Lead - Poisoning India’s food & water supply chain

WHITE PAPER
Lead contamination in drinking water

According to an investigation by the Quality Council of India, 33 percent of over 370 samples of water from the top 26 cities of India have tested positive for harmful content of lead. Another 2 percent of the samples failed to meet even the lenient Indian norms of 50 parts per billion (ppb). Out of these, 31 percent samples failed to adhere to the WHO standards of lead content of less than 10 ppb.

The presence of lead in much higher quantities than permissible in drinking water in most urban and rural populations in India is a cause of great concern. The country needs to wake up before it is too late.

Children – Innocent victims

Children are the most vulnerable to lead poisoning or lead intoxication and often it can result in fatalities. According to WHO data, over 600,000 new cases of intellectual disabilities in children occur every year due to harmful lead exposure. Excessive exposure to lead can cause more than 70 types of neurological problems, siezures leading to coma and even death. It can also result in decreased hearing, reduced IQ and delayed puberty. Chelation therapy for lead poisoning is a quite common leading to increased healthcare costs.

While lead poisoning can happen in children and adults through exposure to house paint, toys, polluted soil, etc. the most common reason for lead poisoning is through potable water. Pipes used for supplying water to homes for drinking and agriculture fields for irrigation are the most common source of lead metal entering the human system.

A recent report mentions that young children as a population group are at the greatest risk of exposure. Even a blood level of 10 micrograms per decilitre can cause behavioral and learning damage in children. Lead is a slow poison that can incapacitate the future generations in a silent manner.

Hazardous effects of lead

- Disruption of the biosynthesis of haemoglobin & anaemia
- A rise in blood pressure & kidney damage
- Miscarriages and abortions
- Disruption of nervous systems & brain damage
- Reduced fertility due to sperm damage
- Diminished learning abilities in children

Source: The Lead Education & Abatement Design Group (LEAD)
**PVC pipes - A major contributor of lead contamination in India**

In the Indian context, high lead content can be found both in urban and rural areas. Thus, ground water sources (bore well/well water) have been found to have lead presence more than the permissible limit in almost 41% of the samples, making it unfit for consumption. Another study found was over 15% of municipal water has lead content higher than the permissible limit. Water borne PVC pipes for human and agriculture used over long periods of time are the cause. Lead mixes with water during transportation before it is used in the house for cooking or drinking purposes. Similarly, water used in agriculture be it for watering the fields or pumping out water from deep wells or bore wells is transported using PVC pipes. This causes lead contamination in the ground water table.

PVC pipes used for sanitation and waste disposal cause lead contamination in ground water through sewage water discharge or effluent plant water recycling. PVC pipes used for transporting or storing water cause immense harm to the human ecosystem as they introduce lead into the food and water chain.

**Lead as a stabilizer in PVC pipes**

Lead based additives are used as stabilizers by most Indian PVC manufacturers to strengthen and increase the life of the pipe. Most nations in US, Europe and Asia have banned the use of lead-based stabilizers and additives in PVC pipes for water supply purposes. India too follows strict ISI - Indian standards certified by Bureaus of Standards (BIS) for lead usage as an additive in PVC pipes. While good quality pipe manufacturers follow these standards, the unorganized sector which accounts for 70% of the PVC pipes sold do not meet these standards.

**Global best practices in banning lead in PVC pipe manufacturing**

Research in the late 1980s and early 1990s in quite a few cities of US and Europe revealed the problem of lead contamination through the water supply network. Because it affected children, it was taken up with equal gravity. These findings led to the ban on lead as an additive in PVC pipe manufacturing in most developed nations, especially, in the West. According to news reports, a full risk assessment on harmful effects of lead was submitted to the European Union in 2004.

In 2000, the European PVC industry consisting of ECVM (vinyl resin producers), ECPI (PVC plasticizer producers), ESPA (PVC stabilizer producers) and EuPC (PVC converters) signed the first voluntary commitment to replace lead based stabilizers by the end of 2015 across EU. The entire industry collaborated with stabilizer producers to develop alternatives to lead based...
systems. This required significant time and resource commitments. The development of alternative stabilizers for PVC systems in Europe got a major thrust with the Vinyl 2010 program. Since 2011, the VinylPlus program has led the course. It was a voluntary commitment to phase out lead based stabilizers by 2015.

