.

## Major Paint Brands in Indonesia

### Market share of paints in Indonesia (%)

Based on data from Mars Indonesia newsletter, May 2013



**Figure 3. Market share of paints in Indonesia (based on Mars Indonesia newsletter, May 2013)**

The major paint brands sold in Indonesia are from ICI (Dulux and Catylac), Avian, Nipponpaint and TDI (Paragon). The market share of different paint companies in Indonesia is shown in Figure 3 below. Due to limited resources, the current survey did not include samples from all major brands.

The Indonesian paint market is one of the fastest growing markets in the world. Indonesia's paint and coating market grew 13% from 2011 to 2012 after a previous average annual growth of 8% between 2006 and 2011 (Frost & Sullivan, 2010; Fangqing, 2011). The potential for increased growth is high for the coming years due to Indonesia's high population and high economic growth at 6% rates. The paint consumption per capita (PCP) in 2012 was still low at 3.27 kg per person, compared to Asia's overall PCP rate of approximately 4-4.5kg and a worldwide PCP of 6-7 kg per person (APCJ, 2010; Mars Indonesia, 2013). However, the domestic paint market in 2012 was about 21.52% higher compared to 2010, or equal with IDR 12.57 trillions or approximately USD 1.28 billion<sup>12</sup> (Harefa, 2013).

<sup>12</sup> 1 USD = IDR 9,793.50 May 29, 2013  
Lead in Indonesia's New Enamel Household Paints



It is not known when lead was first used in paints in Indonesia, but, similar to the rest of Southeast Asia, many houses in Indonesia have most likely been painted in the past with leaded paints. Paints from some of these houses have very likely already resulted in hazardous levels of lead in dust and soil.

A large majority of Indonesian paint manufacturers are concentrated in the western side of Java Island – In Jakarta, Bekasi, Cikarang, Tangerang and Bandung – and in East Java province especially in Surabaya, Gresik and Sidoarjo. Small and medium manufacturers with employees less than 100 workers exist, some with products only available in specific areas and local markets.

Research by BaliFokus, including both store surveys and searching online databases, identified 119 companies registered in the Indonesian Ministry of Industry's database under the category "paints, varnish and lacquer." Three hundred ten different brands of decorative paints were also found. Among those, seventy-two were identified as "enamel" paint and were produced by 52 different manufacturers. However, in the course of field visits to paint retailers, BaliFokus was only able to find 43 brands of enamel decorative paints produced by 28 manufacturers.

## Materials and Methods

### Sample collection

During the period from August 2012 to March 2013, BaliFokus, with help and support from the IPEN and funded by the European Union, purchased seventy-eight cans of enamel (glossy finish, mostly oil-based, paints commonly used for painting wood and metal) household paints from stores in Bandung, Denpasar, Jakarta and South Tangerang. In most cases, BaliFokus selected one white paint and one colored paint, preferably a bright yellow, from each brand. The availability of these paints in retail establishments suggested that they are intended to be used within home environments. Automotive and industrial paints that are not typically used for painting household equipment or toys are excluded.

Sample profiles in brief are described as follow:

**Table 4. Paint sample profile**

No. of samples	No. of brands
78	43
Manufacturers	Made in
28 companies 2 unknown (no clear information on can)	66 Indonesia 2 USA 10 unknown
Type of paint	Color
75 synthetic or acrylic enamel 3 metallic paint	32 yellow 32 white 5 orange 9 others (green, blue, brown, black, silver, gold)
Lead content information	
65 without information, 13 self-marked as unleaded	

## Sample Preparation

Paint sample preparation kits containing individually numbered, untreated wood pieces, single-use brushes and stirring utensils made from untreated wood sticks were assembled and shipped to BaliFokus by staff of Arnika, IPEN's partner NGO in the Czech Republic.

Each paint was thoroughly stirred in the can and applied using a separate, unused, single-use brush to individual, pre-numbered, unused wood pieces by staff of BaliFokus. Each stirring utensil and paint brush was used only once, and care was taken to avoid cross contamination. After thoroughly dried, the painted wood pieces were placed in labeled individual plastic bags and shipped to the Certottica laboratory in Longarone, Italy for analysis of total lead content.

Figures 4 and 5 show how paint samples were prepared.



**Figure 4. Paint sample preparation materials.**

## Laboratory analysis

Certottica is accredited by ACCREDIA, the state-appointed Italian National Accreditation Body. The test procedure for analysis of total concentration of lead on the paint specimens referred to the CPSC-CH-E1003-09.1 *Standard Operating Procedure for Determining Lead (Pb) in Paint and Other Similar Surface Coatings*.

The laboratory scraped paint off the wood pieces they received. The paint was then weighed into a hot block digestion tube and the paint chips digested. The paint was placed in a beaker of borosilicate, in which 3 mL of HNO<sub>3</sub> and 1 mL of 30% H<sub>2</sub>O<sub>2</sub> was added. The beaker was first covered with a glass and then was heated on a hotplate (surface temperature of approximately 140°C, from 85 initially to 100°C) until most of the acid evaporated. This treatment was repeated twice more.



**Figure 5. Preparation of paint samples.**

The beaker containing the sample was removed from the plate and let cool to room temperature. The cover glass was then rinsed with a quantity of HNO<sub>3</sub> 10% from 3 to 5 mL and the solution was left to hot evaporate slowly and let cool to room temperature. Finally, 1 mL of HNO<sub>3</sub> was added to the residue, which was agitated to dissolve the soluble species. The walls of the beaker and the bottom of the watch glass were rinsed and the liquid was transferred into a flask and brought to volume with deionized water.

Lead in the digestates was analyzed by an Atomic emission spectrophotometer (ICP-AES), Thermo Scientific iCAP 6000 Series, using yttrium (2 mg/L) as internal standard.

## **Limit of Detection**

The laboratory's lower limit of detection for the lead concentration in the paint samples is dependent on the amount of paint in the samples. Generally, for 100 mg of paint scraped off the wood pieces, the lowest detection limit is 8 ppm, but for a smaller amount of paint, the detection limit increases. Three samples were reported as having lead content of less than 12 ppm lead. However, two of these samples may in fact contain lead less than 12 ppm, and no conclusion can be reached with regard to their relative lead concentrations more than it was below 12 ppm.

# Results and Discussion

## Summary of Results

The majority of sampled paints sold in Indonesia would not be permitted for sale in the U.S. or most other highly industrialized countries and more than a third of the samples contained hazardous levels of lead (all sample results are expressed as parts per million (ppm) total lead, based on the dry weight of the digested sample; details of the paints sampled and the analysis results are listed in Appendices 1 and 2).

- More than three-quarter of the samples (77% or 60 samples) had a lead content greater than 90 parts per million, and would not be permitted for sale or use in the United States.
- Forty-eight samples (62%) had lead content greater than 600 parts per million and would not be permitted for sale or use in most highly industrial countries.
- Twenty-six (33%) samples had lead content greater than 10,000 parts per million, which can be considered particularly hazardous.

