

Information to support the review of Annex A to the Minamata Convention

Status of switches and relays in Japan

1. Category of mercury-added product¹	<input type="checkbox"/> Batteries <input checked="" type="checkbox"/> Switches and relays <input type="checkbox"/> Lamps <input type="checkbox"/> Cosmetics	<input type="checkbox"/> Pesticides, biocides and topical antiseptics <input type="checkbox"/> Non-electronic measuring devices <input type="checkbox"/> Others (<i>Please specify: _____</i>)						
2. Further description of the product (if any)	<p>• The Major known mercury switches and mercury relays in Japan (classified according to operating mechanism) are as follows:</p> <table border="1"> <tr> <td>Type I</td> <td>Mercury reed relays</td> </tr> <tr> <td>Type II</td> <td>Mercury displacement relays</td> </tr> <tr> <td>Type III</td> <td>Mercury seismic switches</td> </tr> </table> <p>• Although “very high accuracy capacitance and loss measurement bridges and high frequency radio frequency switches and relays in monitoring and control instruments with a maximum mercury content of 20 mg per bridge, switch or relay” are exempted from the requirements of Minamata Convention, survey conducted in Japan could not confirm the domestic manufacture of bridges, switches or relays for the stated purpose.</p>		Type I	Mercury reed relays	Type II	Mercury displacement relays	Type III	Mercury seismic switches
Type I	Mercury reed relays							
Type II	Mercury displacement relays							
Type III	Mercury seismic switches							
3. Information on the use of the product	<p>• Mercury switches/mercury relays are used by incorporating them in equipment.</p>							
4. Information on the availability of mercury-free (or less-mercury) alternatives	<p>• Mercury free switches and relays are available.</p>							
5.(i) Information on the technical feasibility of alternatives	<p>• Currently, there are products (end use) that are difficult to replace with mercury-free relays due to performance and cost issues, and the necessity to change the circuit when using a mercury-free relay. Due to these reasons, there is still a demand for mercury relays for the maintenance of existing (not easily replaceable) products.</p> <p>• Relevant industrial associations, on their websites, have published a list of uses that should be excluded from regulation by the Act on Preventing Environmental Pollution of Mercury of Japan for products commonly recognized by the Association to currently have no mercury free alternatives.</p>							

¹ Dental amalgam is subject to a separate intersessional process as specified in Decision MC-3/2.

5.(ii) Information on the economic feasibility of alternatives	• As stated in 5.(i) above.
6. Information on environmental and health risks and benefits of alternatives	
7. If any, additional information being submitted on mercury-added products pursuant to Article 4.4 of the Convention not addressed above (e.g. manufacture, general trade information, etc.)	<ul style="list-style-type: none"> • In Japan, 1 company currently manufactures mercury switches (mercury seismic switches) and 4 companies manufacture mercury relays (mercury reed relay : 3, mercury displacement relay : 1). • There are cases where mercury relays manufactured outside Japan are imported and incorporated in equipment.
8. Other relevant information pursuant to Decision MC-3/1	• Mercury switches and mercury relays will be regulated by the Act on Preventing Environmental Pollution of Mercury of Japan after the phase-out deadline of the Minamata Convention (end of 2020). Switches and relays for which no feasible mercury-free alternative for replacement is available are excluded from Annex A of Minamata Convention and will also be excluded from the Act on Preventing Environmental Pollution of Mercury of Japan (scope of the exemption will be judged based on the availability of mercury free alternatives)
9. References	• Information is collected through interviews with domestic manufacturers of mercury switches/mercury relays and through questionnaire survey targeting recipients of shipments from the relevant manufacturers and member companies of healthcare/measurement/analysis/control equipment related industrial associations.

