Environmental and Health NGOs response to the 3rd Stakeholder consultation on Adaptation to scientific and technical progress under Directive 2002/95/EC of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment for the purpose of a possible amendment of the annex

27 October 2005

Introduction and summary

A coalition of Environmental and Health NGOs[i] appreciates due notification of this 3rd technical adaptation consultation. This coalition consists of the following organizations: The European Environmental Bureau, European Public Health Alliance Environmental Network, Health Care Without Harm, the Natural Resources Defense Council, the Mercury Policy Project, and the Ban Hg Working Group.

Considering that the above mentioned NGOs have been mainly focusing on the mercury debate, the comments provided below will refer to applications where mercury has been traditionally used, but for which our research demonstrates mercury is no longer justified.

The NGOs are deeply concerned that the ROHS directive be weakened by exemptions on the basis of article 5(1) without the necessary justification. The Commission's criteria for granting exemptions is based upon the following:

"Article 5(1)(b) of the Directive 2002/95/EC provides that materials and components can be exempted from the substance restrictions contained in Article 4(1) if their elimination or substitution via design changes or materials and components which do not require any of the materials or substances referred to therein is technically or scientifically impracticable, or where the negative environmental, health, and/or consumer safety impacts caused by the substitution outweigh the environmental, health and/or consumer safety benefits thereof.

It should be noted that most of the applications for exemptions are not at all justified and the necessary forms are not correctly filled in, or are incomplete or not filled in at all. It must be kept in mind that in drafting the RoHS Directive, the Commission fully intended that the burden of proof would explicitly rest with industry to demonstrate why any specific application should be exempted. Therefore, unless and until the applicants provide the detailed supporting data to demonstrate that an exemption for a specific application may be warranted, all other requests should be denied as a matter of course.

To that end the NGOs opinion can briefly be found below:

Notification for exemption	**NGO opinion**	**Justification**
No.2 Mercury switches	Rejected	1. Commercial substitutes exist for most mercury switches (see example on page 3) 2. It is unclear what type of switch is being asked for.
No. 11, 12, 14,15	Rejected	The requested details and special form have not been filled in and therefore it is unclear for which substances exemptions are sought and for what reason.

On notification No.2 Mercury Switches

The notification of exemptions tabled by industry and related to mercury is mainly Notification 2 on Mercury switches. The source of this notification is not identified, but it appears to have been initiated by the Xerox Corporation. With the comments below we will try to cover the issues addressed by the European Commission on whether feasible substitutes currently exist at an industrial and/or commercial scale, if any restrictions apply to such substitutes and what are the costs and benefits and advantages and disadvantages of such substitutes. On the other hand, the notification does not provide details as to the specific use of the mercury containing switch(es) for which an exemption is requested, making it quite difficult to respond in detail. To that end, we will provide some recent references showing why such an exemption should not be granted.

In general, mercury-containing conductors, **switches** and circuit breakers use mercury in liquid form. The making or breaking of the electrical circuit is achieved in these cases by a mechanical action. The technique is old and has been used in thermostats, tilting switches, float switches and pressure switches, in which a physical movement changes the inclination of the switch, a bead of liquid mercury moves and makes or breaks an electrical circuit. Common applications have been to manually turn domestic lighting on/off, to automatically switch on/off heating or cooling devices in response to temperature changes, to start a fluid pump when the liquid level reaches a certain height – and to stop it when the liquid level goes back down, and to turn on/off a motor or light when a door is opened/closed, for example the lid of a car boot. [1]

In Sweden, in all of the applications mentioned above there are established alternative techniques, and practically no exemptions have been applied for since 1998. A general ban on mercury in such uses was therefore implemented with some very limited exemptions[2].

