About Toxics Link

Toxics Link is an Indian environmental research and advocacy organization set up in 1996, engaged in disseminating information to help strengthen the campaign against toxics pollution, provide cleaner alternatives and bring together groups and people affected by this problem.

Toxics Link’s Mission Statement - “Working together for environmental justice and freedom from toxics. We have taken upon ourselves to collect and share both information about the sources and the dangers of poisons in our environment and bodies, and information about clean and sustainable alternatives for India and the rest of the world.” Toxics Link has a unique expertise in areas of hazardous, medical and municipal wastes, international waste trade, and the emerging issues of pesticides, Persistent Organic Pollutants (POPs), hazardous heavy metal contamination etc. from the environment and public health point of view. We have successfully implemented various best practices and have brought in policy changes in the aforementioned areas apart from creating awareness among several stakeholder groups.

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STUDY ON LEAD IN PAINTS IN INDIA 2019
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Toxics Link is publishing this report to mark the occasion of International Lead Poisoning Prevention Week of Action, 2019, which is being observed globally to phase out lead from household paints. We would like to thank Mr. Ravi Agarwal, Director and Mr. Satish Sinha, Associate Director, Toxics Link for their constant support and encouragement during this study. We also extend our gratitude to our fellow colleagues at Toxics Link, for providing support and guidance in finalizing the report.

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Finally, our sincere thanks to International POPs Elimination Network (IPEN), which is spearheading the campaign across the globe to eliminate lead from paints for their unending support. We would also like to thank Shri K K Sengupta for providing his technical advice and for facilitating the survey.

Also we would like to extend our heartfelt thanks to NABL-accredited SPECTRO Analytical Labs Limited, E-41, Okhla Industrial Area, Phase-II, New Delhi – 110020, for conducting lead testing in paint samples.
CHAPTER 1

INTRODUCTION
Lead (Pb), a toxic heavy metal is being used in paints since ages. However after the health impacts of lead came into the limelight, many countries in Europe and USA started taking decisive action to phase out lead from paints. But the issue was never addressed in the developing countries. Toxics link first released a report in India in 2007 and found very high content of lead in paints sold in India. Following this Toxics Link and International POPs Elimination Network (IPEN) jointly published a report in 2009 covering ten developing countries and found high content of lead in paints sold in all these countries. The report received international attention and triggered global action to eliminate lead from paints. Subsequently the issue was accepted as an emerging policy subject in Strategic Approach to Chemical Management (SAICM) and the Global Alliance to Eliminate Lead Paint (GAELP) was mooted jointly by the World Health Organization (WHO) and the United Nations Environment Programme (UNEP) to focus and catalyze the efforts to achieve international goals to prevent children’s exposure to paints containing lead and to minimize occupational exposures to lead paint.

### Lead Exposure Pathway

The presence of lead in the paints is attributed to two sources: one is the intentional addition of lead to give paints certain properties such as color, shine, durability and reduced corrosion on metal surfaces or faster drying time. Another source is the unintentional addition due to usage of lead contaminated raw materials. Once the paint is used at the household level it can contaminate the environment and cause adverse human health impacts.

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**Figure 1: Pathway of lead through paints to human body**

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1. Environmental investigation for mass lead poisoning among children in industrial area of Samutsakorn Thailand
Once lead reaches the human body it is capable of causing a number of health impacts (both acute and chronic) in all age groups. It accumulates in the body and affects practically all the organ systems. Young children and pregnant women are most vulnerable to lead poisoning even at low concentrations because the nervous system of the child is in a developing stage. Children getting exposed to lead in early childhood are prone to reduction in cognitive abilities, dyslexia, attention deficit disorder and antisocial behavior. Lead exposure can also lead to hypertension, renal impairment, immunotoxicity and toxicity to the reproductive organs. Absorption of large amounts of lead can cause coma, convulsions and even death. Children who survive severe lead poisoning can be left with permanent neurological injury such as deafness and mental retardation.

