

IMERC Fact Sheet

Mercury Use in Pumps

Last Update: October 2008

“Mercury Use in Pumps” summarizes the use of mercury in pumps, which are devices used to transport either a liquid or a gas across a pressure differential. This Fact Sheet covers all the types of pumps that contain mercury in the individual devices; legislation related to mercury-containing pumps (i.e., product bans and phase-outs); disposal and recycling of mercury-containing pumps; and non-mercury alternatives.

The information in this Fact Sheet is based on data submitted to the state members of the Interstate Mercury Education and Reduction Clearinghouse (IMERC)¹ including Connecticut, Louisiana, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. The data is available online through the IMERC Mercury-Added Products Database.²

A number of important caveats must be considered when reviewing the data summarized in this Fact Sheet:

- The information may not represent the entire universe of mercury-containing pumps sold in the U.S. The IMERC-member states continuously receive new information from mercury-added product manufacturers, and the data presented in this Fact Sheet may underestimate the total amount of mercury sold in this product category.
- The information summarizes mercury use in pumps sold nationwide since 2001. It does not include mercury-added pumps sold prior to January 1, 2001 or exported outside of the U.S.
- Reported data includes only mercury that is used in the product, and does not include mercury emitted during mining, manufacturing, or other points in the products' life cycle.

Mercury Components in Pumps

The mercury is typically found in certain switches contained in pumps that are used to control the flow of liquid. These pumps use the mercury switches to initiate activation of the pump when specific conditions are met, such as when a tank is full. Depending on its complexity, a pump typically employs either one or two mercury switches and each switch may contain as little as 0.034 ounces, or as much as 8.0 ounces of mercury. The amount of mercury in pumps that have been reported to the IMERC-member states

¹ IMERC: <http://www.newmoa.org/prevention/mercury/imerc/about.cfm>

² Mercury-Added Products Database:
<http://www.newmoa.org/prevention/mercury/imerc/notification/index.cfm>

ranges from 100 milligrams (mg) to greater than 1,000 mg of mercury, depending on the amount and type of mercury switches in the pump.

Mercury has also been used in seals that protect a pump's motor from water damage. These pumps are primarily used in deep water wells for agriculture and drinking water applications, especially in the western United States. They are used in the oil and gas industry as well.

Float switches include a float that rises in response to changes in the level of a liquid. They are most commonly found in sump pumps and bilge pumps. Particular operating conditions depend on the pump type and its primary functions. The pumps are activated when the water level is unsatisfactory (e.g., either too high or too low). The mercury is usually enclosed within the hollow cylinder or sphere that make up the floatation device. For more information, go to:

www.newmoa.org/prevention/mercury/projects/legacy/appliances.cfm#sp



Mercury Float Switch used in a Sump Pump
Photo Source: Vermont Agency of Natural Resources



Mercury-Containing Bilge Pump
Photo Source: Vermont Agency of Natural Resources

Control switches are typically employed to monitor liquid levels and may be used to activate an alarm system should the liquid rise to and/or above a certain threshold. This category includes tilt switches and pressure switches, which use the mercury as a conductor to complete the electrical circuit that turns the pump system on or off. These types of switches are found in fire pump controllers, spa pumps, tanks, and other commercial/industrial pumping systems.

Mercury Use in Float Switches

Table 1 presents the total amount of mercury in pumps and pump systems sold in the U.S. during calendar years 2001 and 2004. More detailed information on mercury switches can be found in the report, *Trends in Mercury Use in Products: Summary of the IMERC Mercury-added Products Database*, June 2008.³

Table 1 shows that mercury use in pumps and pump systems increased 0.5 tons from approximately 6.2 tons in 2001 to approximately 6.7 tons in 2004. The mercury-added

³ Trends in Mercury Use in Products: Summary of the IMERC Mercury-Added Products Database:
<http://www.newmoa.org/prevention/mercury/imerc/pubs/reports.cfm>

component most commonly used in these pumps were float switches; however, other types of control switches, including tilt switches and leveling switches were also used.

Table 1: Total Mercury Sold in Pumps in the US (pounds)		
Product/Component	2001 Total Mercury	2004 Total Mercury
Pumps	12,382 (6.2 tons)	13,410 (6.7 tons)

Note: 1 gram = 0.002205 pounds.

Five pump companies (see Phase-Outs & Bans on the Sale of Mercury-added Pumps) reported the complete elimination of the use of mercury switches in their pump systems during the past few years to the IMERC-member states. Three of these companies decreased their use of mercury in their pump products from approximately 805 pounds (0.4 tons) in 2001 to approximately 745 pounds of mercury (0.3 tons) in 2004 – a decline of approximately 6 percent. Since the 2004 triennial reporting period, two other companies have reported complete phase-out mercury of mercury pump switches. The IMERC-member states anticipate that mercury use will decline significantly in the 2007 triennial reports.

However, as these five companies decreased their use of mercury switches in pumps, two companies increased their reported total use of mercury in pumps that they sold in 2004. SJE-Rhombus, who is an original equipment manufacturer (OEM) of the switches, reported an increase in the total use of mercury in pump switches from 2001 to 2004. Prior to phasing-out their mercury switches in 2006, Rule Industries reported an increase in their total mercury use in pumps between 2001 and 2004. The increase in total mercury use from 2001 to 2004 from these two companies, accounts for the overall increase in total mercury use in pumps sold in the U.S. over this period of time.

Since 2004, many states have passed legislation restricting the sale of mercury-added switches and relays, including float switches and tilt switches, individually or as a component in a larger product (i.e., pumps). As more of these state laws go into effect, mercury use in this product category will likely decline.