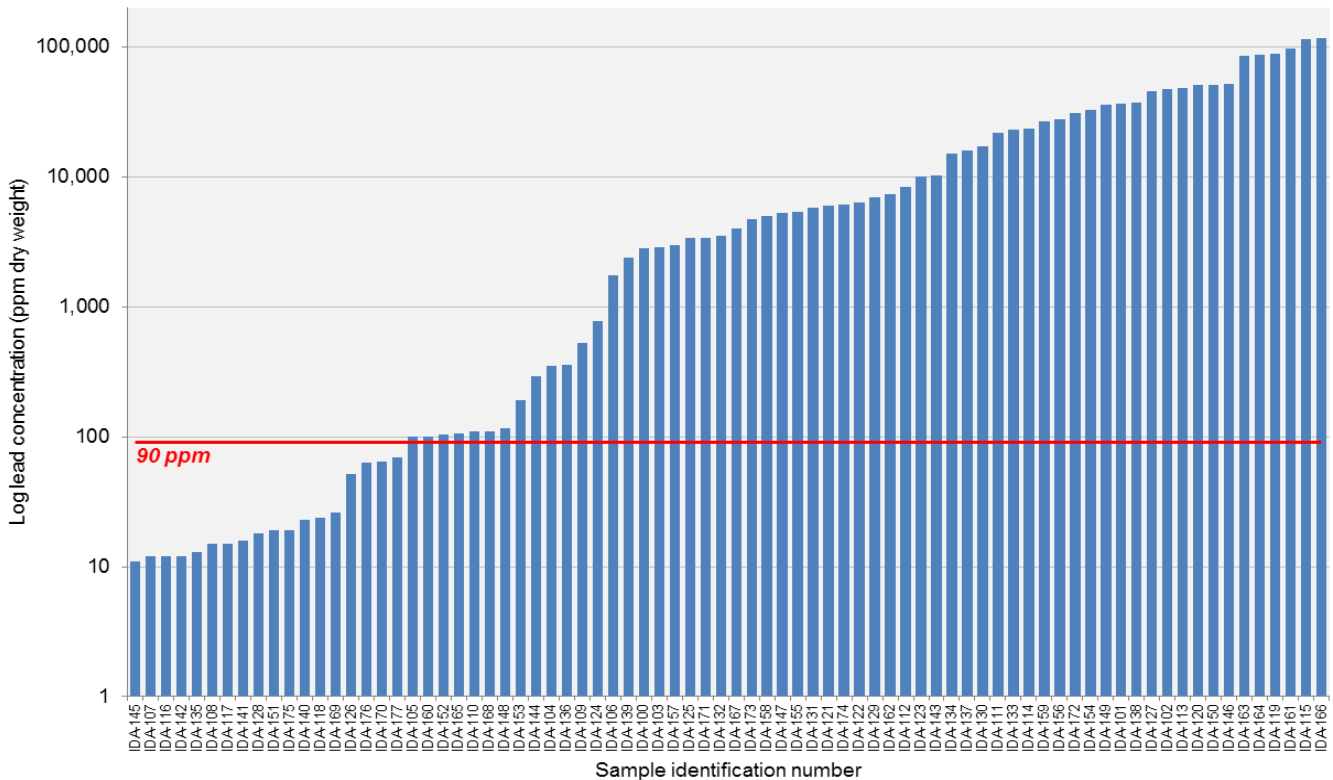


Figure 6. Lead content of the 78 analyzed paints, ordered from lowest to highest.

## Lead concentration by brand

***More than half (58%) of all brands analyzed sell paints with dangerously high levels of lead paint.***

- All samples from 29 of the brands analyzed contained above 90 ppm lead.
- All samples from 19 of the brands analyzed contained above 600 ppm lead.
- All samples from 3 of the brands analyzed were above 10,000 ppm.
- One sample from 2 brands contained lead concentrations above 100,000 ppm.
- 6 brands was shown to produce paints with lead levels both greater than 90 ppm and below 90 ppm.
- For more than half of the brands sampled (25 out of 43), at least one of the paints analyzed had dangerously high lead levels of 10,000 ppm or greater.

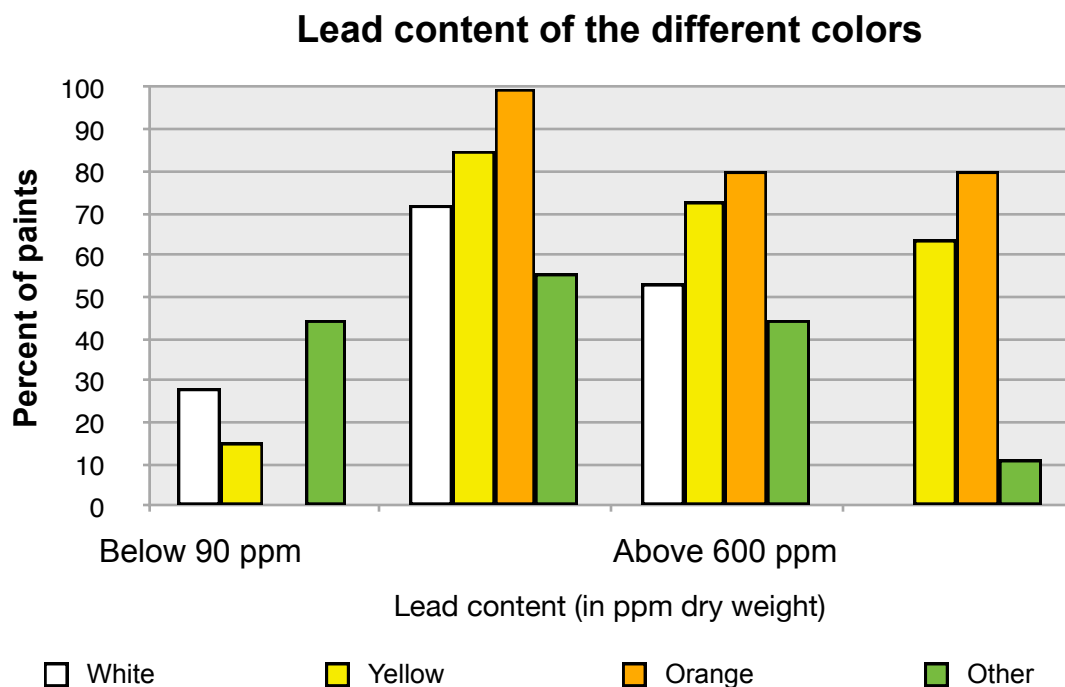
Table 5 shows the distribution of lead concentration by brand of new enamel decorative paints purchased in Indonesia.