**Efforts to eliminate lead from paints**

The issue of Lead in paints was never discussed in India until 2007 when Toxics Link did the first-of-its-kind study on Lead in paints. The study reflected a grim scenario as high content of Lead in the paints was detected in almost all the brands. Subsequently, Toxics link carried out a number of studies and found that though the major manufacturers have shifted to lead-free paints there are still concerns on the use of Lead in paints by the small and medium scale enterprises.

Finally the Government of India acted upon the issue and it notified the “Regulation on Lead contents in Household and Decorative Paints Rules, 2016” on 1st November, 2016 which came into force from 1st November, 2017.

**Trend**

The trend depicted below reflects data collected over the years in a number of studies conducted by Toxics Link (2013, 2015, 2017, 2018 and 2019). The data set has lead content analyzed in different paint samples tested from across the country.

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2 Concerns and challenges of Lead in Paints in India, Toxics Link, 2018
The above trend clearly points out to the weak implementation of the Lead in Paints regulations. Studies conducted in the year 2013 and 2015 found high lead content in the analyzed paint samples when there was no regulation in the country. However, despite of a regulation being notified in the country in 2016, no improvement can be observed. In fact, the latest 2019 study has found lowest lead content as 189 ppm which is way above the 90 ppm mark.

Since, the chart discusses the outcomes of SME paint samples, it raises serious concerns about the compliance of the regulation in the country.

**Regulation on Lead in Paints in India**

**The Regulation on Lead contents in Household and Decorative Paints Rules, 2016**

Salient features of the rules:

- **Prohibition**: Prohibition of manufacturing, trade, export and import of household and decorative paints containing metallic lead in concentration exceeding 90 parts per million.
- **Self-Certification**: Household and decorative paints manufactured or imported after
November, 2017 should have the label: “Lead contents do not exceed 90 parts per million” along with the manufacturing/importing date.

- **Transitory Provision**: The rules had set a window of two years for sale of the paints manufactured before commencement of the legislation till November 2017.

- **Testing**: The manufacturers and importers are also required to get their products tested once a year before putting them in supply chain. The rule has also identified The Central Power Research Institute as the authorized testing agency.

As per the provisions of the rules, on 31st October, 2017 the Central Pollution Control Board notified the Procedure for Measurement of Lead contents in Household and Decorative Paints-Reg. explaining the applicability, requirements and testing procedure for the Lead in Paint Regulations. The document provides details on the assessment of existing and new paints and provides the sampling and testing protocol. It also entails the procedure for analysis of Lead in Paint and lists out authorized agencies for testing, implementation and monitoring.

**Alternatives to Lead in Paints**

**Table 1: Alternatives of Lead in Paint formulation**

<table>
<thead>
<tr>
<th>Drying Agents</th>
<th>Pigments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strontium/Zirconium</td>
<td>- <strong>Titanium dioxide</strong> is used as the alternative to white pigments. It has excellent pigment properties and less toxicity.</td>
</tr>
<tr>
<td></td>
<td>- No 1:1 replacement for lead chromate pigments exist but there are a number of organic (such as Azo type and High performing pigments) and inorganic pigments that can be blended together to produce the desired colors and performance such as chromates or cadmium.</td>
</tr>
<tr>
<td></td>
<td>Zirconium can cause certain health effects. 3 parts of Zr is required to replace 4 parts of Lead. Additional additives may also be required.</td>
</tr>
</tbody>
</table>

4 [https://wedocs.unep.org/bitstream/handle/20.500.11822/25113/GAELP_CEE_10%20Alternatives%20to%20lead%20paint.pdf?sequence=1&isAllowed=y](https://wedocs.unep.org/bitstream/handle/20.500.11822/25113/GAELP_CEE_10%20Alternatives%20to%20lead%20paint.pdf?sequence=1&isAllowed=y)
CHAPTER 2

METHODOLOGY
**Importance of the study**

The present study was conceived to get an overview of the present compliance status of lead-safe paints available in India, in the context of lead in paints regulations. The compliance of Lead in paints regulations is critical considering children’s health and environment. Furthermore, efforts have been made to reach out to the small and medium-sized manufacturers to understand the challenges in shifting to lead-free paints.