The pipe producers’ members of European association TEPPFA, a partner of Vinyl 2010 voluntarily discontinued the use of lead stabilizers in potable water piping in 2005 end.

**Increasing global pressure to ban lead in PVC pipes**

PVC pipe manufacturers who are one of major users of lead-based stabilizers are coming under increasing scrutiny and pressure to use alternate environment-friendly additives. For example, the Beijing-based China Plastics Piping Association passed a voluntary policy to encourage local companies to stop lead usage by 2015, similar to the voluntary commitment by the European vinyl industry. Back in 2006, Chinese national standards banned lead stabilizers in PVC pipes used in water supply though officials are circumspect of the actual implementation.

As per a news report in September 2013, German stabilizer maker Baerlocher GmbH said that lead is used in 95 percent of PVC pipes in India (almost similar to China), 86 percent in Middle East & Africa, 61% in South America. In contrast, only 29% percent of all PVC pipe systems use lead in Europe while the figure is less than 1 percent in North America as nearly 100 percent of vinyl pipe systems use tin as a stabilizer. By 2015 end, Europe completely discontinued the use of lead as a stabilizer.

**Need to implement a voluntary ban on lead stabilizers**

It is time for Indian PVC pipe manufacturers to take voluntary action to ban the use of lead-based stabilizers in manufacturing. Like global counterparts, use of tin-based environment-friendly stabilizers should be adopted as an industry standard. Like their European and Chinese counterparts, Indian PVC pipe manufacturers should take a voluntary pledge to phase out lead based additives in the next 3-5 years.

**A measure like this will not only provide health benefits for the next generation but also ensure quality standards in PVC pipe manufacturing. While many PVC pipe manufacturers have started using lead-free alternative stabilizers, mandatory or voluntary compliance will reduce the gap of an undue price advantage enjoyed by unorganized players. The Asian PVC pipe industry in South Korea, Australia, New Zealand, etc. has been at the forefront in moving away from lead as a stabilizer in PVC pipe manufacturing.**

**India as a lead-free nation**

Both the industry and the Indian government should act together to phase out and ultimately ban the use of lead and cadmium-based stabilizers and plasticizers in India. It is definite way of preventing lead poisoning from PVC pipes permanently. PVC pipes that use lead as an additive should be banned and removed from all

---

**Lead Stabilizer Consumption in Europe (KT)**

![Graph showing lead stabilizer consumption in Europe from 2000 to 2015](chart.png)

---

**Lead - Poisoning India’s food & water supply chain**
direct and indirect water supply use, both in residential, office and agri-use.

Specialty chemical companies in India need to collaborate with their customers in developing effective alternative solutions like tin-based stabilizers. Downstream and upstream players need to work closely to ensure that environment-friendly stabilizers are used in PVC pipes. Training and reskilling of the workforce to use non-lead based stabilizers will be required and must be done.

As a nation that wants to 'Make in India' and 'Sell to the World', PVC pipes with no lead content will see a surge in export demand, especially from Europe, USA and Gulf countries where public infrastructure and housing spend is on the rise. Last but not the least, young children who are India’s future will not be affected by any physical and mental disability due to slow lead poisoning from the food and water supply. The Indian PVC pipe industry and its allied partners should contribute to making India a lead-free nation.

References:
http://indianexpress.com/article/explained/explained-noodles-in-the-soup/
http://www.pvc.org/en/p/lead-stabilisers
http://www.lead.org.au/lanv10n1/lanv10n1-5.html
http://www.stabilisers.eu/lead-replacement/

About Vikas Ecotech

For more information, contact info@vikasecotech.com
www.vikasecotech.com

© 2016 Vikas Ecotech Limited, New Delhi, India. All Rights Reserved. Vikas Ecotech believes the information in this document is accurate as of its publication date; such information is subject to change without notice.

Vikas Ecotech acknowledges the proprietary rights of other companies to the trademarks, product names and such other intellectual property rights mentioned in this document. Except as expressly permitted, neither this documentation nor any part of it may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, printing, photocopying, recording or otherwise, without the prior permission of Vikas Ecotech and/ or any named intellectual property rights holders under this document.