



August 10, 2007

National Center for Standards and Certification Information (NCSCI)
National Institute of Standards and Technology (NIST)
100 Bureau Drive, MS-2160
Gaithersburg, MD 20899-2160

RE: Norway's Prohibition on Certain Hazardous Substances in Consumer Products; Norway Notification Number 2007/9016/N under EU 98/34 Procedure

IPC — Association Connecting Electronics Industries is pleased to submit the following comments regarding the proposal put forward by the Norwegian Ministry of Environment to restrict the production, import or export of consumer products containing certain chemicals. Among the 18 restricted chemicals, there are seven that are generally included in most electrical and electronic products. Unfortunately, these seven include brominated flame retardants such as TBBPA (tetrabromobisphenol-A) and HBCDD (hexabromocyclododecane), and other chemicals such as BPA (bisphenol-A), GaAs (gallium arsenide), lead and cadmium, that are used in 95 percent of all electronic products. IPC is concerned that Norway's consumer products proposal could have an adverse impact on the global electronics industry.

IPC is a global trade association based in the United States with over 2,500 member companies, of which approximately 11 percent are located in Europe. IPC represents all facets of the electronics interconnect industry, including design, printed circuit board manufacturing and electronics assembly. Printed circuit boards and electronic assemblies are used in a variety of electronic devices that include computers, cell phones, pacemakers, and sophisticated missile defense systems. The industry is vital to the U.S. economy. Without printed circuit boards and electronic assemblies, you would not be able to start your car, watch television, answer a telephone, or turn on a light switch. There would be no Internet, no e-mail, no VCRs and no Nintendo®.

An electronic product can consist of many different boards manufactured from different base materials, thousands of components, with or without underfill, and an enclosure. As a result, nearly all electronic products are likely to contain HBCDD, TBBPA, BPA and GaAs exceeding the limitations proposed by the Norwegian government. The following list can be helpful in understanding how these essential substances are currently used in electronics often in excess of Norway's proposed substance limits.

- Norway proposes a limit for HBCDD of 0.1% weight in homogenous material. HBCDD exceeds the proposed limit in electronic housings, mainly in EPS (expanded polystyrene) but also in HIPS (high impact polystyrene), polycarbonate, rubber, epoxy resin and other thermosetting plastics and polymers in concentrations up to 75%.
- Norway proposes a limit for TBBPA of 1.0% weight in homogenous material. TBBPA can either be chemically reacted into a product or used as an additive (i.e. unreacted). TBBPA that is chemically reacted into a product cannot be released into the environment, which is likely the reason Norway's proposal does not regulate the use of reactive TBBPA. TBBPA is primarily chemically reacted into the laminate base of printed circuit boards. However, residual (i.e. unreacted) TBBPA may be present in the printed circuit board in concentrations generally below 0.1%. Since the concentration of unreacted TBBPA in printed circuit boards is very low, it is not expected to exceed Norway's proposed threshold and will not affect the use of TBBPA in printed circuit boards. However, additive (i.e. unreacted) TBBPA is used in electronics in excess of Norway's proposed limits in the following:
 - Cover and carrier materials for components like ball grid arrays, chip scale, and land grid array packages, which may contain up to 59% additive TBBPA depending on whether epoxy or thermoplastic plastic is used.
 - Underfill material for flip chip and some chip scale packages, which may contain up to 20% additive TBBPA depending on the type of plastic.
 - Connectors that use high-temperature plastics (due to the high temperatures required for lead free solder), which may contain up to 59% additive TBBPA depending on the type of plastic.
 - ABS (acrylo-nitrile-butadiene-styrene), PC/ABS and HIPS plastic, which may contain up to 59% additive TBBPA. Plastics are the most common cover materials for electrical and electronic products.
- Norway proposes a limit for BPA of 0.005% by weight in homogenous material, which is reduced to 0.0025% in three years. BPA is used in the production of epoxy resins, which form the base laminate material that many PCBs are built on.
- Norway proposes a limit of 0.01% weight in homogenous material for arsenic compounds, such as GaAs. Circuits for microwaves, infrared diodes, laser diodes and solar cells contain up to 0.05% GaAs. These types of components exist in nearly all mobile phones, GPS receivers, computer systems and radar units.
- Norway proposes a limit for lead of 0.01% weight in homogenous material. Since "lead-free" solders are permitted under the EU RoHS (Restriction of

Hazardous Substances) Directive to contain up to 0.1% lead, the cost of lead-free solders would rise dramatically with the increased refining required to get very high purity tin. A special grade tin would be needed for solder for electronics destined for Norway. While technically feasible to produce special grade tin that meets the proposed limits, the cost is hundreds of times higher, making it economically unviable.