Toxics Link with the help of the partner NGOs conducted a brief survey of the paint markets in different parts of the country (Rajasthan, Andhra Pradesh, Punjab, and Odisha) to identify the brands that are commonly available in the market. During the survey efforts were made to reach out to the small and medium manufacturers. After identification of the brands, samples of enamel paint were collected from all these places (including Delhi) between July 2019 and September 2019.

In this study, a total of 17 samples of enamel paint of different brands manufactured by small and medium enterprises were collected. The samples were manufactured during or after the year 2018 as the lead in Paint Regulation, 2016 has been implemented since November 2017.
During the paint sample preparation, information such as color, brand, country of manufacture, purchase details, manufacturing date as provided on the label of the paint can were recorded. The availability of these paints in retail establishments suggested that they were intended to be used for homes. For the purpose of testing, bright and dark colours such as yellow, green, red, blue, cherry, etc. were selected.

Each can of paint was thoroughly stirred and was subsequently applied onto individually numbered specific sized transparent glass plates. Some samples were prepared in duplicate to check the testing performance. Each stirring utensil and paintbrush was used only once, and extra caution was taken to avoid cross contamination. All samples were kept in a closed room till they were completely dried and after complete drying, the glass plates were placed in individual resalable plastic bags and sent to the NABL accredited laboratory (SPECTRO analytical lab. Ltd., Okhla, New Delhi) for analysis of total lead content of dry weight of the paint. The paint samples were analyzed using the CPSC-CH-E1003-09 (Inductively Coupled Plasma (ICP) spectroscopy method, as recognized by both the WHO and the United States Consumer Product Safety Commission as appropriate for the purpose.\(^5\)\(^6\)

**Figure 5: Paint sample preparation on glass**

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FIGURE 6: DRIED PAINT SAMPLES
CHAPTER 3

STUDY OUTCOMES
In the present study 20 samples (which includes 3 samples in duplicate) were analyzed for total lead content. The detailed results are presented in the table below (Table 2)

- All the analyzed paint samples have lead level above 90 ppm
- The lead content was observed between 189 ppm to 1092 ppm which is above the prescribed standard of 189 ppm as per the regulation.
- The lowest lead content (189ppm) was observed in a P O red colored sample collected from Odisha. This sample can was labeled as “less than 90 ppm of lead”
- The highest lead concentration 10929 ppm was observed in a golden yellow colored paint collected from Rajasthan
- The samples collected from Delhi clearly mentioned , ‘no added lead’ but both the samples were found to have 49321 ppm (golden yellow) and 473 ppm (cherry) of lead.