**Table 5. Distribution of Lead Concentration by Brand of New Enamel Decorative Paints Purchased in Indonesia**

No.	Brand	Manufacturer	Number of Samples	Number of Samples Above 90 ppm Lead <sup>1</sup>	Number of Samples Above 600 ppm Lead <sup>2</sup>	Number of Samples Above 10,000 ppm Lead	Min. ppm	Max. ppm
1	ABC	San Central Indah	2	2	1	1	108	87,400
2	Ace Rust Stop	Ace Hardware Corp.	1	0	0	0	11.5	
3	Al-Tex	Atlantic Ocean Paint	2	2	2	1	4,010	116,500
4	Avian	Avia Avian	2	2	2	1	5,800	17,000
5	Bee Brand 1000	Nippon Paint	2	2	2	1	7,410	98,400
6	Bee Brand Junior 66	Nippon Paint	2	2	2	1	5,390	32,500
7	Bintang Laut	Warnatama Cemerlang	2	2	2	1	110	21,800
8	Bitalac	Bital Asia	2	0	0	0	18	52
9	Brillo	Rajawali Hiyoto	2	2	2	1	4,970	27,000
10	Catylac	ICI	1	1	1	1	290	
11	Clark + Kensington	Ace Hardware Corp.	1	1	1	1	100	
12	Danalac	Danapaint	2	2	2	1	5,340	51,900
13	Decolux	Warna Agung	1	1	1	1	2,860	
14	Delta	Putramataram Coating	2	2	2	1	117	36,300
15	Dulux Super Gloss	ICI	1	0	0	0	11	
16	Dulux V-Gloss	ICI	2	1	0	0	15	530
17	Dulux Weather-Shield Gloss	ICI	2	2	0	0	100	190
18	Duplex	Penta Prima	1	0	0	1	88,900	
19	Emco Lux	Mataram Paint	2	1	1	1	12	10,310
20	Envi	Indaco	2	0	0	0	26	64
21	Ftalit	Kansai Paint	2	1	1	0	3,463	23,300
22	Garuda	UKSA Paint	2	1	1	1	365	16,000
23	Glo-Tex	Pacific Paint	2	0	0	0	16	24



24	Jotun Gardex	Jotun	1	1	0	0	100	
25	Kangaroo	Asia Sukma Chemindo	1	0	0	0	63	
26	Kuda Terbang	Trico Paint Factory	3	3	3	2	9,970	84,800
27	Lenkote Platinum	Avia Avian	2	2	2	0	780	3,360
28	Mawar	Mikatasa Agung	2	1	1	1	19	51,300
29	Mowilex	Mowilex	2	1	1	1	12	115,000
30	Nippon Paint 9000	Nippon Paint	1	0	0	0	69	
31	Pacific WeatherGuard Gloss	Pacific Paint	1	1	0	0	349	
32	Paiton 8000	Nusantara Paint Indonesia	1	1	1	1	36,600	
33	Propan DAE	Propan Raya	1	1	0	0	111	
34	Property Glozz	Kansai Paint	2	2	2	1	7,000	45,700
35	Recolac	Trico Paint Factory	2	2	2	1	2,900	47,640
36	RJ London	RJ London	7	6	6	2	19	36,800
37	Seiv	Sumber Makmur Bahagia	2	2	2	1	2,950	28,300
38	Sendai	No info	1	1	1	0	1,760	
39	Super Lux	CV Bumi Nusantara Indah	2	2	2	1	6,000	50,600
40	Synthetic 2000	Propan Raya	2	0	0	0	16	23
41	Vim	Penta Prima	2	1	1	1	14	14,760
42	Wita	No info	1	1	1	1	23,400	
43	Yoko	Avia Avian	2	2	2	1	8,300	47,900



\* Note: Other colors are green, blue, brown, black, silver/metallic.

**Figure 7. Lead concentrations in analyzed paints arranged according to color.**

### Lead Concentration by Color

Of the 72 paint samples collected, 32 were white, 32 were yellow, 5 were orange and 9 were other colors including green, blue, brown, black, silver or metallic.

***For more than half of the brands sampled (22 out of 43), at least one of the paints analyzed had dangerously high lead levels of 10,000 ppm or greater.***

More than 70% of sampled paints with yellow and orange colors contained lead levels above 600 ppm (Figure 7). More than 60% of the orange paints and more than 40% of the yellow paints had extremely high lead concentrations - above 10,000 ppm.

### Labeling

***Labels of paints sold in Indonesia do not contain information that helps the consumer understand the lead content.***

None of the paint samples analyzed in the current study by BaliFokus had information on their label indicating paint ingredients or date of manufacture. Batch codes, where available, were not in a form that is understandable to customers. Although for most samples advice to use personal protective gear when painting was present on the can or in the information sheet for customers, there was no clear specification or warning about lead and lead dust.

## **Unleaded Decorative Paints on the Market in Indonesia**

***The technology is available in Indonesia to produce unleaded decorative paints, but change is needed from both transnational and Indonesian headquartered paint companies***

At least one sample from nearly one-third (13 out of 43) of paint brands analyzed had lead concentration below 90 ppm.

Eight paint companies have an estimated total of 80% market share of the Indonesian paint market. The average lead concentrations in the analyzed paints from these brands ranged from 100 ppm to 57,500 ppm.

- The paints analyzed from four of the eight companies based in Indonesia had average concentrations of 130, 13,900, 28,700 and 57,500 ppm respectively (Pacific Paint, Avia Avian, Danapaint, and Mowilex).
- The paints analyzed from the two companies based outside Indonesia (Jotun and ICI), with market shares of 1.4 and 30.4%, had relatively low average concentrations (100 and 190 ppm respectively). In addition, the paints from Ace Hardware Corp., with an unknown market share, had an average lead concentration of 56 ppm.
- The paints analyzed from the other two other companies based outside of Indonesia, with market shares of 2 and 16.1%, had very high average lead concentrations of 19,900 and 28,900 ppm, respectively (Kansai and Nippon). The high average of 28,900 ppm resulted from high lead concentrations in two paints from two brands manufactured by Nippon, a major multinational paint company whose website indicates an organization-wide drive for eco- friendliness. In addition, the paints from R.J. London, with an unknown market share, had an average lead concentration of 12,100 ppm.

Table 6 shows the results from the lead analysis of paints from the eight market leaders plus two other foreign-based companies described above.

**Table 5. Total Lead Concentration in Paints from the Major Market Share Companies (market data adapted from Harefa, 2013)**

No.	Brands (Companies)	Headquarters Country	Market Share (%)*	Number of Samples	Average (ppm)	Range (ppm)
1	Dulux and Catylac (ICI/Akzo Nobel)	Netherlands	30.4	6	190	11 to 530
2	Avian (Avia Avian)	Indonesia	17.3	6	6,770	780 and 47,870
3	Nippon 9000, Bee Brands Junior 56 and 1000 (Nippon)	Japan	16.1	4	29,000	69 to 98,000
4	Mowilex	Indonesia	6.1	2	115,000	<12 and 115,000
5	Danalac (Danapaint)	Indonesia	4.0	2	29,000	5,300 and 52,000
6	Glo-Tex and Pacific WeatherGuadr Gloss (Pacific Paint)	Indonesia	4.0	2	19.5	15 and 24
7	Ftalit and Property Glozz (Kansai)	Japan	2.0	3	24,000	3,500 to 46,000
8	Jotun Gardex (Jotun)	Norway	1.4	1	100	100
9	R.J. London (R.J. London)	Singapore	-	7	12,100	19 to 37,000
10	Ace and Kensington-Clark (Ace Hardware Corp.)	USA	-	2	56	<12 and 100

***Companies that manufacture paints with the lowest lead levels are both Indonesian and internationally based.***

- 3 companies manufacture paint samples with lead content less than 90 ppm; all of which is based in Indonesia (Indaco Coatings, Bital Asia, and Asia Sukma Chemindo).
- 4 companies that manufacture paints with lead content both below 90 ppm and above 90 ppm are based outside Indonesia (Ace Hardware Corp, ICI, Nippon and RJ London).

