National Report

# Lead in Indonesia’s New Enamel Household Paints

**BaliFokus**

August 2013

IPEN

a toxics-free future

*National Report*

*Lead in Indonesia's New Enamel Household Paints*

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IPEN a toxics-free future

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.

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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 freedoms. The European Union is committed to sharing its achievements and its values with countries and peoples beyond its borders."

# National Report:

# Lead in Indonesia's New Enamel Household Paints

## Abbreviations

| | |
|---|---|
| AASHTO | American Association of State Highway and Transportation Officials |
| APCJ | Asia Pacific Coatings Journal |
| ASTM | American Society for Testing and Materials |
| CDC | Center for Disease Control and Prevention |
| EU | European Union |
| GAELP | Global Alliance to Eliminate Lead Paint |
| ICCM | International Conference on Chemicals Management |
| IPEN | International POPs Elimination Network |
| ISO | International Standards Organization |
| NGO | Non-Governmental Organization |
| OKI | Occupational Knowledge International |
| PAUD | *Pendidikan Anak Usia Dini* (Early Childhood Education) |
| PCP | Paint Consumption per-Capita |
| ppm | parts per million |
| SAICM | Strategic Approach to International Chemicals Management |
| SNI | *Standar Nasional Indonesia* (Indonesia National Standard) |
| UNEP | United Nations 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.

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.

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 for 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 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 in children is 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 participate in early childhood education programs at facilities commonly painted in red, yellow and other bright colors – paint colors 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 samples from nearly two-thirds of the 43 brands in the study would not be permitted for sale in the United States and all samples from nearly half (44%) of the brands analyzed 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 paint samples 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 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:*** We strongly recommend to switch to safer non-lead 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.

## 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 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[1].

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

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

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 ($PbCrO_4$), lead chromate molybdate ($Cr_2Mo_2O_{11}Pb_2$) and lead sulfate ($PbSO_4$). 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.

Lead carbonate, ($2PbCO_3 \cdot Pb(OH)_2$), also called “white lead,” was once a widely used white pigment. White lead, however, has been almost universally replaced with titanium dioxide ($TiO_2$) 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 $2(C_{11}H_7O_2) \cdot Pb$, lead(II) acetate ($Pb(C_2H_3O_2)_2$) and lead octoate ($C_{16}H_{30}O_4Pb$). Satisfactory and cost-effective non-leaded driers are available. Those paint manufacturers using leaded driers often combine them with non-leaded driers.

A common, lead-based, anti-corrosive agent is triplumbic tetroxide ($Pb_3O_4$), 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 ($Zn_3(PO_4)_2$) have replaced red lead for many applications.

Another family of widely used non-leaded 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 dust and soil in and around the painted house 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 they ingest will carry lead. This is especially true for children in the 6 years and under age group, the group most easily harmed by exposure to lead. For example, a typical 1 to 6 year old child ingests approximately 100 mg of house dust and soil each day[2].

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[3]. 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.

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

[3] *ibid, p.12.*

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

- A child's brain undergoes very rapid growth, development and differentiation. Lead interferes with this process. Brain damage caused by chronic, low-level exposure to lead during early years is irreversible and untreatable.
- 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 children suffering from nutritional deficiencies, ingested lead is absorbed at 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[4].

In recent years, medical researchers have been documenting significant health impacts on children from lower and lower lead exposures[5]. 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[6].

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.*"[7]

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

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

[6] *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*

[7] *WHO (2010). Exposure to Lead: A Major Public Health Concern, p. 1. http://www.who.int/ipcs/features/lead..pdf*

# 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 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 1 below shows the lead content in paints of several countries from international studies.

**Table 1. Lead content in paints from international studies[8]**

| Country | No. of samples | Average | % ≥ 90 ppm | % ≥ 600 ppm |
|---|---|---|---|---|
| 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 |
| **Total / Average** | **371** | **NA** | **74** | **66** |

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.

[8] *Clark, C.S. et.al. (2009). Lead levels in new enamel household paints from Asia, Africa and South America. Environ. Res.*

# 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. Indonesian regulations related to lead paint**

| 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. |
| Ministry of Health Decree No. 1204/ MENKES/SK/ X/2004 regarding 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.<br>Specification for migration of certain elements (including lead).<br>Recall of non-compliant product |

Technical regulations are typically based on voluntary standards established as *Standar Nasional Indonesia* (SNI). Standards can be made mandatory at the national level or in particular strategic projects to ensure consistent quality of works and results are performed all over the country.

Figure 1 shows a simplified flowchart of the technical regulation implementation process.

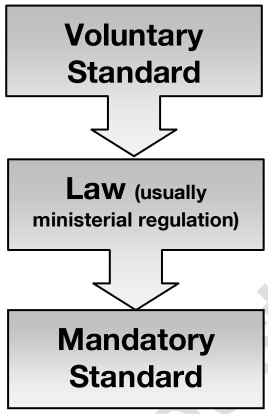


**Figure 1. Technical regulation implementation process**

Specific regulation on lead in paint does not exist in Indonesia, but a national standard[9] 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[10]. 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)[11].

[9] *SNI ISO 8124-3:2010, Toy Safety - Part 3: Specification for migration of certain elements*

[10] *Indonesian Ministry of Industry Regulation No. 24/M-IND/ PER/4/2013*

[11] *Indonesian Ministry of Education and Culture (2011), "Mengenal Pendidikan Anak Usia Dini di Indonesia". http://paud.kemdiknas.go.id/index.php/home/bukaLinkBeritaRSS/1*

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.


**Figure 2. Early childhood education facilities in Indonesia, commonly painted with bright colors.**

Table 3 shows several national standards related to lead in 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)[12] | Max. allowable total lead* content is 0.06% based on the total weight of the non-volatile portion of the paint. **original Indonesian text says "timah" (tin) instead of "timah hitam" (lead), however it refers to AASHTO M. 70-90 standard and as such assumed that "lead" was the intent.* |
| SNI 06-3685.1-2000 on Specification for red lead ready-mixed paint | Mandatory for buildings (refer to SNI 2407:2008)[13] | 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[14] | Wood primer refer to SNI 06-3685.1-2000<br>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; to come into force on 12 October 2013[15] | Pb < 90 mg/kg<br>2 certification laboratories have been accredited. |
| SNI 3564: 2009 on Emulsion Wall Paint | Voluntary | Heavy metals (Pb, Cu, Hg, Cd, $Cr^{6+}$) undetected by ASTM D5702 test. |
| SNI 7188.6: 2010 on Ecolabel Criteria: Part 6 - Wall Paint Product Category | Voluntary | Allowable content: Pb < 90 mg/kg.<br>Test method: ISO 3856-1 or ASTM D 3335 on red, blue, white, yellow & 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 and lead chromate pigment on yellow paint. |