A “Norway only” ban on these substances, which are widely used in the electronics industry, will create an unjustifiable restriction on the free movement of goods within the internal market and will represent a severe barrier to trade. In practice, the proposed law will lead to a prohibition against the import of both new and existing electronic products from the rest of the world to Norway. Such a ban would have global effects for international producing and user industries. Industry would have to adjust its production lines to comply with multiple market demands. A practical consequence might be that some electronic products would disappear from the Norwegian market due to costs associated with industry compliance to a “Norway only” ban. Suppliers will exclude Norway rather than spend money on research and testing concentrations so low that they realistically cannot be achieved. There would also be an added burden of border control for goods containing the Norway banned substances. Additionally, spare parts for existing electronic products will not get into the country. Eventually, the products Norwegians depend on every day such as cars, telephones, television, computers and more will break and not be replaced.

A unilateral ban would also adversely impact the Norwegian job market. It would be nearly impossible and very expensive for Norwegian original equipment manufacturers, electronics manufacturing services companies, and printed circuit board manufacturers to compete in the electronics worldwide market if they must have special materials without HBCDD, TBBPA, BPA and GaAs. This will especially affect small electronic enterprises in rural areas where it will be difficult to find new jobs.

The Norwegian initiative would also interfere with the current EU approach on chemicals regulation (i.e. REACH). The aim of the REACH legislation is to improve the protection of human health and the environment through a better and earlier identification of the properties of chemical substances. The REACH process includes a thorough evaluation to identify potential chemical risks. Due to the general obligations required by the REACH process, there is no need for Norway to act in isolation from the EU approach and propose further legislative restrictions on the listed substances.

In addition to the broader issues that may arise from a “Norway only” ban, IPC has specific concerns regarding Norway’s proposal to ban TBBPA in consumer products. IPC is concerned that the “Norway only” ban on TBBPA unduly disregards the results of an ongoing EU risk assessment. Restricting TBBPA use may cause industry to rely on substitutes that have not been as thoroughly studied as TBBPA. By acting in isolation from the general legislation and approach that prevails in the EU, Norway is creating a serious hindrance to trade in consumer products between the EEA states and Norway.

TBBPA has passed human health environmental assessments conducted by the EU. TBBPA has been thoroughly evaluated for its risks on human health and the environment as part of an EU risk assessment process. The Human Health section of the Risk Assessment was closed in 2005 with no risks identified. The Scientific Committee on Health & Environmental Risks and a study from the University of Würzburg (under the EU Fire project) also confirmed these conclusions. The Environmental section of the Risk Assessment was closed in March 2007. No risk was identified for TBBPA when used as a reactive, such as in the epoxy resins of printed circuit boards. Norway should consider the results of the ongoing EU risk assessment of TBBPA, which will be finalized in 2007.

While non-halogenated alternative fire retardant material systems are being developed and introduced into products, it is important to note that the reliability of many alternative flame retardants has not been fully qualified. There is also no data indicating that any of the materials currently being considered as replacements for these halogenated flame retardants are any better or worse for the environment or human health. In addition to assessments of the flame retardant systems' effects on product functionality and reliability, it is necessary to evaluate the lifecycle impacts (design, use, and end-of-life) of the substitutes, as compared to the substance currently in use. Any alternatives considered should have been subjected to an equivalent battery of testing for human health and environmental effects as the substance they are meant to replace, and been found to have a more favorable toxicity profile. Untested flame retardant materials may spread into other countries and cause more damage.

Norwegians consume an estimated 25 million electronic products every year. TBBPA, BPA and other flame retardants can only be tested by grinding the actual bare board. Testing must take place in a sophisticated laboratory which takes a long time and costs approximately \$2,000 to \$3,000 for each product. The costs for such testing will largely be prohibitive and large scale smuggling of electronic products may result.

Given that Norway's proposal would disrupt free market trade, interfere with the current EU approach on chemicals regulation, ignore ongoing scientific assessments, and may consequently harm human health and the environment, we believe there is no justification to restrict the use of the above mentioned chemicals in consumer products. We urge the US government to take these arguments into account and oppose the Norwegian proposal to restrict certain substances in consumer products.

Should you have any questions, please contact Sahar Osman-Sypher at 703-522-0225 or saharosman-sypher@ipc.org.

Sincerely,

Sahar Osman-Sypher
Project Manager, Environmental, Health and Safety