- 6 companies that manufacture paints with lead content both below 90 ppm and above 90 ppm are based in Indonesia (Mataram Paint, Mikatasa Agung, Mowilex, Pacific Paint, Propan Raya and Penta Prima).

Table 7 shows the brands, company locations and the paint colors analyzed.

**Table 7. Brands, company locations and the analyzed colors**

No.	Brand	Manufacturer	Country of Brand Headquarters	Country Where Manufactured	Min. ppm	Max. ppm	Colours tested*
1	ABC	San Central Indah	Indonesia	Indonesia	108	87,400	Yellow & White
2	Ace Rust Stop	Ace Hardware Corp.	USA	USA	11.5		Yellow
3	Al-Tex	Atlantic Ocean Paint	Indonesia	Indonesia	4,010	116,500	Yellow & White
4	Avian	Avia Avian	Indonesia	Indonesia	5,800	17,000	Yellow & White
5	Bee Brand 1000	Nippon Paint	Japan	Indonesia	7,410	98,400	Yellow & White
6	Bee Brand Junior 66	Nippon Paint	Japan	Indonesia	5,390	32,500	Yellow & White
7	Bintang Laut	Warnatama Cemerlang	Indonesia	Indonesia	110	21,800	Orange & White
8	Bitalac	Bital Asia	Indonesia	Indonesia	18	52	Yellow & White
9	Brillo	Rajawali Hiyoto	Indonesia	Indonesia	4,970	27,000	Orange & White
10	Catylac	ICI	Netherlands	Indonesia	290		Green
11	Clark + Kensington	Ace Hardware Corp.	USA	USA	100		White
12	Danalac	Danapaint	Indonesia	Indonesia	5,340	51,900	Yellow & White
13	Decolux	Warna Agung	Indonesia	Indonesia	2,860		White
14	Delta	Putramataram Coating	Indonesia	Indonesia	117	36,300	Yellow & White
15	Dulux Super Gloss	ICI	UK	Indonesia	11		Yellow
16	Dulux V-Gloss	ICI	Netherlands	Indonesia	15	530	Orange & White
17	Dulux Weather-Shield Gloss	ICI	Netherlands	Indonesia	100	190	Yellow & White
18	Duplex	Penta Prima	Indonesia	Indonesia	88,900		Yellow
19	Emco Lux	Mataram Paint	Indonesia	Indonesia	12	10,310	Yellow & White
20	Envi	Indaco	Indonesia	Indonesia	26	64	Yellow & White
21	Ftalit	Kansai Paint	Japan	Indonesia	3,463	23,300	Orange & White
22	Garuda	UKSA Paint	N/A	N/A	365	16,000	Yellow & White
23	Glo-Tex	Pacific Paint	Indonesia	Indonesia	16	24	Yellow & White
24	Jotun Gardex	Jotun	Norway	Indonesia	100		Yellow
25	Kangaroo	Asia Sukma Chemindo	Indonesia	Indonesia	63		Silver
26	Kuda Terbang	Trico Paint Factory	Indonesia	Indonesia	9,970	84,800	Yellow & White
27	Lenkote Platinum	Avia Avian	Australia	Indonesia	780	3,360	Yellow & White
28	Mawar	Mikatasa Agung	Indonesia	Indonesia	19	51,300	Yellow & White
29	Mowilex	Mowilex	Indonesia	Indonesia	12	115,000	Blue & Yellow
30	Nippon Paint 9000	Nippon Paint	Japan	Indonesia	69		White
31	Pacific WeatherGuard Gloss	Pacific Paint	Indonesia	Indonesia	349		Yellow

32	Paiton 8000	Nusantara Paint Indonesia	Indonesia	Indonesia	36,600		Yellow
33	Propan DAE	Propan Raya	Indonesia	Indonesia	111		Yellow
34	Property Glozz	Kansai Paint	Japan	Indonesia	7,000	45,700	Yellow & White
35	Recolac	Trico Paint Factory	Indonesia	Indonesia	2,900	47,640	Yellow & White
36	RJ London	RJ London	Singapore	N/A	19	36,800	Black, Blue, Brown, Green, Silver, Yellow & White
37	Seiv	Sumber Makmur Bahagia	Indonesia	Indonesia	2,950	28,300	Yellow & White
38	Sendai	No info	Indonesia	Indonesia	1,760		White
39	Super Lux	CV Bumi Nusantara Indah	Indonesia	Indonesia	6,000	50,600	Yellow & White
40	Synthetic 2000	Propan Raya	Indonesia	Indonesia	16	23	Yellow & White
41	Vim	Penta Prima	Indonesia	Indonesia	14	14,760	Yellow & White
42	Wita	No info	N/A	N/A	23,400		Yellow
43	Yoko	Avia Avian	Indonesia	Indonesia	8,300	47,900	Orange & White

\* *Generic color names are used instead of specific color names used by the company.*

## **Comparison of Lead Concentration of Paints in Current Survey with Paints Purchased in 2005 and 2007**

The current survey also compared results for ten of the eleven paints from four brands analyzed in an earlier study published in 2009, based on paints collected in 2005 and 2007.

Three of the brands analyzed in both studies, together, have an estimated 37.9% of the Indonesian paint market; the fourth is from a company based in Singapore with an unknown market share.

The lead concentration in one of the paints, the Mowilex blue, was lower in the current survey (<12 ppm) compared to the previous analysis (159 ppm). At the same time, the lead content of Mowilex's orange paint increased significantly (115,000 ppm) from the level found in the previous study (76,900 ppm). Five of ten paints analyzed showed an increase in lead concentration between the former and the current study. If this increase continues, it represents a possible dangerous trend.

In the previous study, all the paint samples analyzed contained lead levels over 90 ppm, while the current survey with more samples (78) shows about 77% of the samples analyzed had lead levels over 90 ppm. The highest lead level detected in the previous study was 76,900 ppm while in the current survey the highest level was 116,000 ppm. These figures are approximately 854 to 1289 times of the acceptable level of 90 ppm. However, 23% of all the analyzed paints have lead content below 90 ppm and are mostly manufactured by Indonesian companies. It means the technology and lead-free pigments are available in Indonesia at an affordable price and feasible.

Table 8 in the following page shows the comparison of results from current study with that from samples purchased in September 2005 and January 2007.