[12] *Indonesian Ministry of Public Works Decree No. 441/KPTS/1998*

[13] *ibid.*

[14] *ibid.*

[15] *Indonesian Ministry of Industry Regulation No. 24/M-IND/PER/4/2013*

## Major Paint Brands in Indonesia

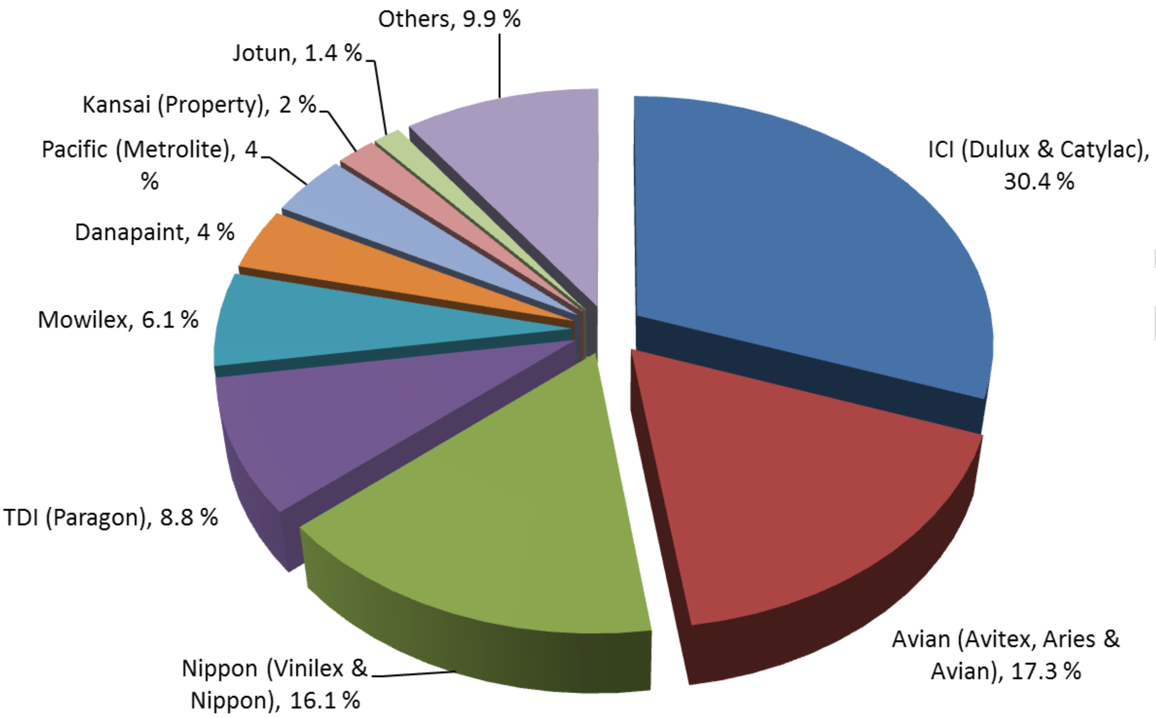


**Figure 3. Market share of paints in Indonesia (based on Mars Indonesia newsletter, May 2013)**

The major paint brands sold in Indonesia are from ICI (Dulux and Catylac), Avian, Nippon and TDI (Paragon). The market share of different paint companies is shown in Figure 3 above. 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 trillion or approximately USD 1.28 billion[16] (Harefa, 2013).

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.

[16] *1 USD = IDR 9,793.50 May 29, 2013*

# 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 |
| **Manufacturer** | **Made in** |
| 28 companies<br>2 unknown (no clear information on can) | 66 Indonesia<br>2 USA<br>10 unknown |
| **Type of paint** | **Color** |
| 75 synthetic or acrylic enamel<br>3 metallic paint | 32 yellow<br>32 white<br>5 orange<br>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 $HNO_3$ and 1 mL of 30% $H_2O_2$ 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.

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 $HNO_3$ 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 $HNO_3$ 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.

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

# 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 lead 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 lead, which can be considered to be particularly hazardous.

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

- All samples from 29 brands contained lead at levels above 90 ppm
- All samples from 19 brands contained lead at levels above 600 ppm
- All samples from 3 brands contained lead at levels above 10,000 ppm

***The average lead concentration in the sampled Indonesian paints is dangerously high.***

**The average concentration of the analyzed paints was 18,500 ppm or 205 times higher than the acceptable level of 90 ppm.**

Figure 6 presents the lead concentration of all analyzed paints in this study in logarithmic scale.



