



Summary & Recommendations

Based on the report Toxic Hot Spot in Kalasin

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Executive Summary

The Kalasin province, particularly the Khok Sa-ad subdistrict, has emerged as a significant hotspot for e-waste pollution in Thailand. The informal recycling of electronic waste, combined with unregulated disposal practices, has resulted in severe environmental contamination. Toxic substances from various plastics, such as polyurethane (PU), acrylonitrile butadiene styrene (ABS), and polyvinyl chloride (PVC), are being released into the environment, posing risks to local communities and ecosystems. Despite existing regulations and efforts to manage e-waste, the current measures have not effectively addressed the scale and urgency of the problem.

Key Findings

Sources of Pollution: E-waste pollution in Kalasin primarily results from domestic waste generation, imports, informal recycling networks, and unregulated dumping. Imported e-waste continues to enter the country, often exploiting regulatory loopholes that bypass the 2020 import ban.

Toxic Substances Released: Improper handling and disposal of e-waste release hazardous chemicals, including brominated flame retardants (BFRs), dioxins, and polychlorinated biphenyls (PCBs), into the soil, water, and air. These contaminants can travel significant distances through wind, surface water, and groundwater, extending the impact well beyond the immediate area.

Current Mitigation Efforts: While some cleanup initiatives and policy measures are in place, they lack coordination and comprehensive enforcement. Efforts led by NGOs such as EARTH Thailand and Arnika have made some progress, but there is no systematic approach to remediation or regulatory alignment with international standards.

Conclusion

The existing measures taken by the government have not demonstrated sufficient effectiveness or urgency. The current regulatory framework allows imported e-waste to continue entering Thailand through legal loopholes, while enforcement of bans and waste management practices remains inconsistent. Furthermore, the lack of clarity on who is responsible for cleaning up contaminated areas has resulted in ongoing environmental and health risks for local communities.

Recommendations

1. Accelerate Private Sector Involvement:

The private sector needs to play a more active role by investing in initiatives to address e-waste pollution. This includes establishing dedicated funds for cleanup and remediation efforts, supporting research on safer recycling technologies, and promoting community education.

2. Strengthen Import Controls:

A holistic approach is necessary to cut off the flow of materials at the source. Implementing measures such as 100% container checks for imported e-waste and adopting an Authorized Economic Operator (AEO) status for compliant importers could help close loopholes and prevent illegal import. See Appendix B.

3. Adopt a Comprehensive Cleanup Plan:

There is an urgent need for a coordinated cleanup strategy to remediate contaminated sites. The government, private sector, and NGOs must work together to establish clear responsibilities and funding mechanisms for soil and water decontamination.

4. Enforce International Standards:

Aligning national regulations with international agreements such as the Basel Convention and the Stockholm Convention will improve the handling of hazardous waste and reduce the inflow of toxic substances.

5. Holistic Approach for Prevention and Remediation:

Cutting the flow of e-waste at the source, whether through import controls or domestic regulation, is crucial. A preventive approach should be combined with active remediation of contaminated areas to prevent further degradation of the environment.

Call to Action

To effectively tackle the e-waste crisis, Thailand must act decisively to implement these recommendations. Delaying action will only exacerbate the environmental and health risks while making future cleanup efforts more complex and costly. Immediate steps are needed to enforce stricter regulations, engage the private sector, and establish a comprehensive approach to e-waste management and remediation.

1. Introduction

Kalasin province, specifically the Khok Saad subdistrict, has emerged as a significant site for e-wasterelated pollution due to informal recycling activities and improper disposal. This report focuses on the types of plastics involved in the contamination, the associated toxic substances, and steps to mitigate the problem.

2. Key Findings

A. Sources of E-waste Pollution

Pollution primarily arises from informal recycling of electronic equipment containing various types of plastics. The key pathways through which e-waste materials reach Kalasin include:

A1. Domestic E-waste Generation: Households in the region contribute to e-waste by discarding outdated or broken electronic devices, such as TVs, refrigerators, and computers. The rise in electronic consumption has led to a growing volume of local e-waste.

A2. Imported E-waste: Thailand, including Kalasin, imports e-waste, sometimes under customs codes that are not strictly covered by import bans. In 2021, over 43,000 tons of electronic waste were imported, with similar trends continuing into 2022. These imported materials are processed informally, often without proper safety measures.