**Table 8. Comparison of Results from Analysis of Paints Analyzed in Current Study and Those Analyzed in an Earlier Study<sup>13</sup>**

<b>Brand</b>	<b>Color</b>	<b>2013 Lead Survey (Paints Purchased 8/12 to 2/13) Total Lead Concentration (ppm)</b>	<b>Earlier Survey (Paints Purchased 9/05 and 1/07) Total Lead Concentration (ppm)</b>
ICI Dulux	Yellow	192	210
Jotun	Yellow	100	92.3
Mowilex	Blue	<12	159
Mowilex	Orange	115,000	76,900
R J London	White	2,400	3,140
R J London	Blue	3,400	3,530
R J London	Green	31,000	12,900
R J London	Black	4,700	3,470
R J London	Yellow	37,000	32,200
R J London	Brown	6,100	26,600
AVERAGE		19,200	13,600

<sup>13</sup> Clark, C. Scott. et.al. (2009). Lead levels in new enamel household paints from Asia, Africa and South America. *Environmental Research* 109 (7), October 2009, pp. 930–936.



## Conclusions and Recommendations

The average concentration of lead in the 78 analyzed paint samples was 17,300 ppm, which is considered mid-range among the country averages in the published literature (see Table 1). This average is 192 times the recommended limit of 90 ppm. Although many of the paints with high lead content are from brands based in Indonesia, four are based in other countries.

Since there is no safe level for lead in paint, the high lead levels overall and the high percentage of samples above the recommended level of 90 ppm (77%) is quite alarming, especially since the Indonesian paint market is one of the fastest growing markets in the world and will continue to grow along with the population and high economic growth.

However, 23% of the analyzed paints have lead content below 90 ppm and are mostly manufactured by Indonesian companies. In addition, although yellow paints most commonly contain high levels of lead, some of the samples with the lowest lead content (far below 90 ppm) were yellow. This suggests that the technology and lead-free pigments are available in Indonesia, feasible and available at an affordable price.

Because leaded household paints are widely available for use in Indonesia, children and others are being needlessly exposed to lead from the lead paints that coat the surfaces of homes and other buildings. This will continue and increase unless action is taken to prevent future production, import, sale and use of lead paints, especially for those applications most likely to contribute to early childhood lead exposure.

Along with the growth of the middle class, the sale and use of household paints is growing rapidly in most developing countries, including Indonesia. National action is urgently needed to eliminate the production, import, sale, and use of leaded household paints in Indonesia as well as paints for other applications likely to contribute to childhood lead exposure. In addition, since many homes and schools have already been coated with leaded paints, initiatives are also needed to protect children and others from these legacy paints.

BaliFokus recommends:

- **For the government and relevant agencies:** To regulate the lead content of paint imports, manufacturing and sale to a maximum of 90 parts per million (ppm) total dry weight lead content. Paint can labels should be required to alert users to the hazards of lead-contaminated dust and other materials when previously painted surfaces are scraped or sanded in preparation for repainting.
- **For the private sector:** To switch to safer unleaded alternatives for paint ingredients. These substitute materials are available in the market at an affordable price.
- **For individual consumers as well as organizations:** To choose unleaded paints in your purchases to protect the health of the children and all the members of the family.
- **For all stakeholders:** To cooperate in establishing a reliable third-party certification system of lead in paint to ensure the paints sold in the market meet the acceptable limit of 90 ppm.

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## Appendix 1

### Details of Enamel Decorative Paints Purchased in Indonesia and Tested for Lead Content

No.	Sample Number	Brand Name	Paint Can Size	Price		Manufacture Date	Batch Number	Date of Purchase	Lead content label or website
				(IDR)	(USD)				
1	IDA-165	ABC	1 L	29,500.00	3.01	N/A	C22300	25-Dec-12	Not available
2	IDA-164	ABC	1 L	29,500.00	3.01	N/A	B09**0 (print not clear)	25-Dec-12	Not available
3	IDA-107	Ace Rust Stop	1 L	75,600.00	7.71	N/A	16639 N 0198 100317958	12-Dec-12	Yes - Do not contain lead; <a href="http://www.acehardware.com">www.acehardware.com</a>
4	IDA-167	Al-Tex	1 L	55,000.00	5.61	N/A	11310074	4-Jan-13	Not available
5	IDA-166	Al-Tex	1 L	55,000.00	5.61	N/A	01310599	4-Jan-13	Not available
6	IDA-131	Avian	1 L	41,400.00	4.22	N/A	J-SBJ 22	25-Dec-12	Not available
7	IDA-130	Avian	0.1 L	41,400.00	4.22	N/A	N/A	26-Sep-12	Not available
8	IDA-162	Bee Brand 1000	1 L	44,400.00	4.53	N/A	P.BIOR	19-Feb-13	Not available <a href="http://www.nipponpaint-indonesia.com">www.nipponpaint-indonesia.com</a>
9	IDA-161	Bee Brand 1000	1 L	40,000.00	4.08	N/A	BO DTCS	21-Sep-12	Not available <a href="http://www.nipponpaint-indonesia.com">www.nipponpaint-indonesia.com</a>
10	IDA-155	Bee Brand Junior 66	1 L	40,000.00	4.08	N/A	PAAVR	28-Dec-12	Not available <a href="http://www.nipponpaint-indonesia.com">www.nipponpaint-indonesia.com</a>
11	IDA-154	Bee Brand Junior 66	1 L	39,900.00	4.07	N/A	PHRR	27-Oct-12	Not available
12	IDA-110	Bintang Laut	1 L	38,800.00	3.96	N/A	120829	5-Jan-13	Not available
13	IDA-111	Bintang Laut	1 L	38,800.00	3.96	N/A	10 1007	25-Aug-12	Not available
14	IDA-128	Bitalac	1 L	85,150.00	8.69	N/A	0674190103	25-Aug-12	Not available <a href="http://www.bitalasia.com">www.bitalasia.com</a>
15	IDA-126	Bitalac	1 L	40,500.00	4.13	N/A	0663270101	19-Feb-13	Not available <a href="http://www.bitalasia.com">www.bitalasia.com</a>
16	IDA-158	Brillo	1 L	40,200.00	4.10	N/A	S1096730068	25-Dec-12	Not available
17	IDA-159	Brillo	1 L	40,200.00	4.10	N/A	S2206830115	25-Aug-12	Not available
18	IDA-144	Catylac	1 L	37,000.00	3.78	N/A	42096 99/46	19-Feb-13	Yes (No added lead)