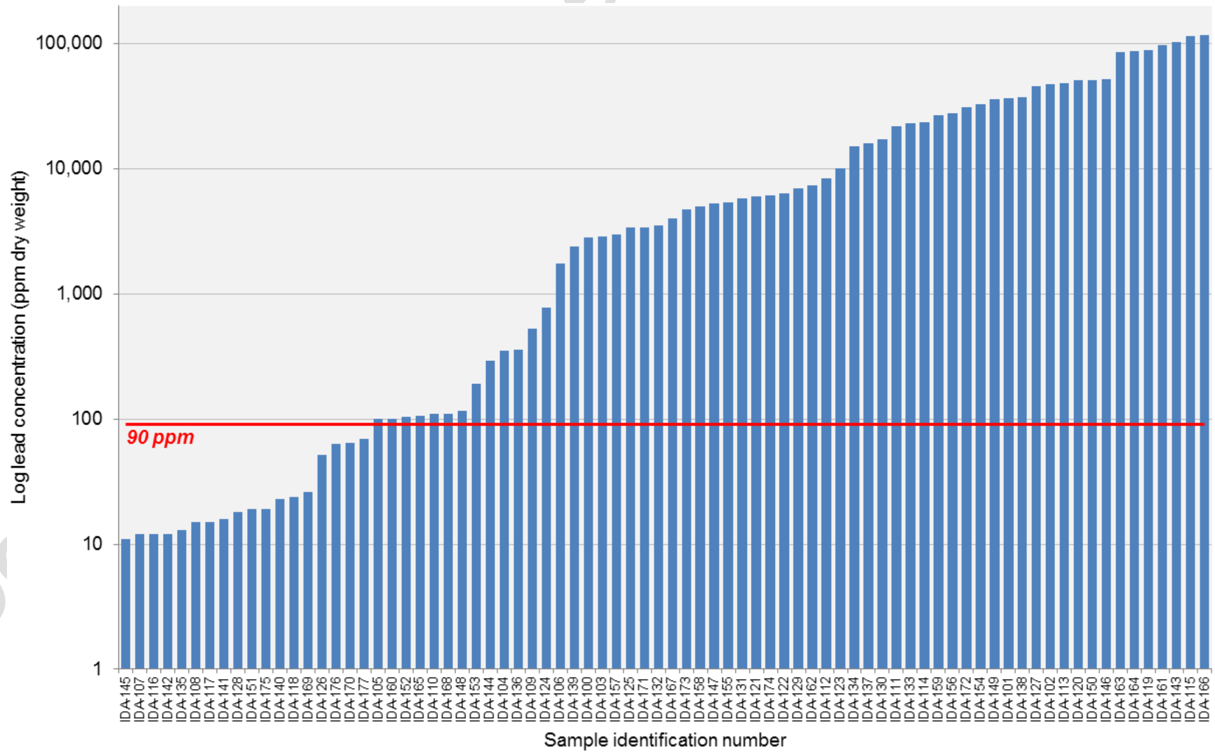


**Figure 6. Lead content of the 78 analyzed paints, ordered from lowest to highest.**

## 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 3 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**

| No | Brand | Manufacturer | No. of samples | No. of samples >90ppm lead | No. of samples >600ppm lead | No. of samples >10,000 ppm lead | Min. ppm | Max. ppm |
|---|---|---|---|---|---|---|---|---|
| 1 | ABC | San Central Indah | 2 | 2 | 1 | 1 | 107 | 87,000 |
| 2 | Ace Rust Stop | Ace Hardware Corp. | 1 | 0 | 0 | 0 | < 12 | < 12 |
| 3 | Al-Tex | Atlantic Ocean Paint | 2 | 2 | 2 | 1 | 4,000 | 116,000 |
| 4 | Avian | Avia Avian | 2 | 2 | 2 | 1 | 5,800 | 17,100 |
| 5 | Bee Brand 1000 | Nippon Paint | 2 | 2 | 2 | 1 | 7,400 | 98,000 |
| 6 | Bee Brand Junior 66 | Nippon Paint | 2 | 2 | 2 | 1 | 5,400 | 33,000 |
| 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 | 5,000 | 27,000 |
| 10 | Catylac | ICI | 1 | 1 | 1 | 1 | 290 | 290 |
| 11 | Clark + Kensington | Ace Hardware Corp. | 1 | 1 | 1 | 1 | 100 | 100 |
| 12 | Danalac | Danapaint | 2 | 2 | 2 | 1 | 5,300 | 52,000 |
| 13 | Decolux | Warna Agung | 1 | 1 | 1 | 1 | 2,800 | 2,800 |
| 14 | Delta | Putramataram Coating | 2 | 2 | 2 | 1 | 117 | 36,000 |
| 15 | Dulux Super Gloss | ICI | 1 | 0 | 0 | 0 | 11 | 11 |
| 16 | Dulux V-Gloss | ICI | 2 | 1 | 0 | 0 | 15 | 530 |
| 17 | Dulux Weather-Shield Gloss | ICI | 2 | 2 | 0 | 0 | 104 | 192 |
| 18 | Duplex | Penta Prima | 1 | 0 | 0 | 1 | 88,900 | 88,900 |
| 19 | Emco Lux | Mataram Paint | 2 | 1 | 1 | 1 | 12 | 103,000 |
| 20 | Envi | Indaco | 2 | 0 | 0 | 0 | 26 | 64 |
| 21 | Ftalit | Kansai Paint | 2 | 1 | 1 | 0 | 3,500 | 23,000 |
| 22 | Garuda | UKSA Paint | 2 | 1 | 1 | 1 | 360 | 16,000 |
| 23 | Glo-Tex | Pacific Paint | 2 | 0 | 0 | 0 | 15 | 24 |
| 24 | Jotun Gardex | Jotun | 1 | 1 | 0 | 0 | 100 | 100 |
| 25 | Kangaroo | Asia Sukma Chemindo | 1 | 0 | 0 | 0 | 63 | 63 |
| 26 | Kuda Terbang | Trico Paint Factory | 3 | 3 | 3 | 2 | 6,400 | 85,000 |
| 27 | Lenkote Platinum | Avia Avian | 2 | 2 | 2 | 0 | 780 | 3,400 |
| 28 | Mawar | Mikatasa Agung | 2 | 1 | 1 | 1 | 19 | 51,000 |
| 29 | Mowilex | Mowilex | 2 | 1 | 1 | 1 | < 12 | 115,000 |

| No | Brand | Manufacturer | No. of samples | No. of samples >90ppm lead | No. of samples >600ppm lead | No. of samples >10,000 ppm lead | Min. ppm | Max. ppm |
|---|---|---|---|---|---|---|---|---|
| 30 | Nippon Paint 9000 | Nippon Paint | 1 | 0 | 0 | 0 | 69 | 69 |
| 31 | Pacific WeatherGuard Gloss | Pacific Paint | 1 | 1 | 0 | 0 | 350 | 350 |
| 32 | Paiton 8000 | Nusantara Paint Indonesia | 1 | 1 | 1 | 1 | 36,600 | 36,600 |
| 33 | Propan DAE | Propan Raya | 1 | 1 | 0 | 0 | 111 | 111 |
| 34 | Property Glozz | Kansai Paint | 2 | 2 | 2 | 1 | 7,000 | 46,000 |
| 35 | Recolac | Trico Paint Factory | 2 | 2 | 2 | 1 | 2,900 | 47,600 |
| 36 | RJ London | RJ London | 7 | 6 | 6 | 2 | 19 | 37,000 |
| 37 | Seiv | Sumber Makmur Bahagia | 2 | 2 | 2 | 1 | 3,000 | 28,000 |
| 38 | Sendai | No info | 1 | 1 | 1 | 0 | 1,760 | 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 | 13 | 15,000 |
| 42 | Wita | No info | 1 | 1 | 1 | 1 | 23,400 | 23,400 |
| 43 | Yoko | Avia Avian | 2 | 2 | 2 | 1 | 8,320 | 47,900 |

## Lead concentration by color

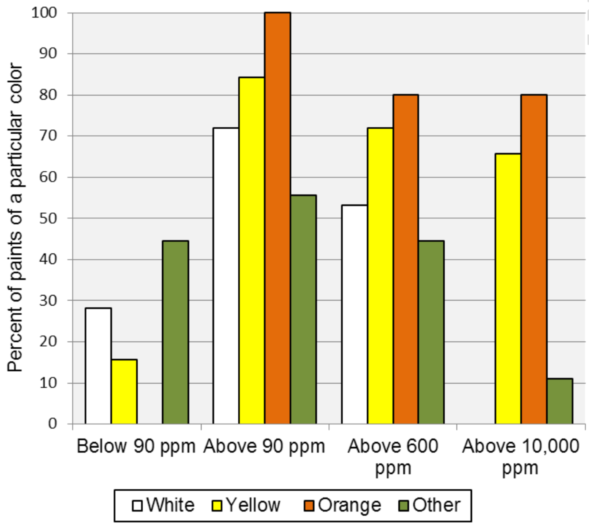


**Figure 7. Lead concentrations in analyzed paints arranged according to color.**

Of the 78 paint samples collected, 32 were white, 32 were yellow, 5 were orange and 9 were in other colors, including green, blue, brown, black, silver and gold.