【Type I : Mercury reed relays】

1. Category of mercury-added product²	<input type="checkbox"/> Batteries <input checked="" type="checkbox"/> Switches and relays <input type="checkbox"/> Lamps <input type="checkbox"/> Cosmetics	<input type="checkbox"/> Pesticides, biocides and topical antiseptics <input type="checkbox"/> Non-electronic measuring devices <input type="checkbox"/> Others (<i>Please specify: _____</i>)
2. Further description of the product (if any)	• Performs electrical circuit signal switching, etc.	

² Dental amalgam is subject to a separate intersessional process as specified in Decision MC-3/2.

	<ul style="list-style-type: none"> Mercury content depends on the application and is in the range of 10 to 4,000 mg per mercury reed relay.
3. Information on the use of the product	<ul style="list-style-type: none"> Due to its low contact resistance, no chattering, and long life, it has been widely used in the past for inspection devices, analysis devices, control devices, etc.
4. Information on the availability of mercury-free (or less-mercury) alternatives	<ul style="list-style-type: none"> Currently, mercury-free relays (reed relays, semiconductor relays) are available and for many applications new use of mercury-based reed relays is not required.
5.(i) Information on the technical feasibility of alternatives	<ul style="list-style-type: none"> However, for some applications, mercury-free relays cannot be substituted due to performance and cost issues. Specifically, semiconductor inspection equipment (or semiconductor manufacturing equipment) that can handle high current/high voltage and require high current accuracy, Noise Test equipment (noise simulator, ESD (electrostatic discharge) test equipment, CMR inspection equipment) that can handle high voltage and require conformance to rapid rising waveform generation and standards, trimming equipment that can handle high voltage and require high precision waveform to be maintained, drawing devices that can handle high voltage and require high precision electron beam control, electron microscopes that can handle high voltages, nano-indentation testers that control minute electric currents, scanners that measure extremely small currents, and nuclear instrumentation that require high performance. Even after the end of 2020, manufacture, import and export of these products is desired. The Semiconductor Equipment Association of Japan considers that there are no mercury free alternatives for semiconductor inspection equipment (or semiconductor manufacturing equipment) that satisfy the required conditions and has published these products on its website as products that should not be subject to the Act on Preventing Environmental Pollution of Mercury of Japan. Further, existing products such as vehicle control devices, instrument landing system ground facility, steel welding machines, inverter devices and control panels for social infrastructure equipment, noise test devices, semiconductor inspection devices, etc. that use mercury reed relays, require the circuit to be changed in order to use mercury free relays, resulting in the need to develop a new board at a high cost and to review the entire system. Hence, a simple replacement is not possible and thus the demand for maintenance purposes exists. Some of these products are exported and used overseas, and their maintenance may result in the manufacture and export

	of mercury reed relays, as well as the export and import of parts and products containing the relays.
5.(ii) Information on the economic feasibility of alternatives	• As stated in 5.(i) above.
6. Information on environmental and health risks and benefits of alternatives	
7. If any, additional information being submitted on mercury-added products pursuant to Article 4.4 of the Convention not addressed above (e.g. manufacture, general trade information, etc.)	<ul style="list-style-type: none"> • There are 3 manufacturers in Japan. • In the manufacture of mercury reed relays, mercury switches (elements) are imported from outside Japan and used.
8. Other relevant information pursuant to Decision MC-3/1	
9. References	

【Type II : Mercury Displacement Relay】

1. Category of mercury-added product³	<input type="checkbox"/> Batteries <input checked="" type="checkbox"/> Switches and relays <input type="checkbox"/> Lamps <input type="checkbox"/> Cosmetics	<input type="checkbox"/> Pesticides, biocides and topical antiseptics <input type="checkbox"/> Non-electronic measuring devices <input type="checkbox"/> Others (<i>Please specify: _____</i>)
2. Further description of the product (if any)	(Mercury overcurrent relay) <ul style="list-style-type: none"> • A type of mercury displacement relay. • Detects overcurrent and shuts off the circuit. • The maximum mercury content per piece is 15 g. 	
3. Information on the use of the product	(Mercury overcurrent relay) <ul style="list-style-type: none"> • Used for air conditioning and refrigeration equipment for train cars and large-scale industrial equipment. 	