19	IDA-105	Clark + Kensington	1 L	169,000.00	17.24	N/A	1430834 11255 110720901 N	12-Dec-12	Yes (Do not contain lead); <a href="http://www.acehardware.com">www.acehardware.com</a>
20	IDA-147	Danalac	1 L	39,900.00	4.07	N/A	12100049	25-Dec-12	Not available
21	IDA-146	Danalac	1 L	35,720.00	3.64	N/A	12040637	23-Oct-12	Not available
22	IDA-100	Decolux	1 L	35,000.00	3.57	N/A	8M-J121M-06	13-Dec-12	Not available
23	IDA-148	Delta	0.5 L	25,000.00	2.55	N/A	0289.1004091 5	4-Dec-12	Not available
24	IDA-149	Delta	0.2 L	15,000.00	1.53	N/A	1044.1111111 5	4-Dec-12	Not available
25	IDA-145	Dulux Super Gloss	1 L	79,000.00	8.06	N/A	727 449/32	25-Dec-12	Yes (No added lead)
26	IDA-108	Dulux V-Gloss	1 L	41,200.00	4.20	N/A	5135821 4502416258	5-Jan-13	Yes (No added lead)
27	IDA-109	Dulux V-Gloss	1 L	40,500.00	4.13	N/A	47575 8/53	25-Aug-12	Yes (No added lead)
28	IDA-152	Dulux Weather-Shield Gloss	1 L	68,360.00	6.98	N/A	5135531 4503109406	25-Dec-12	Yes (No added lead)
29	IDA-153	Dulux Weather-Shield Gloss	1 L	78,098.00	7.97	N/A	5135521 4502353636	25-Dec-12	Yes (No added lead)
30	IDA-119	Duplex	0.1 L	7,000.00	0.71	N/A	LD1295	1-Nov-12	Not available
31	IDA-142	Emco Lux	1 L	45,000.00	4.59	N/A	IIZHQQ	28-Jan-13	Not available
32	IDA-143	Emco Lux	1 L	48,500.00	4.95	N/A	HZZBZ	21-Sep-12	Not available
33	IDA-169	Envi	0.1 L	36,000.00	3.67	N/A	3112110640	28-Jan-13	Yes (No added lead)
34	IDA-170	Envi	0.1 L	36,000.00	3.67	N/A	3112118340	28-Jan-13	Yes (No added lead)
35	IDA-132	Ftalit	1 L	46,500.00	4.74	N/A	2101543	25-Dec-12	Not available <a href="http://www.kansaicoatings.co.id">www.kansaicoatings.co.id</a>
36	IDA-133	Ftalit	1 L	45,980.00	4.69	N/A	2050858	25-Aug-12	Not available <a href="http://www.gtp-kansai.co.id">www.gtp-kansai.co.id</a>
37	IDA-136	Garuda	0.1 L	6,000.00	0.61	N/A	N/A	28-Dec-12	Not available
38	IDA-137	Garuda	0.1 L	6,000.00	0.61	N/A	N/A	28-Dec-12	Not available
39	IDA-117	Glo-Tex	0.1 L	45,000.00	4.59	N/A	20613119 09:29	13-Dec-12	Not available <a href="http://www.pacificpaint.com">www.pacificpaint.com</a>
40	IDA-118	Glo-Tex	1 L	45,000.00	4.59	N/A	4100 481 10610443 07:51	1-Nov-12	Yes (Lead-free); <a href="http://www.pacificpaint.com">www.pacificpaint.com</a>
41	IDA-160	Jotun Gardex	1 L	68,000.00	6.94	N/A	DK4319099A 2W6MBSATB	21-Sep-12	Yes (100% lead free); <a href="http://www.jotun.com/ap">www.jotun.com/ap</a>
42	IDA-176	Kangaroo	0.1 L	10,000.00	1.02	N/A	111102	2-Mar-13	Not available
43	IDA-123	Kuda Terbang	0.1 L	36,000.00	3.67	N/A	COOH BOAB	13-Dec-12	Not available
44	IDA-122	Kuda Terbang	0.1 L	40,000.00	4.08	N/A	BCOE BOAB	1-Nov-12	Not available

45	IDA-163	Kuda Terbang 1/2 Duco	1 L	42,000.00	4.29	N/A	N/A	1-Sep-12	Not available
46	IDA-124	Lenkote Platinum	1 L	73,800.00	7.53	N/A	S-ICA 04.1	19-Feb-13	Not available
47	IDA-125	Lenkote Platinum	1 L	63,000.00	6.43	N/A	S-IBC 01.1	27-Oct-12	Not available
48	IDA-151	Mawar	1 L	45,000.00	4.59	N/A	OL 1415	4-Jan-13	Not available
49	IDA-150	Mawar	0.5 L	45,000.00	4.59	N/A	CAN 091	4-Jan-13	Not available
50	IDA-116	Mowilex	1 L	60,000.00	6.12	N/A	6107 10	12-Nov-12	Not available
51	IDA-115	Mowilex	1 L	65,000.00	6.63	N/A	5203 5	1-Nov-12	Not available
52	IDA-177	Nippon Paint 9000	1 L	74,700.00	7.62	N/A	12062201715		Not available <a href="http://www.nipponpaint-indonesia.com">www.nipponpaint-indonesia.com</a>
53	IDA-104	Pacific WeatherGuard Gloss	1 L	42,500.00	4.34	N/A	4310 10002 00705448 13:08	13-Dec-12	Yes (Chrome lead free); <a href="http://www.pacificpaint.com">www.pacificpaint.com</a>
54	IDA-101	Paiton 8000	1 L	35,000.00	3.57	N/A	KJ 18	13-Dec-12	Not available
55	IDA-168	Propan DAE	2.5 L	295,000.00	30.100	N/A	B#3032056100	19-Feb-13	Not available <a href="http://www.propanraya.com">www.propanraya.com</a>
56	IDA-129	Property Glozz	1 L	35,150.00	3.59	N/A	2100647	25-Dec-12	Not available <a href="http://www.kansaicoatings.co.id">www.kansaicoatings.co.id</a>
57	IDA-127	Property Glozz	1 L	37,000.00	3.78	N/A	2051964	23-Oct-12	Not available <a href="http://www.gtp-kansai.co.id">www.gtp-kansai.co.id</a>
58	IDA-103	Recolac	1 L	30,000.00	3.06	N/A	0A0T0Y	13-Dec-12	No
59	IDA-102	Recolac	1 L	30,000.00	3.06	N/A	181111	13-Dec-12	No
60	IDA-175	RJ London	1 L	29,000.00	2.96	N/A	332120 T4DI 18		Not available <a href="http://www.rjlondon.com">www.rjlondon.com</a>
61	IDA-139	RJ London	0.1 L	36,500.00	3.72	N/A	271922.KBB	25-Dec-12	Not available <a href="http://www.rjlondon.com">www.rjlondon.com</a>
62	IDA-171	RJ London	0.1 L	36,500.00	3.72	N/A	341321KKI	27-Feb-13	Not available <a href="http://www.rjlondon.com">www.rjlondon.com</a>
63	IDA-173	RJ London	0.1 L	36,500.00	3.72	N/A	252022.IK	27-Feb-13	Not available <a href="http://www.rjlondon.com">www.rjlondon.com</a>
64	IDA-174	RJ London	0.1 L	36,500.00	3.72	N/A	241822.KBB	27-Feb-13	Not available <a href="http://www.rjlondon.com">www.rjlondon.com</a>
65	IDA-172	RJ London	0.1 L	36,500.00	3.72	N/A	121819.IX	27-Feb-13	Not available <a href="http://www.rjlondon.com">www.rjlondon.com</a>
66	IDA-138	RJ London	0.1 L	36,500.00	3.72	N/A	332122.KK	27-Feb-13	Not available <a href="http://www.rjlondon.com">www.rjlondon.com</a>
67	IDA-157	Seiv	1 L	45,000.00	4.59	N/A	N/A	28-Dec-12	Not available
68	IDA-156	Seiv	1 L	45,000.00	4.59	N/A	13G12	1-Sep-12	Not available <a href="http://www.seiv.co.id">www.seiv.co.id</a>
69	IDA-106	Sendai	1 L	25,000.00	2.55	N/A	S1187550078	13-Dec-12	Not available
70	IDA-121	Super Lux	0.1 L	7,500.00	0.77	N/A	LF 28	13-Dec-12	Not available