More than 70% of sampled paints with yellow and orange colors contained lead levels above 600 ppm (Figure 7). 80% of the orange paints and more than 60% 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 in the Indonesian market

***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 6. Total lead concentration in paints from companies with major market shares (market data adapted from Harefa, 2013)**

| No. | Brands *(Company)* | Headquarters country | Market share (%) | No. of samples | Average (ppm) | Range (ppm) |
|---|---|---|---|---|---|---|
| 1 | Dulux & Catylac *(ICI/Akzo Nobel)* | Netherlands | 30.4 | 6 | 190 | 11 to 530 |
| 2 | Avian, Lenkote & Yoko *(Avia Avian)* | Indonesia | 17.3 | 6 | 13,900 | 780 to 47,900 |
| 3 | Nippon Paint 9000, Bee Brand Junior 66 & Bee Brand 1000 *(Nippon)* | Japan | 16.1 | 5 | 28,800 | 69 to 98,000 |
| 4 | Mowilex *(Mowilex)* | Indonesia | 6.1 | 2 | 57,500 | <12 to 115,000 |
| 5 | Danalac *(Danapaint)* | Indonesia | 4.0 | 2 | 28,700 | 5,300 to 52,000 |
| 6 | Glo-Tex and Pacific WeatherGuard Gloss *(Pacific Paint)* | Indonesia | 4.0 | 3 | 130 | 15 to 350 |
| 7 | Ftalit and Property Glozz *(Kansai)* | Japan | 2.0 | 4 | 19,900 | 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 & Clark+Kensington *(Ace Hardware Corp.)* | USA | - | 2 | 56 | <12 to 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 analyzed colors**

| No | Brand | Manufacturer | Country of brand head quarters | Country of manufacture | Min. ppm | Max. ppm | Colors analyzed[17] |
|---|---|---|---|---|---|---|---|
| 1 | ABC | San Central Indah | Indonesia | Indonesia | 107 | 87,000 | Yellow & White |
| 2 | Ace Rust Stop | Ace Hardware Corp. | USA | USA | < 12 | < 12 | Yellow |
| 3 | Al-Tex | Atlantic Ocean Paint | Indonesia | Indonesia | 4,000 | 116,000 | Yellow & White |
| 4 | Avian | Avia Avian | Indonesia | Indonesia | 5,800 | 17,100 | Yellow & White |
| 5 | Bee Brand 1000 | Nippon Paint | Japan | Indonesia | 7,400 | 98,000 | Yellow & White |
| 6 | Bee Brand Junior 66 | Nippon Paint | Japan | Indonesia | 5,400 | 33,000 | Yellow & White |
| 7 | Bintang Laut | Warnatama Cemerlang | Indonesia | Indonesia | 110 | 21,800 | Orange & White |
| 8 | Bitalac | Bital Asia | Indonesia | Indonesia | 18 | 52 | Gold & White |
| 9 | Brillo | Rajawali Hiyoto | Indonesia | Indonesia | 5,000 | 27,000 | Orange & White |
| 10 | Catylac | ICI | Netherlands | Indonesia | 290 | 290 | Green |
| 11 | Clark + Kensington | Ace Hardware Corp. | USA | USA | 100 | 100 | White |
| 12 | Danalac | Danapaint | Indonesia | Indonesia | 5,300 | 52,000 | Yellow & White |
| 13 | Decolux | Warna Agung | Indonesia | Indonesia | 2,800 | 2,800 | White |
| 14 | Delta | Putramataram Coating | Indonesia | Indonesia | 117 | 36,000 | Yellow & White |
| 15 | Dulux Super Gloss | ICI | UK | Indonesia | 11 | 11 | Yellow |
| 16 | Dulux V-Gloss | ICI | Netherlands | Indonesia | 15 | 530 | Orange & White |
| 17 | Dulux WeatherShield Gloss | ICI | Netherlands | Indonesia | 104 | 192 | Yellow & White |
| 18 | Duplex | Penta Prima | Indonesia | Indonesia | 88,900 | 88,900 | Yellow |
| 19 | Emco Lux | Mataram Paint | Indonesia | Indonesia | 12 | 103,000 | Yellow & White |
| 20 | Envi | Indaco | Indonesia | Indonesia | 26 | 64 | Yellow & White |
| 21 | Ftalit | Kansai Paint | Japan | Indonesia | 3,500 | 23,000 | Orange & White |
| 22 | Garuda | UKSA Paint | No info | No info | 360 | 16,000 | Yellow & White |
| 23 | Glo-Tex | Pacific Paint | Indonesia | Indonesia | 15 | 24 | Yellow & White |
| 24 | Jotun Gardex | Jotun | Norway | Indonesia | 100 | 100 | Yellow |
| 25 | Kangaroo | Asia Sukma Chemindo | Indonesia | Indonesia | 63 | 63 | Silver |

[17] *Generic color names are used instead of specific color names used by the company.*

| No | Brand | Manufacturer | Country of brand head quarters | Country of manufacture | Min. ppm | Max. ppm | Colors analyzed[17] |
|---|---|---|---|---|---|---|---|
| 26 | Kuda Terbang | Trico Paint Factory | Indonesia | Indonesia | 6,400 | 85,000 | Yellow & White |
| 27 | Lenkote Platinum | Avia Avian | Australia | Indonesia | 780 | 3,400 | Yellow & White |
| 28 | Mawar | Mikatasa Agung | Indonesia | Indonesia | 19 | 51,000 | Yellow & White |
| 29 | Mowilex | Mowilex | Indonesia | Indonesia | < 12 | 115,000 | Blue & Yellow |
| 30 | Nippon Paint 9000 | Nippon Paint | Japan | Indonesia | 69 | 69 | White |
| 31 | Pacific WeatherGuard Gloss | Pacific Paint | Indonesia | Indonesia | 350 | 350 | Yellow |
| 32 | Paiton 8000 | Nusantara Paint Indonesia | Indonesia | Indonesia | 36,600 | 36,600 | Yellow |
| 33 | Propan DAE | Propan Raya | Indonesia | Indonesia | 111 | 111 | Yellow |
| 34 | Property Glozz | Kansai Paint | Japan | Indonesia | 7,000 | 46,000 | Yellow & White |
| 35 | Recolac | Trico Paint Factory | Indonesia | Indonesia | 2,900 | 47,600 | Yellow & White |
| 36 | RJ London | RJ London | Singapore | No info | 19 | 37,000 | Black, Blue, Brown, Green, Silver, Yellow & White |
| 37 | Seiv | Sumber Makmur Bahagia | Indonesia | Indonesia | 3,000 | 28,000 | Yellow & White |
| 38 | Sendai | No info | Indonesia | Indonesia | 1,760 | 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 | 13 | 15,000 | Yellow & White |
| 42 | Wita | No info | No info | No info | 23,400 | 23,400 | Yellow |
| 43 | Yoko | Avia Avian | Indonesia | Indonesia | 8,320 | 47,900 | Orange & White |

## 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 lead content in paints analyzed in current study and earlier study[18]**

| Brand | Color | 2013 Lead study (paints purchased 8/12 to 3/13) Total lead concentration (ppm) | Earlier study (paints purchased 9/05 and 1/07) Total lead concentration (ppm) |
|---|---|---|---|
| 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** | | **20,000** | **15,900** |

[18] *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 18,500 ppm, which is among the highest found in any of the countries in the published literature (see Table 1). This average is 205 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.

## References

Advisory Committee on Childhood Lead Poisoning Prevention of the Centers for Disease Control and Prevention (2012). *Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention.* Available on http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf. Accessed on June 2, 2013.

Asia Pacific Coating Journal (2010). Market report. *Country Focus: Indonesia. Paint Sector Benefits from Indonesia's Economic Growth*. Available on http://www.growthconsulting.frost.com/web/images.nsf/0/A01DC38EC55ECCE3652577430040C4D9/$File/APCJ.FebMar10.Sheila.pdf. Accessed on May 28, 2013.