A3. Informal Recycling Networks: E-waste is collected from various sources, including other provinces or cities, and brought to Kalasin for processing by small-scale recyclers. This network facilitates the flow of waste into areas where informal recycling practices are prevalent.

A4. Unregulated Disposal Practices: Due to the lack of formal waste management infrastructure, open dumping and burning are common. Informal operators often transport e-waste to local dumpsites or workshops for dismantling, where nonvaluable parts are discarded or burned, releasing toxins.

B. Toxic Substances from Plastics

The contamination in Kalasin is linked to several toxic substances released from plastic materials in e-waste. Improper handling and disposal lead to the release of harmful pollutants into the environment:

B1. Brominated Flame Retardants (BFRs)

Details: BFRs, including PBDEs, HBCD, and TBBPA, are used in electronics to reduce flammability.

Plastics: Found in polyurethane (PU) foam used for cushioning, acrylonitrile butadiene styrene (ABS) in electronic casings, and highimpact polystyrene (HIPS) in older TV and monitor housings.

Other Research Findings: Studies by Arnika and IPEN reveal extensive BFR contamination at e-waste sites across Asia, with significant bioaccumulation observed in exposed populations.

B2. Polybrominated DibenzopDioxins and Dibenzofurans (PBDD/Fs)

Details: PBDD/Fs are formed when BFRladen plastics are burned or exposed to high temperatures.

Plastics: Generated from polyurethane (PU) and ABS plastics containing BFRs during burning.

Other Research Findings: Elevated levels of PBDD/Fs have been detected in China's Guiyu region, a similar e-waste hotspot, suggesting comparable risks in Kalasin.

B3. Polychlorinated Biphenyls (PCBs)

Details: While PCBs are no longer intentionally used in modern electronics, they may persist as contaminants in older materials.

Plastics: Commonly found in older PVC cable insulation and polycarbonate (PC) components.

Other Research Findings: PCB contamination is prevalent in soil samples from recycling sites across Southeast Asia.

B4. Dechlorane Plus (DP)

Details: A chlorinated flame retardant used as an alternative to some banned BFRs.

Plastics: Found in nylon and polypropylene (PP) used for cable coatings and electronic connectors.

Other Research Findings: Detected in blood serum samples of e-waste workers at significantly higher concentrations than nonexposed populations.

B5. Polyvinyl Chloride (PVC)

Details: PVC is commonly used in electronics for insulation and components. When burned, it releases dioxins, furans, and hydrochloric acid gas.

Plastics: PVC itself is the source, releasing toxic compounds during burning.

Other Research Findings: UNEP and Arnika studies indicate significant dioxin formation from burning PVC in dumpsites.

B6. Novel Brominated Flame Retardants (nBFRs)

Details: Newer BFRs like DBDPE and BTBPE were introduced as replacements for older flame retardants but remain persistent and bioaccumulative.

Plastics: Commonly found in HIPS, PP, and PE plastics used in various electronic devices.

Other Research Findings: Detected in marine life in studies conducted in Japan and South Korea, indicating their widespread environmental presence.

C. Geographic Spread and Environmental Impact

Wind Dispersion (Airborne Contaminants): *Pollutants can travel 10–20 kilometers from the source due to wind, with the possibility of reaching up to 25 kilometers under stronger seasonal winds.* The extent of dispersion depends on factors like wind speed, direction, and local topography.

Water Pathways (Surface and Runoff Contamination): *Contaminants could impact water bodies within 10–15 kilometers downstream, with the potential to spread 20–30 kilometers or more during flood events.* Irrigation can carry pollutants to fields within a 5–10 kilometer radius.

Groundwater Contamination: *Leaching of toxic substances could affect groundwater over a range of 30–50 kilometers, especially in interconnected aquifer systems.*

Overall Impact Area: The most intense contamination would be found within a 0–5 kilometer radius, while the moderate impact zone could extend to 15–30 kilometers.

Depending on environmental conditions, the total affected surface area may cover several hundred square kilometers.

3. Environmental and Health Impacts

The release of toxic substances from plastics leads to significant risks for e-waste workers and nearby residents. The primary exposure pathways include inhalation of fumes, ingestion of contaminated food, and contact with polluted soil and dust.