In **relays** a more powerful electric current is generally turned on or off by the action of a smaller one. Small relays are found in printed circuit boards. Larger relays may be found in, for example, stairwell lighting, signal systems, machinery and elevator controls, and traffic lights. Mercury relays (and switches) are a large group of products which have gradually been replaced by electrical and electronic alternatives. The driving forces for this have been developments in the electronics sector, increased pressure to phase out mercury, and increased awareness of the latent waste situation as manufacturers have proven unable or unwilling to take sufficient responsibility for their products after sale and use. In Sweden, mercury-containing relays are routinely being replaced by alternative technology. [3]

According to a highly detailed 2003 report, *An Investigation of Alternatives to Mercury-Containing Products,* prepared for the State of Maine[4], "there were many common findings and conclusions during this research for float switches, pressure switches, temperature switches, tilt switches, mercury wetted reed relays, and mercury displacement relays. The following is a summary of these similarities:

- These components are used in a wide range of products and applications.
- Numerous design parameters need to be considered prior to final component selection.

[1] KemI Report 4/04, Mercury-Investigation of a general ban, p.60-61
http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf
[2] KemI Report 4/04, Mercury-Investigation of a general ban, p.60-61
http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf
[3] KemI Report 4/04, Mercury-Investigation of a general ban, p.60-61
http://www.kemi.se/upload/Trycksaker/Pdf/Rapporter/Rapport4_04.pdf
[4] An Investigation of Alternatives to Mercury Containing Products, Lowell centre for Sustainable Production, January 2003, p. 31-65, http://mainegov-images.informe.org/dep/mercury/lcspfinal.pdf

- Several different non-mercury alternative technologies were identified to replace each of the mercury switches and relays.
- Several manufacturers were identified for most non-mercury alternative technologies.
- Manufacturers of mercury containing products often provide non-mercury alternatives.
- Manufacturers often provide more than one non-mercury alternative technology.
- The non-mercury technologies identified provide a variety of options for each major design parameter.
- Non-mercury alternatives were identified to meet the needs from low cost, simple applications to higher cost, more demanding applications.
- Although, it is difficult to precisely compare pricing for the various switch and relay technologies because there are many design features and options available for each component, it appears that mercury and non-mercury switches/relays with similar functionality for many applications are comparable in price.
- At least one manufacturer was identified that produced both the mercury and non-mercury relay/switch with comparable functionality at comparable costs."

Further to the above we would also like to give an example of the contents on this report which goes down to proposing several alternatives for each type of switch, their cost, the advantages and disadvantages and provides a list of manufacturers of the mercury-free substitutes for each alternative presented.

For Mercury Tilt Switches:

<table>
<tr><td>Alternatives proposed</td><td>Manufacturers</td></tr>
<tr><td>1. Metallic ball</td><td>
<table>
<tr><th>Manufacturer Name</th><th>Product</th><th>Phone Number (US)
Website</th></tr>
<tr><td>Comus International

AssemTech Europe
Comus Intl Belgium
Comus France</td><td>Numerous Models</td><td>973-777-8405
www.comus-intl.com
http://www.assemtech.co.uk/
http://www.comus.be/
http://www.comus.fr/</td></tr>
<tr><td>Magnasphere Corp.</td><td>Magna-sphere Switch</td><td>262-792-1306
www.magnaspherecorp.com</td></tr>
<tr><td>Signal Systems International Inc.</td><td>NM 1001, NM 2001, NM 3001, NM 4001</td><td>732-793-4668
www.signalsystem.com</td></tr>
</table>
</td></tr>
<tr><td>2. Electrolytic tilt sensor</td><td>
<table>
<tr><th>Manufacturer Name</th><th>Product</th><th>Phone Number(US)
Website</th></tr>
<tr><td>Fredericks Company</td><td>Numerous models.</td><td>215-947-2500
www.frederickscom.com</td></tr>
<tr><td>Nanotron, Inc.</td><td>Ultimate I and II Series</td><td>480-966-9006
www.nanotronusa.com</td></tr>
<tr><td>Spectron Glass and Electronics, Inc.</td><td>The SP5000 and AU6000 series</td><td>631-582-5600
www.spectronsensors.com</td></tr>
</table>
</td></tr>
</table>