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. Available on http://dx.doi.org/10.1016/j.envres.2009.07.002. Accessed on May 15, 2013.

EFSA Panel on Contaminants in the Food Chain (CONTAM) (2013). Scientific opinion on lead in food. *EFSA Journal 8* (4):1570. Available on http://www.efsa.europa.eu/en/efsajournal/doc/1570.pdf. Accessed on June 1, 2013.

Fangqing, Wang (2011). Indonesian market facing double digit growth through 2012. *Asia Pacific Coatings Journal 24 (*04):8.

Frost and Sullivan (2010). *Strategic Analysis of the Paint and Coating Industry 2010*. Available on http://www.slideshare.net/FrostandSullivan/. Accessed on May 2, 2013.

Harefa, Faah (2013). *Tidak Mudah Bermain di Bisnis Cat.* Mars Indonesia Newsletter, 21 May 2013. Available on http://newsletter.marsindonesia.com/2013/05/21/tidak-mudah-bermain-di-bisnis-cat/. Accessed on May 31, 2013.

Johnson, Dr. Sapna; Saikia, Dr. Nirmali; Sahu, Mr. Ramakant (2009). *Lead in Paints*. Centre for Science and Environment. India. Available on http://www.cseindia.org/userfiles/lead_paints.pdf. Accessed on June 1, 2013.

Kementerian Pendidikan dan Kebudayaan Republik Indonesia (2011). *Mengenal Pendidikan Anak Usia Dini di Indonesia*. Available on http://paud.kemdiknas.go.id/index.php/home/bukaLinkBeritaRSS/1. Accessed on May 28, 2013.

Kumar, Abahy; Gottesfeld, Perry. (2008). Short Communication. Lead content in household paints in India. *Science of the Total Environment 407,* 2008, pp. 333–337. Available on http://dx.doi.org/10.1016/j.scitotenv.2008.08.038

Murao, Satoshi and Ono, Kyoko. (2012). *Current Status and Future of Lead-Based Paints and Pigments in Asia and the Pacific. Interim Report.* United Nations Environmental Programme Regional Office for Asia and the Pacific (UNEP-ROAP) and National Institute of Advanced Industrial Science and Technology (AIST). Tsukuba, Japan.

Needleman, Herbert (2004). Lead Poisoning. *Annual Review of Medicine 55*, 209–22. Available on http://www.rachel.org/files/document/Lead_Poisoning.pdf. Accessed on June 2, 2013.

Occupational Knowledge International (2013). Lead Paint Background. Available on http://www.okinternational.org/lead-paint/Background. Accessed on June 1, 2013.

US Centre for Disease Control & Prevention (2007). *Information on Childhood Lead Exposure*. Available on http://www.cdc.gov/Features/ChildhoodLead/. Accessed on May 31, 2013.

Weinberg, Jack (2009). *An NGO Guide to SAICM. The Strategic Approach to International Chemicals Management, A Framework for Action To Protect Human Health and the Environment From Toxic Chemicals.* International POPs Elimination Network. Available on http://www.ipen.org/ipenweb/documents/book/saicm%20introduction%20english.pdf. Accessed on April 20, 2013.

Weinberg, Jack and Clark, Scott (2012). *Global lead paint elimination by 2020: A test of the effectiveness of the Strategic Approach to International Chemicals Management.* IPEN. Available on http://ipen.org/pdfs/ipen_global_lead_paint_elimination_report_2012.pdf. Accessed on May 15, 2013.

World Health Organization (2006). *Preventing disease through healthy environments*. Available on http://www.who.int/quantifying_ehimpacts/publications/preventingdisease.pdf

WHO/UNECE (2007). *Health Risks of Heavy Metals from Long-Range Transboundary Air Pollution, Draft of May 2006.* Geneva, Switzerland.

World Health Organization (2010). *Childhood Lead Poisoning*. Available on http://www.who.int/ceh/publications/leadguidance.pdf.

## Appendix 1

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

| No | Sample number | Brand name | Paint can size | Price | | Manu-facture date | Batch number (if given) | Date of purchase | Information about lead on can |
|---|---|---|---|---|---|---|---|---|---|
| | | | | IDR | EUR* | | | | |
| 1 | IDA-164 | ABC | 1 L | 29,500 | 2.36 | N/A | B09…...0 (print not clear) | 25-Dec-12 | No |
| 2 | IDA-165 | ABC | 1 L | 29,500 | 2.36 | N/A | C22300 | 25-Dec-12 | No |
| 3 | IDA-107 | Ace Rust Stop | 1 L | 75,600 | 6.05 | N/A | 16639 N 0198 100317958 | 12-Dec-12 | Yes (Do not contain lead) |
| 4 | IDA-166 | Al-Tex | 1 L | 55,000 | 4.33 | N/A | 01310599 | 4-Jan-13 | No |
| 5 | IDA-167 | Al-Tex | 1 L | 55,000 | 4.33 | N/A | 11310074 | 4-Jan-13 | No |
| 6 | IDA-130 | Avian | 0.1 L | 8,500 | 0.71 | N/A | Not available | 26-Sep-12 | No |
| 7 | IDA-131 | Avian | 1 L | 41,400 | 3.31 | N/A | J-SBJ 22 | 25-Dec-12 | No |
| 8 | IDA-161 | Bee Brand 1000 | 1 L | 40,000 | 3.34 | N/A | BO DTCS | 21-Sep-12 | No |
| 9 | IDA-162 | Bee Brand 1000 | 1 L | 44,400 | 3.36 | N/A | P.BIOR | 19-Feb-13 | No |
| 10 | IDA-154 | Bee Brand Junior 66 | 1 L | 39,900 | 3.23 | N/A | PHRR | 27-Oct-12 | No |
| 11 | IDA-155 | Bee Brand Junior 66 | 1 L | 40,000 | 3.20 | N/A | PAAVR | 28-Dec-12 | No |
| 12 | IDA-110 | Bintang Laut | 1 L | 38,800 | 3.05 | N/A | 120829 | 5-Jan-13 | No |
| 13 | IDA-111 | Bintang Laut | 1 L | 27,100 | 2.34 | N/A | 10 1007 | 25-Aug-12 | No |
| 14 | IDA-126 | Bitalac | 1 L | 40,500 | 3.07 | N/A | 0663270101 | 19-Feb-13 | No (On website: "Toxicity, Heavy metal, Cu, Hg, Pb, As and etc: Negative) |
| 15 | IDA-128 | Bitalac | 1 L | 85,150 | 7.35 | N/A | 0674190103 | 25-Aug-12 | No (same as above) |
| 16 | IDA-158 | Brillo | 1 L | 40,200 | 3.22 | N/A | S1096730068 | 25-Dec-12 | No |
| 17 | IDA-159 | Brillo | 1 L | 40,200 | 3.47 | N/A | S2206830115 | 25-Aug-12 | No |
| 18 | IDA-144 | Catylac | 1 L | 37,000 | 2.80 | N/A | 42096 99/46 | 19-Feb-13 | Yes (No added lead) |
| 19 | IDA-105 | Clark + Kensington | 1 L | 169,000 | 13.53 | N/A | 1430834 11255 110720901 N | 12-Dec-12 | Yes (Do not contain lead) |
| 20 | IDA-146 | Danalac | 1 L | 35,720 | 2.90 | N/A | 12048637 | 23-Oct-12 | No |
| 21 | IDA-147 | Danalac | 1 L | 39,900 | 3.19 | N/A | 12100049 | 25-Dec-12 | No |
| 22 | IDA-100 | Decolux | 1 L | 35,000 | 2.80 | N/A | 8M-J121M-06 | 13-Dec-12 | No |
| 23 | IDA-148 | Delta | 0.5 L | 25,000 | 2.00 | N/A | 1044.11111115 | 4-Dec-12 | No |
| 24 | IDA-149 | Delta | 0.2 L | 15,000 | 1.20 | N/A | 0289.10040915 | 4-Dec-12 | No |
| 25 | IDA-145 | Dulux Super Gloss | 1 L | 79,000 | 6.32 | N/A | 727 449/32 | 25-Dec-12 | Yes (No added lead) |
| 26 | IDA-108 | Dulux V-Gloss | 1 L | 41,200 | 3.24 | N/A | 5135821 4503416258 | 5-Jan-13 | Yes (No added lead) |
| 27 | IDA-109 | Dulux V-Gloss | 1 L | 40,500 | 3.49 | N/A | 47575 8/53 | 25-Aug-12 | Yes (No added lead) |
| 28 | IDA-152 | Dulux WeatherShield Gloss | 1 L | 68,360 | 5.47 | N/A | 5135531 4503109406 | 25-Dec-12 | Yes (No added lead) |
| 29 | IDA-153 | Dulux WeatherShield Gloss | 1 L | 78,098 | 6.25 | N/A | 5135521 4502353636 | 25-Dec-12 | Yes (No added lead) |
| 30 | IDA-119 | Duplex | 0.1 L | 7,000 | 0.56 | N/A | LD1295 | 1-Nov-12 | No |
| 31 | IDA-142 | Emco Lux | 1 L | 45,000 | 3.54 | N/A | IIZHQQ | 28-Jan-13 | No |
| 32 | IDA-143 | Emco Lux | 1 L | 48,500 | 4.04 | N/A | IIZZBZ | 21-Sep-12 | No |
| 33 | IDA-169 | Envi | 0.1 L | 8,000 | 0.63 | N/A | 3112110640 | 28-Jan-13 | Yes (No added lead) |