### Table 2: Lead Content in Analyzed Paint Samples

<table>
<thead>
<tr>
<th>SN</th>
<th>Sample Code</th>
<th>State</th>
<th>Colour</th>
<th>Year of Manf.</th>
<th>Lead content</th>
<th>Results (PPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TL - 01</td>
<td>Andhra Pradesh</td>
<td>P.O Red</td>
<td>2019</td>
<td>Not mentioned</td>
<td>85444</td>
</tr>
<tr>
<td>2</td>
<td>TL - 02</td>
<td>Andhra Pradesh</td>
<td>Oxford Blue</td>
<td>2018</td>
<td>Not mentioned</td>
<td>3932</td>
</tr>
<tr>
<td>3</td>
<td>TL - 03</td>
<td>Andhra Pradesh</td>
<td>Bus Green</td>
<td>2018</td>
<td>Not mentioned</td>
<td>57198</td>
</tr>
<tr>
<td>4</td>
<td>TL - 04</td>
<td>Andhra Pradesh</td>
<td>Golden yellow</td>
<td>2018</td>
<td>Not mentioned</td>
<td>74972</td>
</tr>
<tr>
<td>5</td>
<td>TL - 05</td>
<td>Delhi</td>
<td>G. Yellow</td>
<td>2018</td>
<td>No added lead</td>
<td>49321</td>
</tr>
<tr>
<td>6</td>
<td>TL - 06</td>
<td>Delhi</td>
<td>Cherry</td>
<td>2019</td>
<td>No added lead</td>
<td>473</td>
</tr>
<tr>
<td>7</td>
<td>TL - 07</td>
<td>Delhi</td>
<td>P.O. Red</td>
<td>2019</td>
<td>Not mentioned</td>
<td>37268</td>
</tr>
<tr>
<td>8</td>
<td>TL - 08</td>
<td>Delhi</td>
<td>G. Yellow</td>
<td>2019</td>
<td>Not mentioned</td>
<td>57563</td>
</tr>
<tr>
<td>9</td>
<td>TL - 09</td>
<td>Delhi</td>
<td>Phiroza</td>
<td>2019</td>
<td>Not mentioned</td>
<td>2946</td>
</tr>
<tr>
<td>10</td>
<td>TL - 10</td>
<td>Odisha</td>
<td>P.O Red</td>
<td>2018</td>
<td>Less than 90 ppm</td>
<td>189</td>
</tr>
<tr>
<td>11</td>
<td>TL - 11</td>
<td>Punjab</td>
<td>P.O. RED</td>
<td>2019</td>
<td>Not mentioned</td>
<td>50714</td>
</tr>
<tr>
<td>12</td>
<td>TL - 12</td>
<td>Punjab</td>
<td>P.O. RED</td>
<td>2019</td>
<td>Not mentioned</td>
<td>55978</td>
</tr>
<tr>
<td>13</td>
<td>TL - 13</td>
<td>Punjab</td>
<td>P.O. Red</td>
<td>2018</td>
<td>Not mentioned</td>
<td>45967</td>
</tr>
<tr>
<td>14</td>
<td>TL - 14</td>
<td>Rajasthan</td>
<td>Golden yellow</td>
<td>2018</td>
<td>Not mentioned</td>
<td>109289</td>
</tr>
<tr>
<td>15</td>
<td>TL - 15</td>
<td>Rajasthan</td>
<td>P.O Red</td>
<td>2018</td>
<td>Not mentioned</td>
<td>98046</td>
</tr>
<tr>
<td>16</td>
<td>TL - 16</td>
<td>Rajasthan</td>
<td>Bus Green</td>
<td>2018</td>
<td>Not mentioned</td>
<td>50050</td>
</tr>
<tr>
<td>17</td>
<td>TL - 17</td>
<td>Rajasthan</td>
<td>Golden yellow</td>
<td>2018</td>
<td>Not mentioned</td>
<td>67484</td>
</tr>
<tr>
<td>18</td>
<td>TL - 18</td>
<td>Repeat of TL - 09</td>
<td>Phiroza</td>
<td>2019</td>
<td>Not mentioned</td>
<td>2668</td>
</tr>
<tr>
<td>19</td>
<td>TL - 19</td>
<td>Repeat of TL - 06</td>
<td>Cherry</td>
<td>2019</td>
<td>No added lead</td>
<td>393</td>
</tr>
<tr>
<td>20</td>
<td>TL - 20</td>
<td>Repeat of TL - 11</td>
<td>P.O. RED</td>
<td>2019</td>
<td>Not mentioned</td>
<td>51422</td>
</tr>
</tbody>
</table>
**Figure 7:** Lead concentration (in ppm) in enamel paint manufactured by SMEs in 2018

**Figure 8:** Lead concentration (in ppm) in enamel paint manufactured by SMEs in 2019
Implementation Bottlenecks

The lead in paints rules were notified on November 1, 2016 and came into force from November 2017. Furthermore the rules have the provision that no lead paints can be manufactured after November 2017 and the old paints manufactured before November 2017 can be sold only for two years. However going by the present trend, the study has raised serious concerns on the implementation of the rules on ground.