4. Recommendations for Risk Mitigation

1. Strengthening E-Waste Management Policies

Current Status: Thailand has implemented measures such as the 2020 ban on certain e-waste imports, but **enforcement remains inconsistent**. Regulatory gaps still allow e-waste to enter under alternate customs classifications.

Recommendation: Tighten regulations to close loopholes, ensure safe recycling practices, and impose stricter penalties for illegal activities.

2. Conducting an Interdepartmental Investigation

Current Status: Efforts exist to improve coordination between agencies like the Pollution Control Department and Customs Department, but **a fully integrated approach** is not yet in place.

Recommendation: Form an investigation team from multiple departments to share data, trace e-waste supply chains, and address regulatory weaknesses. Plus adapt to existing international standards such as adopting an **Authorized Economic Operator (AEO) status** for compliant importers could help close loopholes and prevent illegal imports.

3. Remediation of Contaminated Areas

Current Status: **Some cleanup efforts have been initiated**, led by NGOs such as EARTH Thailand and Arnika. **Government actions have been limited in scope.**

Recommendation: Scale up remediation with a systematic approach to target affected areas, using methods like soil washing and long-term monitoring.

4. Supporting Community Education and Alternative Livelihoods

Current Status: NGOs have taken the lead on community outreach and training, but **broader government supported initiatives are needed.**

Recommendation: Expand training programs and raise awareness about safe practices to support sustainable employment alternatives for informal recyclers.

5. Expanding Research on Safer Materials and Recycling Technologies

Current Status: Ongoing research is supported by international partners, but **local funding and incentives for safer material development are limited.**

Recommendation: Encourage innovation and invest in recycling technologies to reduce dependency on hazardous substances.

6. Promoting International Cooperation

Current Status: Thailand participates in international agreements like the Basel Convention, but **implementation of guidelines varies.**

Recommendation: Strengthen alignment with international standards and seek external support for funding and technical assistance.

Appendix A:

Types of Plastics in E-waste

The following types of plastics are commonly found in e-waste and contribute to pollution:

Polyurethane (PU): Used in cushioning and insulation for electronic devices.

Acrylonitrile Butadiene Styrene (ABS): Found in electronic casings and housings.

Polyvinyl Chloride (PVC): Utilized in cable insulation and plastic components.

High Impact Polystyrene (HIPS): Common in older TV and computer monitor housings.

Polypropylene (PP): Used in cable coatings and certain casings.

Polyethylene (PE): Found in various electronic parts and accessories.

Polycarbonate (PC): Used in electronic components such as older circuit boards.

Appendix B:

Authorized Economic Operator (AEO): Overview, Scope, and Effectiveness

The Authorized Economic Operator (AEO) program was introduced by the World Customs Organization (WCO) in 2005 as part of the SAFE Framework of Standards to secure and facilitate global trade. The initiative aims to enhance supply chain security while providing trade facilitation benefits to businesses that comply with certain standards.

Scope

The AEO program grants certification to companies that meet criteria related to customs compliance, financial solvency, safety, and security.

It covers various stakeholders in the supply chain, including importers, exporters, manufacturers, freight forwarders, customs brokers, and warehouse operators.

Certified companies enjoy benefits such as simplified customs procedures, reduced inspections, and faster clearance times at borders. They may also receive priority treatment during disruptions.

Effectiveness

Adoption: The program has been widely adopted, with over **97 countries** implementing AEO standards in their customs procedures. This demonstrates the global acceptance and integration of AEO programs as a key component of international trade security.

Certified Companies: **Approximately 80,000 companies worldwide** hold AEO certification, taking advantage of the streamlined customs processes and reduced regulatory burdens.

Trade Facilitation: AEO-certified companies experience lower customs processing times, resulting in cost savings and improved supply chain efficiency.

Security Enhancement: The program's security requirements help prevent illegal goods from entering the supply chain, contributing to overall trade safety.

International Cooperation: Countries have developed mutual recognition agreements (MRAs) to acknowledge AEO certifications across borders, enhancing the program's effectiveness by allowing certified companies to benefit from reduced inspections in multiple jurisdictions.

While the AEO program has delivered significant benefits in terms of trade facilitation and security, its effectiveness can vary depending on the quality of national implementation, the level of international cooperation, and the presence of mutual recognition agreements.