³ Dental amalgam is subject to a separate intersessional process as specified in Decision MC-3/2.

	<p>(Mercury displacement relay manufactured outside Japan)</p> <ul style="list-style-type: none"> Mercury displacement relay manufactured outside Japan are used as components (polarity switching controller) of the particle accelerator.
<p>4. Information on the availability of mercury-free (or less-mercury) alternatives</p>	<p>(Mercury overcurrent relay)</p> <ul style="list-style-type: none"> Manufacturers are carrying out replacement, not by mercury-free overcurrent relays, but by IMPs (Internal Motor Protector) which similarly provides the functionality of protecting against overcurrent. <p>(Mercury displacement relay manufactured outside Japan)</p> <ul style="list-style-type: none"> Mercury-free relay was being used, but the occurrence of a problem resulted in reverting to the use of this product.
<p>5.(i) Information on the technical feasibility of alternatives</p>	<p>(Mercury overcurrent relay)</p> <ul style="list-style-type: none"> The manufacturer is planning to end the production by the end of 2020. However, due to a difference in the maximum value of the protection current that can be supported, substitution with IMP may not be possible for new equipment that require a large amount of current. Hence, even after the end of 2020, there may be a desire to manufacture mercury-based overcurrent relays. Further, due to structural differences, it is not possible to simply replace the existing mercury overcurrent relay with an IMP. Hence, there is a possibility that the manufacturer may wish to manufacture a mercury overcurrent relay after the end of 2020 for maintenance purposes. <p>(Mercury displacement relay manufactured outside Japan)</p> <ul style="list-style-type: none"> Although development is underway towards the replacement of mercury-free relays, based on current situation, it may be necessary to import the relays even after the end of 2020. The Semiconductor Equipment Association of Japan has published on its website that no mercury-free alternatives currently exist for homopolarity switching controllers. In addition to importing mercury displacement relays for maintenance, import/export of parts and products containing these relays may occur.

5.(ii) Information on the economic feasibility of alternatives	
6. Information on environmental and health risks and benefits of alternatives	
7. If any, additional information being submitted on mercury-added products pursuant to Article 4.4 of the Convention not addressed above (e.g. manufacture, general trade information, etc.)	(Mercury overcurrent relay) • There is 1 manufacturer in Japan.
8. Other relevant information pursuant to Decision MC-3/1	
9. References	

【Type III : Mercury seismic switch】

1. Category of mercury-added product⁴	<input type="checkbox"/> Batteries <input checked="" type="checkbox"/> Switches and relays <input type="checkbox"/> Lamps <input type="checkbox"/> Cosmetics	<input type="checkbox"/> Pesticides, biocides and topical antiseptics <input type="checkbox"/> Non-electronic measuring devices <input type="checkbox"/> Others (<i>Please specify: _____</i>)
2. Further description of the product (if any)	<ul style="list-style-type: none"> • Detect vibration and shut off the circuit. • The maximum mercury content per piece is 300 mg. 	
3. Information on the use of the product	<ul style="list-style-type: none"> • Used for cassette type portable gas heating equipment. 	
4. Information on the availability of mercury-free (or less-mercury) alternatives	<ul style="list-style-type: none"> • The manufacturer has developed a mercury-free seismic switch, and the manufacture of mercury seismic switch is scheduled to be discontinued by the end of 2020. 	
5.(i) Information on the technical feasibility of alternatives		

⁴ Dental amalgam is subject to a separate intersessional process as specified in Decision MC-3/2.

5.(ii) Information on the economic feasibility of alternatives	
6. Information on environmental and health risks and benefits of alternatives	
7. If any, additional information being submitted on mercury-added products pursuant to Article 4.4 of the Convention not addressed above (e.g. manufacture, general trade information, etc.)	• There is 1 manufacturer in Japan.
8. Other relevant information pursuant to Decision MC-3/1	
9. References	