Some of the major gaps in implementation identified in this study are:

- Paints containing high levels of lead which have been manufactured in the year 2018 and 2019 are widely available across the country in clear violation of the rules.
- The study has reflected that the small and medium scale enterprises are not adhering to the 90 PPM lead standard as per the rules.
- A most disturbing fact that came out in the study was that high content of lead has been detected even in the paint cans labelled as Lead-free.
- One of the labelled samples was found to have about 548 times higher lead level than the Indian lead in paint standard i.e. 90 ppm.
- The retailers are selling very old paints where high content of lead has been detected.
- No monitoring or compliance mechanism is in place to check lead level in paints.
Challenges faced by small and medium scale paint manufacturers

Toxics Link’s studies have clearly indicated that though the major manufacturers have shifted to lead-free paints the small and medium scale manufacturers are still lagging in terms of compliance. However the studies have also confirmed that many SMEs have shifted to lead-safe paints during these years. Therefore few SMEs were contacted to understand their perspective towards the regulations and the challenges in shifting towards Lead-free paints. The issue of Lead in Paints is being sincerely addressed by the Paint manufacturing Industry and many of them have either already shifted to lead-free paints or are currently planning to make the shift. In order to further understand their knowledge on the issue and the challenges that they face to move towards the technology, a brief survey was conducted where industries that have shifted and not shifted were interviewed. (For successful implementation of this project it is very important to remove the last gram of lead chrome pigments and lead based driers from the market). According to manufacturers

The surveyed manufacturers were of the view that they find procurement of lead-free pigments a financial challenge for the company. It is easier for a new manufacturer to make the shift as compared to the already established ones. Organic Red and yellow pigments in place of Lead Chrome pigments and Zirconium Octoate in place of Lead Octoate are being used as the alternatives. Interestingly, the manufacturers who haven’t shifted to lead-free technology yet find costing to be a major challenge to make the shift. The manufacturers surveyed were aware that Lead should not be added to household paints, whereas few of them knew about the “Regulation on Lead Content in Household and Decorative Paints Rules, 2016”. The major challenges that they are facing are:

- Higher investment: Increased initial cost of pigments & dryers.
- Possibility of loss of business due to increase in the selling price.

Testimony from paint technologist

Dr. K. K. Sen Gupta, a paint technologist based in India highlighted the importance of Lead in Paint rule in India and mentioned that “for effective implementation of the rules it is important to put efforts at both the ends; now that the paint manufacturers are shifting, there must be a law to stop the production of lead chrome pigments and lead Octoate. A situation is required where the availability of these items are zero in the market place”. He also stressed upon the fact that the higher cost of non-leaded pigments acts as a major challenge to make the shift.
Conclusion

The study reflected the extremely grim scenario of the use of Lead in paints in the country even after the rules came into effect from November 2017. Astonishingly all the paint samples that were tested have Lead content above 90 PPM which shows the poor implementation of the rules in the country with no checks and balances and monitoring system in place. The scenario is quite prevalent across the country as the samples have been collected from five states; Delhi, Rajasthan, Punjab, Odisha and Andhra Pradesh. Further, over the year Toxics Link studies have found that there are serious bottlenecks with Small and Mediums Scale Enterprises (SMEs) in adhering to the regulation of 90 PPM.

Lead exposure in case of children, especially below the age of six, can affect their behavioral and cognitive development and can also cause death. The study has confirmed that toxic lead paints are readily available in the market and no action has been initiated to remove these paints from the shelves. Hence it is of utmost importance that the regulators need to act on the large-scale violation of the rules and ensure Lead-safe paints are available in the market considering its environment and human health.

Action Points

- **Compliance and monitoring**
  - Strengthening the monitoring system to check the compliance of Lead paints regulation.
  - Raising public awareness through media (digital, paper or social), radio or TV shows
  - Facilitating technical and/or financial assistance to the SMEs to shift to lead-free technology
  - Periodic testing of samples to check the compliance.
  - Penalty for selling the Lead paints though labelled as Lead free

- **Role of the paint industries**
  - Creating and distributing information materials to make vendors/retailers aware with an aim of increasing consumer awareness.
  - Organizing periodic awareness programs for the retailers
  - Producing Lead-free paints as per the regulations

- **Consumers:**
  - Checking the labels on paints and opting against lead-containing paints.
  - Inquiring about lead-safe paints, health risks etc. from the vendors.