*Based on the European Commission's official EUR to IDR exchange rate on the month of purchase.*

| No | Sample number | Brand name | Paint can size | Price IDR | Price EUR* | Manu-facture date | Batch number (if given) | Date of purchase | Information about lead on can |
|---|---|---|---|---|---|---|---|---|---|
| 34 | IDA-170 | Envi | 0.1 L | 8,000 | 0.63 | N/A | 3112110340 | 28-Jan-13 | Yes (No added lead) |
| 35 | IDA-132 | Ftalit | 1 L | 46,500 | 3.72 | N/A | 2101543 | 25-Dec-12 | No |
| 36 | IDA-133 | Ftalit | 1 L | 45,980 | 3.97 | N/A | 2050858 | 25-Aug-12 | No |
| 37 | IDA-136 | Garuda | 0.1 L | 6,000 | 0.48 | N/A | Not available | 28-Dec-12 | No |
| 38 | IDA-137 | Garuda | 0.1 L | 6,000 | 0.48 | N/A | Not available | 28-Dec-12 | No |
| 39 | IDA-117 | Glo-Tex | 0.1 L | 7,500 | 0.60 | N/A | 20613119 09:29 | 13-Dec-12 | No |
| 40 | IDA-118 | Glo-Tex | 1 L | 45,000 | 3.61 | N/A | 4100 481 10610443 07:51 | 1-Nov-12 | Yes (Lead-free) |
| 41 | IDA-160 | Jotun Gardex | 1 L | 68,000 | 5.67 | N/A | DK4319099A 2W6MBSATB | 21-Sep-12 | Yes (100% lead free) |
| 42 | IDA-176 | Kangaroo | 0.1 L | 10,000 | 0.79 | N/A | 111102 | 2-Mar-13 | No |
| 43 | IDA-122 | Kuda Terbang | 0.1 L | 8,000 | 0.64 | N/A | BCOE BOAB | 1-Nov-12 | No |
| 44 | IDA-123 | Kuda Terbang | 0.1 L | 7,500 | 0.60 | N/A | COOH BOAB | 13-Dec-12 | No |
| 45 | IDA-163 | Kuda Terbang 1/2 Duco | 1 L | 42,000 | 3.50 | N/A | BBOA/ROT | 1-Sep-12 | No |
| 46 | IDA-124 | Lenkote Platinum | 1 L | 73,800 | 5.59 | N/A | S-ICA 04.1 | 19-Feb-13 | No |
| 47 | IDA-125 | Lenkote Platinum | 1 L | 63,000 | 5.11 | N/A | S-IBC 01.1 | 27-Oct-12 | No |
| 48 | IDA-150 | Mawar | 0.5 L | 35,000 | 2.75 | N/A | CNA 091 | 4-Jan-13 | No |
| 49 | IDA-151 | Mawar | 1 L | 45,000 | 3.54 | N/A | OL 1415 | 4-Jan-13 | No |
| 50 | IDA-115 | Mowilex | 1 L | 65,000 | 5.22 | N/A | 5203 5 | 1-Nov-12 | No |
| 51 | IDA-116 | Mowilex | 1 L | 60,000 | 4.81 | N/A | 6107 10 | 12-Nov-12 | No |
| 52 | IDA-177 | Nippon Paint 9000 | 1 L | 74,700 | 5.88 | N/A | 12062201715 | 2-Mar-13 | No |
| 53 | IDA-104 | Pacific WeatherGuard Gloss | 1 L | 42,500 | 3.40 | N/A | 4310 10002 00705448 13:08 | 13-Dec-12 | Yes (Chrome lead free) |
| 54 | IDA-101 | Paiton 8000 | 1 L | 35,000 | 2.80 | N/A | KJ 18 | 13-Dec-12 | No |
| 55 | IDA-168 | Propan DAE | 2.5 L | 295,000 | 22.35 | N/A | B#3032056100 | 19-Feb-13 | No |
| 56 | IDA-127 | Property Glozz | 1 L | 37,000 | 3.00 | N/A | 2051964 | 23-Oct-12 | No |
| 57 | IDA-129 | Property Glozz | 1 L | 35,150 | 2.81 | N/A | 2100647 | 25-Dec-12 | No |
| 58 | IDA-102 | Recolac | 1 L | 30,000 | 2.40 | N/A | 181111 | 13-Dec-12 | No |
| 59 | IDA-103 | Recolac | 1 L | 42,500 | 3.40 | N/A | 0A0T0Y | 13-Dec-12 | No |
| 60 | IDA-138 | RJ London | 0.1 L | 6,700 | 0.51 | N/A | 332122.KK | 27-Feb-13 | No |
| 61 | IDA-139 | RJ London | 0.1 L | 6,700 | 0.54 | N/A | 271922.KBB | 25-Dec-12 | No |
| 62 | IDA-171 | RJ London | 0.1 L | 6,700 | 0.51 | N/A | 341321KKI | 27-Feb-13 | No |
| 63 | IDA-172 | RJ London | 0.1 L | 6,700 | 0.51 | N/A | 121819.IX | 27-Feb-13 | No |
| 64 | IDA-173 | RJ London | 0.1 L | 6,700 | 0.51 | N/A | 252022.BK | 27-Feb-13 | No |
| 65 | IDA-174 | RJ London | 0.1 L | 6,700 | 0.51 | N/A | 241822.KBB | 27-Feb-13 | No |
| 66 | IDA-175 | RJ London | 1 L | 29,000 | 2.28 | N/A | 332120 T4DI 18 | 2-Mar-13 | No |
| 67 | IDA-156 | Seiv | 1 L | 45,000 | 3.75 | N/A | 13G12 | 1-Sep-12 | No |
| 68 | IDA-157 | Seiv | 1 L | 45,000 | 3.60 | N/A | Not available | 28-Dec-12 | No |
| 69 | IDA-106 | Sendai | 1 L | 25,000 | 2.00 | N/A | S1187550078 | 13-Dec-12 | No |
| 70 | IDA-120 | Super Lux | 0.1 L | 7,500 | 0.60 | N/A | LF 13 | 13-Dec-12 | No |
| 71 | IDA-121 | Super Lux | 0.1 L | 7,500 | 0.60 | N/A | LF 28 | 13-Dec-12 | No |
| 72 | IDA-140 | Synthetic 2000 | 1 L | 34,560 | 2.77 | N/A | B*3100476200 | 25-Dec-12 | No |
| 73 | IDA-141 | Synthetic 2000 | 1 L | 34,560 | 2.80 | N/A | B*3121825000 | 23-Oct-12 | No |
| 74 | IDA-134 | Vim | 1 L | 30,000 | 2.36 | N/A | HC0671 | 28-Jan-13 | No |
| 75 | IDA-135 | Vim | 1 L | 30,000 | 2.36 | N/A | LD0239 | 28-Jan-13 | No |
| 76 | IDA-114 | Wita | 1 L | 25,000 | 2.01 | N/A | 171105 | 12-Nov-12 | No |
| 77 | IDA-112 | Yoko | 1 L | 27,100 | 2.13 | N/A | J-SBK 19 | 5-Jan-13 | No |
| 78 | IDA-113 | Yoko | 1 L | 27,100 | 2.34 | N/A | J-SAK 02 | 25-Aug-12 | No |