Phase-Outs & Bans on the Sale of Mercury-added Pumps

Manufacturers have used mercury switches in their pumps for many decades because mercury switches were durable and effective. However, the use of these switches in pumps has steadily declined due to concerns over the potential environmental and human health effects posed by mercury. In addition, many IMERC-member states have implemented mercury product bans and phase-outs that include mercury-added pumps; therefore, many companies have ceased manufacturing them and/or stopped selling them to these states.

The following IMERC-member states currently have restrictions on the sale and/or distribution of mercury-containing pumps due to the amount of mercury that they contain: Connecticut, Louisiana, and Rhode Island.⁴ Additional IMERC-member states, including California, Illinois, Maine, Massachusetts, Minnesota, New Hampshire, New York, and Vermont restrict the sale and/or distribution of pumps that contain a mercury switch as a component.⁵ Most of these states allow manufacturers to apply for an exemption, which, if approved, would allow them to sell these products in the state after the effective phase-out date. However, to date, no exemptions have been granted for these products, so they are effectively banned from sale in these states.

Some manufacturers of pumps continue to manufacture and sell products containing mercury-added components in other states. Table 2 includes a list of manufacturers that still manufacture pumps and pump systems containing a mercury component as of the 2004 IMERC triennial reporting period.

Table 2: Manufacturers of Mercury-Containing Pumps		
Product	Mercury Component	Manufacturers Reporting to IMERC-member States
Pumps and Pump Systems	Float switch	Anchor Scientific Crane Pumps & Systems FE Water Transfer Systems SJE-Rhombus
	Level switch	Kessel GmbH
	Tilt switch	FE Water Transfer Systems
	Other type of switch (not specified)	Crane Pumps & Systems ITT McDonnell & Miller Zoeller Pump Co., LLC

The following is a list of companies and mercury-added pumps that the manufacturers have reportedly eliminated from the U.S. market since 2001:

Sullair Corporation reported to the IMERC-member states that they began the phase-out of mercury pressure switches in two models of their vacuum pumps in June/July 2003. The original switch for these pumps was replaced with a non-mercury component, and the use of mercury switches in their pump products was fully eliminated in October/November 2003.

Joslyn Clark Controls reported to the IMERC-member states that they phased-out the manufacture and sale of their fire pump control products with a mercury switch in 2003.

⁴ State Mercury-Added Product Phase-Out Guidance:
<http://www.newmoa.org/prevention/mercury/imerc/phaseoutinfo.cfm>

⁵ State Mercury-Added Product Ban Guidance:
<http://www.newmoa.org/prevention/mercury/imerc/productban.cfm>

Lancaster Pump reported to the IMERC-member states that they phased-out the manufacture and sale of their pump products containing mercury float switches in 2004.

BJM Pumps reported to the IMERC-member states that they phased-out the manufacture and sale of their pump products containing mercury float switches in 2006.

Rule Industries reported to the IMERC-member states that they phased-out the manufacture and sale of their marine pump float switches in 2006.

Disposal and Recycling of Mercury-Containing Pumps

Despite the emerging trend toward mercury-free pumps, the current inventory of pumps used in wastewater and drinking water treatment plants, as well as in manufacturing and other industrial applications may include mercury switches. As the pumps age, wear, and become obsolete, proper disposal becomes a concern.

Most submerged pumps and pumping systems (including sump pumps) contain a mercury-added float switch. A wire attached to the float is a good indication that a sump pump contains a mercury switch. The mercury is located in the bulb of the float. Non-mercury float switches are not usually used for submerged pumps. They do not have attached wires; instead they have a metal guide rod that holds the mechanical switch to the pump system. Once the users have determined whether or not their pump has a mercury switch, the wire attaching the float can simply be cut, and the whole float switch can be properly disposed of.

Several of the newer bilge pumps use a rolling brass ball bearing instead of mercury to complete the electrical circuit. To determine if the bilge pump contains mercury, gently shake the bilge pump – a brass ball bearing will be easily discerned from liquid mercury because of the sound it makes inside the pump when shaken. Once it is determined that the pump has a mercury switch, the user can remove the entire pump for proper disposal.

For more information about the removal of mercury switches from pumps see:

- Maine Department of Environmental Protection (ME DEP):
<http://mainegov-images.informe.org/dep/rwm/hazardouswaste/pdf/appliance.pdf>
- Vermont Department of Environmental Conservation (VT DEC):
<http://www.anr.state.vt.us/dec/ead/mercury/PDF/appman.pdf>

Mercury control switches (e.g., tilt switches, pressure switches) may also be part of a pumping system and/or control panel. The best way to determine whether or not a pump or pumping system contains a mercury component is to contact the pump manufacturer directly.

Some states ban the disposal of all mercury-containing devices, including pumps, in solid waste landfills and incinerators. Household hazardous waste (HHW) collection programs may accept mercury-added pumps for recycling and disposal in many communities. However, most HHW programs will only accept the mercury-added switch and not the

entire pump. Persons should contact their state and/or local environmental agencies to verify solid waste disposal regulations, especially those pertaining to mercury-containing components and devices. They can also check with their local municipality to find out about the specific recycling and disposal options for mercury pumps. Prior to disposal, the mercury switches should be removed by a service technician and sent to a recycler for reclamation.

Non-Mercury Alternatives

As the phase-out of the sale of pumps with mercury switches has become more widespread, pump manufacturers have responded by working with their suppliers to develop alternative non-mercury components. Non-mercury switch alternatives suitable for use in pumps include pressure switches (sensor or transmitter), dry reed switches (magnetic), mechanical switches, optical switches, temperature/thermal switches, and vacuum switches. Many factors should be considered when switching to a non-mercury device, including the relative costs, availability, product effectiveness, and desired application (i.e., different switches are suited for different types of pumps).

For more information on non-mercury alternatives for pump switches, see:
<http://sustainableproduction.org/downloads/An%20Investigation%20Hg.pdf>