3. Potentiometers

Manufacturer Name	Product	Phone Number (US)& Website
ETI Systems	LCP8, SP12B, Series	760-929-0749 www.etisystems.com/singledesign.htm
Precision Electronic	RV4, RV6 Series	416-744-8840 www.precisionelectronics.com
Tocos America, Inc.	G3, G4 Series	847-884-6664 www.tocos.com
Vishay	249, 357, 533 Series	402-563-6866 www.vishay.com

4. Mechanical tilt switch

Manufacturer Name	Product	Phone Number (US) & Website
Binmasater	BM-T Series	800-278-4241 www.binmaster.com
Monitor Technologies LLC Europe Reps in many EU counties	TC Series	800-601-6302 www.monitortech.com +36 23 504 718 http://www.monitortech.com/Reps/Intl.shtml#Austria
Omron Electronics Omron has branches in most EU countries	D7E Series	847-882-2288 www.omron.com http://www.europe.omron.com/en/cor/

5. Solid –State tilt switch

Manufacturer Name	Product	Phone Number (US) & Website
Clarostat Sensors and Controls	HRS100 Series	800-872-0042 www.clarostat.com
Columbia Research Labs	SI-701 Series	800-813-8471 http://www.columbiaresearchlab.com/
Crossbow Contacts in most European countries	CXTA and CXTLA Series	408-965-3300 www.xbow.com www.jr-france.com www.cmt-gmbh.de www.instrumentation.it www.amtele.se www.willow.co.uk
Jewell Instruments LLC	LSO Series	800-227-5955 www.jewellinstruments.com
Omron Electronics Omron has branches in most EU countries	D6B Series	847-882-2288 www.omron.com http://www.europe.omron.com/en/cor/

6. Capacitive tilt switch

Manufacturer Name	Product	Phone Number (US) & Website
Measurement Specialties	Accustar and Accuswitch Series	800-745-8008 www.schaevitz.com
Rieker Inc.	N Series and NG Series	610-534-9000 www.riekerinc.com
Seika (Germany) Reiker Inc. – U.S. Representative Partners in other EU countries	NG2, NG3, and NG4 Series	Reiker Inc. 610-534-9000 www.seika.de http://www.ntt.dk http://www.aesensors.nl http://www.sensorsuk.com http://www.sensing.es http://www.luchsinger.it

Based on the results of this study, legislation has been passed in a growing number of states in the USA (including California, New York, Illinois, Maine, Vermont, Rhode Island, and Connecticut) banning future use by industry of a wide variety of mercury-containing products, including those used in electrical and electronic equipment. Exemption requests under these laws have been rare, and have been granted in even fewer cases.

Furthermore, data on switches have been included in the UNEP Global Mercury Assessment, where it is mentioned that with very few exceptions, there are no technical obstacles to replacing electrical components, conventional relays and other contacts (even when these are contained in level switches, pressure switches, thermostats, etc.) with equivalent mercury-free components. A number of examples are given below[5]:

Mercury component	Alternative component	Application
Tilt-switch – silent switch	Various, e.g. manual/mechanical (rolling steel ball, alternative conducting fluid), micro-switch	Circuit control, thermostats, communications
Electronic-switch	Solid state-switch, optical switch	Circuit control, thermostats, communications
Reed-switch – "mercury-wetted"	Solid-state-switch, electro-optical-switch, semi-conductor	Communications, circuit control in sensitive electronic devices
Proximity sensor/switch – "non-touch-contact"	inductive sensor capacitive sensor photoelectric sensor ultrasonic	shaft rotation, conveyors conveyors conveyors conveyors

There are no significant price differences between conventional mercury and mercury-free relays and contacts, except for very few and specific applications. There are also examples of mercury components which are more expensive than the alternatives[6].