## Appendix 2

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

| No. | Sample number | Brand name | Manufacturer | Country of brand headquarters | Country of manufacture | Color of paint | Is there information on can about lead content? | Lead content (ppm) |
|---|---|---|---|---|---|---|---|---|
| 1 | IDA-100 | Decolux | Warna Agung | Indonesia | Indonesia | White | No | 2,800 |
| 2 | IDA-101 | Paiton 8000 | Nusantara Paint Indonesia | Indonesia | Indonesia | 881 Yellow | No | 36,600 |
| 3 | IDA-102 | Recolac | Trico Paint Factory | Indonesia | Indonesia | 980 Lemon | No | 47,600 |
| 4 | IDA-103 | Recolac | Trico Paint Factory | Indonesia | Indonesia | 063 White | No | 2,900 |
| 5 | IDA-104 | Pacific WeatherGuard Gloss | Pacific Paint | Indonesia | Indonesia | Yellow | Yes (Chrome lead free) | 350 |
| 6 | IDA-105 | Clark + Kensington | Ace Hardware Corp. | USA | USA | Ultra white | Yes (Do not contain lead) | 100 |
| 7 | IDA-106 | Sendai | No information | Indonesia | Indonesia | 110 White | No | 1,760 |
| 8 | IDA-107 | Ace Rust Stop | Ace Hardware Corp. | USA | USA | Safety yellow | Yes (Do not contain lead) | 12 |
| 9 | IDA-108 | Dulux V-Gloss | ICI Paints | Netherlands | Indonesia | White | Yes (No added lead) | 15 |
| 10 | IDA-109 | Dulux V-Gloss | ICI Paints | Netherlands | Indonesia | Cinnabar orange | Yes (No added lead) | 530 |
| 11 | IDA-110 | Bintang Laut | Warnatama Cemerlang | Indonesia | Indonesia | B White | No | 110 |
| 12 | IDA-111 | Bintang Laut | Warnatama Cemerlang | Indonesia | Indonesia | B20 Bright orange | No | 21,800 |
| 13 | IDA-112 | Yoko | Avia Avian | Indonesia | Indonesia | Super white | No | 8,320 |
| 14 | IDA-113 | Yoko | Avia Avian | Indonesia | Indonesia | 781 Bright orange | No | 47,900 |
| 15 | IDA-114 | Wita | No information | No info | No info | 142 Yellow | No | 23,400 |
| 16 | IDA-115 | Mowilex | Mowilex | Indonesia | Indonesia | 675 Popcorn | No | 115,000 |
| 17 | IDA-116 | Mowilex | Mowilex | Indonesia | Indonesia | 610 Velvet sky | No | 12 |
| 18 | IDA-117 | Glo-Tex | Pacific Paint | Indonesia | Indonesia | White | No | 15 |
| 19 | IDA-118 | Glo-Tex | Pacific Paint | Indonesia | Indonesia | Yellow | Yes (Lead-free) | 24 |
| 20 | IDA-119 | Duplex | Penta Prima | Indonesia | Indonesia | 606 Golden yellow | No | 88,900 |
| 21 | IDA-120 | Super Lux | CV Bumi Nusantara Indah | Indonesia | Indonesia | Yellow | No | 50,600 |
| 22 | IDA-121 | Super Lux | CV Bumi Nusantara Indah | Indonesia | Indonesia | White | No | 6,000 |
| 23 | IDA-122 | Kuda Terbang | Trico Paint Factory | Indonesia | Indonesia | 922 Yellow | No | 6,400 |
| 24 | IDA-123 | Kuda Terbang | Trico Paint Factory | Indonesia | Indonesia | White | No | 10,000 |
| 25 | IDA-124 | Lenkote Platinum | Avia Avian | Australia | Indonesia | 01 Absolute white | No | 780 |
| 26 | IDA-125 | Lenkote Platinum | Avia Avian | Australia | Indonesia | 16 Bright spirit | No | 3,400 |
| 27 | IDA-126 | Bitalac | Bital Asia | Indonesia | Indonesia | 1001 Super white | No | 52 |