71	IDA-120	Super Lux	0.1 L	7,500.00	0.77	N/A	LF 13	13-Dec-12	Not available
72	IDA-141	Synthetic 2000	1 L	34,560.00	3.53	N/A	B* 3121825000	23-Oct-12	Not available <a href="http://www.propanraya.com">www.propanraya.com</a>
73	IDA-140	Synthetic 2000	1 L	34,560.00	3.53	N/A	B* 3100476200	25-Dec-12	Not available <a href="http://www.propanraya.com">www.propanraya.com</a>
74	IDA-135	Vim	1 L	30,000.00	3.06	N/A	LD0239	28-Jan-13	Not available
75	IDA-134	Vim	1 L	30,000.00	3.06	N/A	HC0671	28-Jan-13	Not available
76	IDA-114	Wita	1 L	25,000.00	2.55	N/A	171105	12-Nov-12	Not available
77	IDA-112	Yoko	1 L	27,100.00	2.77	N/A	J-SBK 19	5-Jan-13	Not available
78	IDA-113	Yoko	1 L	27,100.00	2.77	N/A	J-SAK 02	25-Aug-12	Not available

## Appendix 2

### Results of Lead Analysis and Purchase Information for New Enamel Decorative Paints Purchased in Indonesia

No.	Sample Number	Brand Name	Manufacturer	Brand Head-quarters <sup>1</sup> Country	Country Where Manufactured <sup>1</sup>	Color of Paint	Information about lead content of paint on the can	Lead content (ppm)
1	IDA-100	Decolux	San Central Indah	Indonesia	Indonesia	White	Not available	2.8*10 <sup>3</sup>
2	IDA-101	Paiton 8000	Avia Avian	Indonesia	Indonesia	881 Yellow	Not available	3.66*10 <sup>4</sup>
3	IDA-102	Recolac	Sumber Makmur Bahagia	Indonesia	Indonesia	980 Lemon	No	4.76*10 <sup>4</sup>
4	IDA-103	Recolac	Rajawali Hiyoto	Indonesia	Indonesia	063 White	No	2.9*10 <sup>3</sup>
5	IDA-104	Pacific WeatherGuard Gloss	UKSA Paint	Indonesia	Indonesia	Yellow	Yes (Chrome lead free)	3.5*10 <sup>2</sup>
6	IDA-105	Clark + Kensington	Jotun	USA	USA	Ultra white	Yes (Do not contain lead)	1.0*10 <sup>2</sup>
7	IDA-106	Sendai	Mikatasa Agung	Indonesia	Indonesia	110 White	Not available	1.76*10 <sup>3</sup>
8	IDA-107	Ace Rust Stop	Mowilex	USA	USA	Safety yellow	Yes - Do not contain lead	<12
9	IDA-108	Dulux V-Gloss	ICI	Netherlands	Indonesia	White	Yes (No added lead)	15
10	IDA-109	Dulux V-Gloss	ICI	Netherlands	Indonesia	Cinnabar orange	Yes (No added lead)	5.3*10 <sup>2</sup>
11	IDA-110	Bintang Laut	Propan Raya	Indonesia	Indonesia	B White	Not available	1.1*10 <sup>2</sup>
12	IDA-111	Bintang Laut	Pacific Paint	Indonesia	Indonesia	B20 Bright orange	Not available	2.18*10 <sup>4</sup>
13	IDA-112	Yoko	Mowilex	Indonesia	Indonesia	Super white	Not available	8.32*10 <sup>3</sup>
14	IDA-113	Yoko	Atlantic Ocean Paint	Indonesia	Indonesia	781 Bright orange	Not available	4.79*10 <sup>4</sup>
15	IDA-114	Wita	Mataram Paint	N/A	N/A	142 Yellow	Not available	2.34*10 <sup>4</sup>
16	IDA-115	Mowilex	Trico Paint Factory	Indonesia	Indonesia	675 Popcorn	Not available	1.15*10 <sup>5</sup>
17	IDA-116	Mowilex	Avia Avian	Indonesia	Indonesia		Not available	<12
18	IDA-117	Glo-Tex	Kansai Paint	Indonesia	Indonesia	White	Not available	15.00
19	IDA-118	Glo-Tex	Atlantic Ocean Paint	Indonesia	Indonesia	Yellow	Yes (Lead-free)	24.00
20	IDA-119	Duplex	ICI	Indonesia	Indonesia	606 Golden yellow	Not available	8.89*10 <sup>4</sup>
21	IDA-120	Super Lux	Trico Paint Factory	Indonesia	Indonesia	Yellow	Not available	5.06*10 <sup>4</sup>
22	IDA-121	Super Lux	Danapaint	Indonesia	Indonesia	White	Not available	6.0*10 <sup>3</sup>
23	IDA-122	Kuda Terbang	Nippon Paint	Indonesia	Indonesia	922 Yellow	Not available	6.4*10 <sup>3</sup>
24	IDA-123	Kuda Terbang	Danapaint	Indonesia	Indonesia	White	Not available	1.0*10 <sup>4</sup>
25	IDA-124	Lenkote Platinum	CV Bumi Nusantara Indah	Australia	Indonesia	01 Absolute white	Not available	7.8*10 <sup>2</sup>
26	IDA-125	Lenkote Platinum	RJ London	Australia	Indonesia	16 Bright spirit	Not available	3.4*10 <sup>3</sup>