In Denmark and other countries, substitutes of electric and electronic switches are reported as "today's standard" (see below) [7]

Use	Alternative(s)	Level of expenses relative to Hg-technology *1
Electric and electronic switches	Vary according to different application fields. 1) Larger switches for level or position controls: Rolling steel balls or metal powder in liquid suspension. 2) Micro-switches: Gold-	1) Substitutes are today's standard (in new equipment) in Denmark and other countries, comparative price level not investigated here, probably = 2) + (Rasmussen, 1992)

[5] UNEP Global Mercury Assessment, p. http://www.chem.unep.ch/mercury/Report/Chapter8.htm#8.2

[6] Eva Gustafsson, Swedish National chemicals Inspectorate, Discussion paper submitted by Sweden at the meeting of designated experts, Geneva 17-21 March 1997, on annexes to the UNECE LRTAP Heavy Metals Protocol – Mercury in Products and available substitutes.

[7] Mercury – a global pollutant requiring global initiatives , p.71, http://www.norden.org/pub/miljo/miljo/sk/2002-516.pdf

	plated micro-switches. 3) Optical switches 4) Other electronic circuits (Rasmussen, 1992)	

Conventional relays and other contacts – also when these are contained in level switches, pressure switches and thermostats - can normally be replaced by a corresponding mercury-free component. This is not only applicable when fitting components into equipment being manufactured, but also when exchanging spare parts in the majority of older equipment.[8]

Other notifications potentially relevant to mercury

Notifications 11, 12, 14 and 15, concerning different equipment/applications are not explicit on the substances they refer to and where these are used in each of the mentioned devices. Furthermore, some of these devices, such as **thermostats**, are not currently included in the scope of the ROHS directive and should not be therefore taken into consideration, before the study "Review of Directive 2002/95/EC" (RoHS) for the possible inclusion in the scope of this Directive, equipment which falls under categories 8 and 9 set out in Annex IA to Directive 2002/96/EC (WEEE)," carried out by ERA Technology Ltd. is completed.

In that respect, the environmental NGOs are planning to provide their detailed comments in due time, given that the study is at its beginning. Nevertheless, we would already like to bring to your attention the following information, as an example of mercury free alternatives that already exist.

The mercury in thermostats serves to connect two electrodes, thereby completing an electrical circuit that triggers heating and air-conditioning units to turn on. Each switch contains approximately 3-4 grams of mercury in a glass ampoule, typically attached to, and activated by, a metal coil. Mercury-containing switches have been used in thermostats for over 40 years. They provide accurate and reliable temperature control, require little or no maintenance, and do not require a power source. These types of thermostats are used in most residential and commercial heating, and many air conditioning appliances as well.

There are many mercury-free thermostats available on the market. Electronic thermostats can provide more features than mercury thermostats. The use of this product can result in significant savings in fuel cost and environmental benefits from burning less fuel. [9]

Programmable digital thermostats are a viable alternative to mercury thermostats. They are readily available, contain no mercury, and are more cost effective than mercury thermostats. A digital thermostat can be programmed to turn down the heat when people are sleeping or away at work, and then turn it back up when more heat is needed. This additional function can save large amounts of energy compared with a mercury thermostat that maintains a single setting. [10]

Digital and electromechanical alternatives are listed in Purchasing for Pollution Prevention: Mercury-Free Industrial Thermometers, Manometers, Thermostats, and Switches Fact Sheet. Both digital and electromechanical thermostats can be as accurate or more accurate than mercury devices. Depending on the application, mercury-free thermostats

[8] Mercury – a global pollutant requiring global initiatives , p.133, http://www.norden.org/pub/miljo/miljo/sk/2002-516.pdf

[9] Environment Canada, Pollution Prevention Program, Federal Programs Division, Fact Sheet No.21 (revised), http://www.on.ec.gc.ca/pollution/fpd/fsheets/4021-e.html

[10] Turning up the Heat: Eliminating Mercury Thermostats from the Marketplace, New England Zero Mercury Campaign, February 2005, p.7.

may be cheaper than their mercury equivalents. In 2001, the price of a non-mercury building thermostat ranged from approximately $16 to $34, while mercury thermostats cost from $25 to $35. [11]