| No. | Sample number | Brand name | Manufacturer | Country of brand headquarters | Country of manufacture | Color of paint | Is there information on can about lead content? | Lead content (ppm) |
|---|---|---|---|---|---|---|---|---|
| 28 | IDA-127 | Property Glozz | Kansai Paint | Japan | Indonesia | 007 Summer sun | No | 46,000 |
| 29 | IDA-128 | Bitalac | Bital Asia | Indonesia | Indonesia | 1064 Spanish gold | No | 18 |
| 30 | IDA-129 | Property Glozz | Kansai Paint | Japan | Indonesia | 033 Super white | No | 7,000 |
| 31 | IDA-130 | Avian | Avia Avian | Indonesia | Indonesia | Yellow | No | 17,100 |
| 32 | IDA-131 | Avian | Avia Avian | Indonesia | Indonesia | White | No | 5,800 |
| 33 | IDA-132 | Ftalit | Kansai Paint | Japan | Indonesia | 203 Irish white | No | 3,500 |
| 34 | IDA-133 | Ftalit | Kansai Paint | Japan | Indonesia | 600 Bright orange | No | 23,000 |
| 35 | IDA-134 | Vim | Penta Prima | Indonesia | Indonesia | 906 Yellow | No | 15,000 |
| 36 | IDA-135 | Vim | Penta Prima | Indonesia | Indonesia | White | No | 13 |
| 37 | IDA-136 | Garuda | UKSA Paint | No info | No info | White | No | 360 |
| 38 | IDA-137 | Garuda | UKSA Paint | No info | No info | Yellow | No | 16,000 |
| 39 | IDA-138 | RJ London | RJ London | Singapore | No info | 500 Yellow | No | 37,000 |
| 40 | IDA-139 | RJ London | RJ London | Singapore | No info | 102 Super white | No | 2,400 |
| 41 | IDA-140 | Synthetic 2000 | Propan Raya | Indonesia | Indonesia | 9102 Super white | No | 23 |
| 42 | IDA-141 | Synthetic 2000 | Propan Raya | Indonesia | Indonesia | 1207 Golden yellow | No | 16 |
| 43 | IDA-142 | Emco Lux | Mataram Paint | Indonesia | Indonesia | White | No | 12 |
| 44 | IDA-143 | Emco Lux | Mataram Paint | Indonesia | Indonesia | 117 Lemon yellow | No | 103,000 |
| 45 | IDA-144 | Catylac | ICI Paints | Netherlands | Indonesia | Army green | Yes (No added lead) | 290 |
| 46 | IDA-145 | Dulux Super Gloss | ICI Paints | UK* | Indonesia | Golden honey | Yes (No added lead) | 11 |
| 47 | IDA-146 | Danalac | Danapaint | Indonesia | Indonesia | Golden canary | No | 52,000 |
| 48 | IDA-147 | Danalac | Danapaint | Indonesia | Indonesia | White | No | 5,300 |
| 49 | IDA-148 | Delta | Putramataram Coating | Indonesia | Indonesia | White | No | 117 |
| 50 | IDA-149 | Delta | Putramataram Coating | Indonesia | Indonesia | 967 Golden yellow | No | 36,000 |
| 51 | IDA-150 | Mawar | Mikatasa Agung | Indonesia | Indonesia | 117 Lemon yellow | No | 51,000 |
| 52 | IDA-151 | Mawar | Mikatasa Agung | Indonesia | Indonesia | White | No | 19 |
| 53 | IDA-152 | Dulux Weather-Shield Gloss | ICI Paints | Netherlands | Indonesia | White | Yes (No added lead) | 104 |
| 54 | IDA-153 | Dulux Weather-Shield Gloss | ICI Paints | Netherlands | Indonesia | Tuscany yellow | Yes (No added lead) | 192 |
| 55 | IDA-154 | Bee Brand Junior 66 | Nippon Paint | Japan | Indonesia | 602 Golden yellow | No | 33,000 |
| 56 | IDA-155 | Bee Brand Junior 66 | Nippon Paint | Japan | Indonesia | 9102 Super white | No | 5,400 |
| 57 | IDA-156 | Seiv | Sumber Makmur Bahagia | Indonesia | Indonesia | 500 Lemon yellow | No | 28,000 |

| No. | Sample number | Brand name | Manufacturer | Country of brand headquarters | Country of manufacture | Color of paint | Is there information on can about lead content? | Lead content (ppm) |
|---|---|---|---|---|---|---|---|---|
| 58 | IDA-157 | Seiv | Sumber Makmur Bahagia | Indonesia | Indonesia | 180 Super white | No | 3,000 |
| 59 | IDA-158 | Brillo | Rajawali Hiyoto | Indonesia | Indonesia | 1111 Super white | No | 5,000 |
| 60 | IDA-159 | Brillo | Rajawali Hiyoto | Indonesia | Indonesia | 4480 Pumpkin | No | 27,000 |
| 61 | IDA-160 | Jotun Gardex | Jotun | Norway | Indonesia | Yellow | Yes (100% lead free) | 100 |
| 62 | IDA-161 | Bee Brand 1000 | Nippon Paint | Japan | Indonesia | 166 Mayan yellow | No | 98,000 |
| 63 | IDA-162 | Bee Brand 1000 | Nippon Paint | Japan | Indonesia | 119 Thick white | No | 7,400 |
| 64 | IDA-163 | Kuda Terbang 1/2 Duco | Trico Paint Factory | Indonesia | Indonesia | 980 Lemon | No | 85,000 |
| 65 | IDA-164 | ABC | San Central Indah | Indonesia | Indonesia | 955 Sunshine | No | 87,000 |
| 66 | IDA-165 | ABC | San Central Indah | Indonesia | Indonesia | 901 White | No | 107 |
| 67 | IDA-166 | Al-Tex | Atlantic Ocean Paint | Indonesia | Indonesia | 18 Yellow | No | 116,000 |
| 68 | IDA-167 | Al-Tex | Atlantic Ocean Paint | Indonesia | Indonesia | White | No | 4,000 |
| 69 | IDA-168 | Propan DAE | Propan Raya | Indonesia | Indonesia | Traffic yellow | No | 111 |
| 70 | IDA-169 | Envi | Indaco | Indonesia | Indonesia | 908 Lemon yellow | Yes (No added lead) | 26 |
| 71 | IDA-170 | Envi | Indaco | Indonesia | Indonesia | 945 Brilliant white | Yes (No added lead) | 64 |
| 72 | IDA-171 | RJ London | RJ London | Singapore | No info | 308 Romance blue | No | 3,400 |
| 73 | IDA-172 | RJ London | RJ London | Singapore | No info | 403 Spring green | No | 31,000 |
| 74 | IDA-173 | RJ London | RJ London | Singapore | No info | 200 Black | No | 4,700 |
| 75 | IDA-174 | RJ London | RJ London | Singapore | No info | 903 Brown | No | 6,100 |
| 76 | IDA-175 | RJ London | RJ London | Singapore | No info | Silver | No | 19 |
| 77 | IDA-176 | Kangaroo | Asia Sukma Chemindo | Indonesia | Indonesia | Silver | No | 63 |
| 78 | IDA-177 | Nippon Paint 9000 | Nippon Paint | Japan | Indonesia | White | No | 69 |

**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 | Number of samples with above 90 ppm lead | Number of samples with above 600 ppm lead | Number of samples with above 10,000 ppm lead | Minimum ppm | Maximum ppm |
|---|---|---|---|---|---|---|---|---|
| White | 32 | 2,580 | 9 | 23 | 17 | 0 | 12 | 10,000 |
| Yellow | 32 | 37,300 | 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 |
| **TOTAL** | **78** | | | | | | | |

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