27	IDA-126	Bitalac	Bital Asia	Indonesia	Indonesia	1001 Super white	Not available	52.00
28	IDA-127	Property Glozz	No info	Japan	Indonesia	007 Summer sun	Not available	4.6*10 <sup>4</sup>
29	IDA-128	Bitalac	Indaco	Indonesia	Indonesia	1064 Spanish gold	Not available	18.00
30	IDA-129	Property Glozz	Kansai Paint	Japan	Indonesia	033 Super white	Not available	7.0*10 <sup>3</sup>
31	IDA-130	Avian	Pacific Paint	Indonesia	Indonesia	Yellow	Not available	1.71*10 <sup>4</sup>
32	IDA-131	Avian	ICI	Indonesia	Indonesia	White	Not available	5.8*10 <sup>3</sup>
33	IDA-132	Ftalit	Trico Paint Factory	Japan	Indonesia	203 Irish white	Not available	3.5*10 <sup>3</sup>
34	IDA-133	Ftalit	Sumber Makmur Bahagia	Japan	Indonesia	600 Bright orange	Not available	2.3*10 <sup>4</sup>
35	IDA-134	Vim	Nippon Paint	Indonesia	Indonesia	906 Yellow	Not available	1.5*10 <sup>4</sup>
36	IDA-135	Vim	Penta Prima	Indonesia	Indonesia	White	Not available	13.00
37	IDA-136	Garuda	Avia Avian	N/A	N/A	White	Not available	3.6*10 <sup>2</sup>
38	IDA-137	Garuda	RJ London	N/A	N/A	Yellow	Not available	1.6*10 <sup>4</sup>
39	IDA-138	RJ London	Trico Paint Factory	Singapore	N/A	500 Yellow	Not available	3.7*10 <sup>4</sup>
40	IDA-139	RJ London	Nippon Paint	Singapore	N/A	102 Super white	Not available	2.4*10 <sup>3</sup>
41	IDA-140	Synthetic 2000	San Central Indah	Indonesia	Indonesia	9102 Super white	Not available	23.00
42	IDA-141	Synthetic 2000	Trico Paint Factory	Indonesia	Indonesia	1207 Golden yellow	Not available	16.00
43	IDA-142	Emco Lux	Avia Avian	Indonesia	Indonesia	White	Not available	12.00
44	IDA-143	Emco Lux	No info	Indonesia	Indonesia	117 Lemon yellow	Not available	1.03*10 <sup>3</sup>
45	IDA-144	Catylac	Nippon Paint	Netherlands	Indonesia	Army green	Yes (No added lead)	2.9*10 <sup>2</sup>
46	IDA-145	Dulux Super Gloss	Putramataram Coating	UK	Indonesia	Golden honey	Yes (No added lead)	11.00
47	IDA-146	Danalac	ICI	Indonesia	Indonesia	Golden canary	Not available	5.2*10 <sup>4</sup>
48	IDA-147	Danalac	Ace Hardware Corp.	Indonesia	Indonesia	White	Not available	5.3*10 <sup>3</sup>
49	IDA-148	Delta	Warnatama Cemerlang	Indonesia	Indonesia	White	Not available	117.00
50	IDA-149	Delta	Propan Raya	Indonesia	Indonesia	967 Golden yellow	Not available	3.6*10 <sup>4</sup>
51	IDA-150	Mawar	Nippon Paint	Indonesia	Indonesia	117 Lemon yellow	Not available	5.1*10 <sup>4</sup>
52	IDA-151	Mawar	Kansai Paint	Indonesia	Indonesia	White	Not available	19.00
53	IDA-152	Dulux Weather-Shield Gloss	Pacific Paint	Netherlands	Indonesia	White	Yes (No added lead)	104.00
54	IDA-153	Dulux Weather-Shield Gloss	UKSA Paint	Netherlands	Indonesia	Tuscany yellow	Yes (No added lead)	192.00
55	IDA-154	Bee Brand Junior 66	Mikatasa Agung	Japan	Indonesia	602 Golden yellow	Not available	3.3*10 <sup>4</sup>
56	IDA-155	Bee Brand Junior 66	RJ London	Japan	Indonesia	9102 Super white	Not available	5.4*10 <sup>3</sup>
57	IDA-156	Seiv	CV Bumi Nusantara Indah	Indonesia	Indonesia	500 Lemon yellow	Not available	2.8*10 <sup>4</sup>

58	IDA-157	Seiv	Avia Avian	Indonesia	Indonesia	180 Super white	Not available	3.0*10 <sup>3</sup>
59	IDA-158	Brillo	Asia Sukma Chemindo	Indonesia	Indonesia	1111 Super white	Not available	5.0*10 <sup>3</sup>
60	IDA-159	Brillo	Indaco	Indonesia	Indonesia	4480 Pumpkin	Not available	2.7*10 <sup>4</sup>
61	IDA-160	Jotun Gardex	RJ London	Norway	Indonesia	Yellow	Yes (100% lead free)	100.00
62	IDA-161	Bee Brand 1000	Bital Asia	Japan	Indonesia	166 Mayan yellow	Not available	9.8*10 <sup>4</sup>
63	IDA-162	Bee Brand 1000	Propan Raya	Japan	Indonesia	119 Thick white	Not available	7.4*10 <sup>3</sup>
64	IDA-163	Kuda Terbang 1/2 Duco	Avia Avian	Indonesia	Indonesia	980 Lemon	Not available	8.5*10 <sup>4</sup>
65	IDA-164	ABC	Ace Hardware Corp.	Indonesia	Indonesia	955 Sunshine	Not available	8.7*10 <sup>4</sup>
66	IDA-165	ABC	ICI	Indonesia	Indonesia	901 White	Not available	107.00
67	IDA-166	AI-TEX	Penta Prima	Indonesia	Indonesia	18 Yellow	Not available	1.16*10 <sup>5</sup>
68	IDA-167	AI-TEX	Mataram Paint	Indonesia	Indonesia	White	Not available	4.0*10 <sup>3</sup>
69	IDA-168	Propan DAE	Warnatama Cemerlang	Indonesia	Indonesia	Traffic yellow	Not available	111.00
70	IDA-169	Envi	RJ London	Indonesia	Indonesia	908 Lemon yellow	Yes (No added lead)	26.00
71	IDA-170	Envi	Warna Agung	Indonesia	Indonesia	945 Brilliant white	Yes (No added lead)	64.00
72	IDA-171	RJ London	Putramataram Coating	Singapore	N/A		Not available	3.4*10 <sup>3</sup>
73	IDA-172	RJ London	Kansai Paint	Singapore	N/A	403 Spring green	Not available	3.1*10 <sup>4</sup>
74	IDA-173	RJ London	Nusantara Paint Indonesia	Singapore	N/A		Not available	4.7*10 <sup>3</sup>
75	IDA-174	RJ London	RJ London	Singapore	N/A	903 Brown	Not available	6.1*10 <sup>3</sup>
76	IDA-175	RJ London	RJ London	Singapore	N/A	Silver	Not available	19.00
77	IDA-176	Kangaroo	Rajawali Hiyoto	Indonesia	Indonesia	Silver	Not available	63.00
78	IDA-177	Nippon Paint 9000	Penta Prima	Japan	Indonesia	White	Not available	69.00

### Appendix 3

#### Lead Concentration (ppm) by Color of New Enamel Decorative Paints Purchased in Indonesia

Color	Number of Samples	Average lead concentration ppm	Number of samples below detection limit	Percent of Samples Above 90 ppm Lead (number)	Percent of Samples Above 600 ppm Lead (number)	Percent of Samples Above 10,000 ppm Lead (number)	Minimum ppm	Maximum ppm
White	32	2,580	9	23	17	0	12	10,000
Yellow	32	34,400	5	27	23	21	11	116,000
Orange	5	24,000	0	5	5	4	530	47,900
Others	9	5,070	4	5	4	1	12	31,000
<b>TOTAL</b>	<b>78</b>							

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