To that end, Massachusetts has restricted the sale of mercury manometers, thermometers, and thermostats on its Industrial Supplies contract, permitting their purchase only when no non-mercury-containing alternative is available that can meet the needs of the purchasing agency.[12] Perhaps more importantly, legislation prohibiting the sale of mercury added thermostats has been enacted in Connecticut, Maine, Rhode Island, Oregon, California, Vermont, and New York. Enactment of this legislation was supported, in large part, on studies indicating alternatives to mercury added thermostats are equal or superior in performance and energy savings.[13]

Similarly, the sale of mercury thermostats was banned in Sweden in 1993. The National Chemicals Inspectorate administers some general and individual dispensations to this act. Many of the general exemptions/dispensations had expired in 1998 (KEMI, 1998).[14]

Therefore, it is already clear from the above mentioned references that mercury free thermostats exist and are currently available. Many more references exist, which may be elaborated by the NGOs and submitted to the European Commission in due time as necessary.

In conclusion, the NGOs respectfully request that the European Commission examine carefully all comments and references above before deciding on further expanding the exemptions list of the ROHS directive. In case further details are submitted by industry, we would be happy to provide more concrete information on alternatives as well. In the extraordinary circumstances where exemptions may be warranted (as indicated above, none of the specific requests addressed by these comments are warranted due to a lack of information and/or the availability of functional alternatives), such exemptions should be for a limited period of time. Exemptions of a temporary nature provide incentives for research & development, and encourage industries to shift to alternative substances and techniques.

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T: +1 802 2239000

[11] Purchasing for Pollution Prevention: Mercury-Free Industrial Thermometers, Manometers, Thermostats, and Switches Fact Sheet, http://www.informinc.org/fact_P3industrialmeters.php
[12] http://www.mass.gov/legis/bills/house/ht01/ht01392.htm
[13] Thermostat Stewardship Initiative Background Research Summary, Product Stewardship Institute, October 18, 2004, p. 25, http://www.productstewardship.us/prod_mercury_project.html; A Review of Thermostat Energy Efficiency and Pricing,, Lowell Canter for Sustainable Production, May 2003.
[14] Mercury – a global pollutant requiring global initiatives , p.93, http://www.norden.org/pub/miljo/miljo/sk/2002-516.pdf

[i] NGOs include

The European Environmental Bureau (EEB) is a federation of 145 environmental citizens organizations based in all EU Member States and most Accession countries, as well as a few neighbouring countries. The organizations range from local and national to European and international. The aim of the EEB is to protect and improve the environment of Europe and to enable the citizens of Europe to play their part in achieving that goal.

[i] European Public Health Alliance Environment Network (EEN), http://www.env-health.org/, is an international non-governmental organization advocating environmental protection as a means to improving health and well-being. The group has a diverse membership, 29 members with 5 international organizations, 10 European networks and 14 national/local organizations, including non-governmental organizations, professional bodies representative of doctors and nurses, academic institutions and other not-for-profit organizations.

[i] Health Care Without Harm Europe (HCWH), www.noharm.org, is an international coalition of hospitals and health care systems, medical and nursing professionals, community groups, health-affected constituencies, labor unions, environmental, and religious organizations. HCWH is dedicated to transforming the health care industry worldwide, without compromising patient safety or care, so that it is ecologically sustainable and no longer a source of harm to public health and the environment.

[i] The Natural Resources Defense Council is a private, U.S. not-for-profit environmental organization that uses science, law, and the support of more than 600,000 members nationwide to protect the planet's wildlife and wild places, and to ensure a safe and healthy environment for all living things.

[i] The Mercury Policy Project, a project of the Tides Center and co-founder of the Ban Mercury Working Group, works at the local, national, and international level to promote policies and programs to indefinitely store surplus mercury; and reduce/eliminate anthropogenic mercury uses and releases, trade in mercury, and human, ecological and wildlife exposures to mercury. See www.mercurypolicy.org.

[i] The Ban Mercury Working Group (Ban Hg-Wg), is an international coalition of 27 public interest non-governmental organisations from around the world formed initially in 2002 by 2 US based NGOs, the Basel Action Network (www.ban.org) and the Mercury Policy Project (www.Mercurypolicy.org). working to end pollution from the toxic metal -- Mercury.

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