



# Eliminating the Use of Mercury Manometers in the Dairy Industry

Minnesota Technical Assistance Program ■ INTERN SUMMARY

<b>Company</b>	Dairyland Equipment Services Inc., Plainview, Minnesota, in conjunction with the Wabasha County Solid Waste/Recycling Office
<b>Results</b>	The Mercury Manometer Replacement Project—a manometer changeout program for dairy farmers throughout the state—replaced 1,353 manometers with a non-mercury gauge and removed 1,134 pounds of potentially hazardous mercury from dairy farms and the environment.

After removing contaminated mercury manometers from the farm, service technicians return to the shop and drained the mercury into a sealed storage container. When Dairyland accumulated up to 25 pounds of mercury, it contacted its county solid waste officer for assistance transporting the mercury to a recycling company.

## Incentives for Change

Dairyland initially contacted the Wabasha County solid waste officer in 1994 to find out how to dispose of 25 pounds of mercury it had accumulated from servicing mercury manometers.

After learning about the need for proper mercury management, Dairyland was concerned about the potential for mercury spills when service technicians filled new manometers with mercury, and about the collection, storage and disposal of used mercury.

Because Dairyland was interested in reducing future disposal costs and liability associated with mercury, it began replacing contaminated mercury manometers with bourdon (spring) gauges—a nonmercury-containing alternative.

## Mercury

Mercury is a toxin that has been associated with nervous system disorders. When mercury enters lakes and streams, it can build up in the tissue of fish and result in high concentrations. Minnesota issues advisories cautioning people to limit how much fish they eat from waters in the state.

## Intern Activities

Under the direction of Dairyland and Wabasha County, the MnTAP intern evaluated the use of mercury manometers in Minnesota’s dairy industry and researched alternative vacuum gauges. The intern conducted a survey of 85 dairy equipment dealers to 1) determine which dealers offer mercury

## Process Background

Dairyland Equipment Services sells, installs and services milking systems for dairy farmers within a 60 mile radius of Plainview, Minnesota.

Milking systems have vacuum lines that remove and transport milk from cows’ udders to a bulk tank. As part of this system, vacuum gauges measure pressure in the vacuum line. By monitoring the gauges, farmers can be alerted to large pressure fluctuations in the vacuum line, which can result in health problems for the cows or indicate operational inefficiencies.

Mercury manometers are one type of vacuum gauge used in milking systems. Each gauge has a U-shaped plastic tube containing 0.781 pounds of mercury. The mercury in these manometers can become contaminated with water, milk, dirt and cleaning chemicals. Also, the plastic mercury-containing tube can become discolored and cloudy. These problems make the manometers difficult to read accurately. Once this occurs, Dairyland must repair or replace the manometers and manage the waste mercury.

manometers, and 2) estimate the amount of mercury present on dairy farms and at equipment dealerships.

### **Volume of Mercury**

Responses from the equipment dealers survey indicated that nearly 20 percent of all Minnesota dairy farms—2,357 farms—had mercury manometers. These manometers contained a total of about 1,825 pounds of mercury. An additional 205 pounds of mercury were in storage or in use at dairy equipment dealerships. In 1994 alone, Dairyland accumulated 15 pounds of waste mercury for recycling.

### **Alternative Gauges**

Based on current dairy industry standards for vacuum gauges, accuracy, durability and cost, the intern found that bourdon liquid-filled gauges and digital gauges were acceptable alternatives to mercury manometers.

**Bourdon liquid-filled gauges.** The intern determined that the bourdon gauges need to be stainless steel and filled with oil. Stainless steel will prevent corrosion by contaminants, and oil dampens vibrations resulting in smaller needle fluctuations and greater accuracy. The oil also lubricates the moving mechanical parts, which reduces wear. Similar gauges are currently used in the dairy industry and retail costs are comparable to that of mercury manometers.

**Digital gauges.** Digital gauges give more precise readings and have a higher degree of accuracy than mercury or bourdon gauges. Unlike other gauges, digital gauges require a power source. Because the gauges are in use at least 35 hours per week, the intern suggested that the gauges be powered by the same source as the milking system so they can be turned on and off with the system. A few digital gauges were in the price range of mercury manometers.

Equipment manufacturers recommend that service technicians use a bourdon gauge or digital gauge to test the milking systems they are servicing. The gauges used in the field should be calibrated with a mercury manometer kept at the shop.

### **Conclusion**

Dairyland plans to continue replacing contaminated mercury manometers with nonmercury-containing gauges to help reduce the amount of mercury on Minnesota farms.

With support from a Legislative Commission on Minnesota Resources grant, the Minnesota Department of Agriculture conducted the Mercury Manometer Replacement Project. The manometer changeout program for dairy farmers throughout the state replaced 1,353 manometers with a nonmercury gauge and removed 1,134 pounds of mercury.

### **Management Options**

The Minnesota Pollution Control Agency (MPCA) recommends the following management options when replacing mercury manometers.

- Take mercury and mercury manometers to a mercury recycling facility or arrange with a waste hauler to take them to a recycling facility. A sample list of mercury recycling facilities is included below. Contact recyclers directly for shipping information, prices and a list of haulers that serve their facilities.
- Check with dairy equipment dealers to see if they accept mercury or mercury manometers for recycling.
- Check with the county solid waste office to see if any other services are available in the area.
- If accessible management services are not available, store mercury and mercury manometers until services are established in the area.

### **Storage**

Always store mercury and mercury manometers removed from service in covered leak-proof containers, such as small plastic buckets with sealable lids. Mark containers as appropriate: "Mercury for Recycling" or "Mercury Manometers for Recycling."

### **Shipping Invoice**

When shipping mercury or mercury manometers to another location, an invoice must accompany each shipment. That invoice must include the date of shipment, the amount of mercury or number of mercury manometers in the shipment, the location from where the waste is being shipped, and the destination of the shipment. Keep a copy of each invoice as a record of the shipment.

### **Mercury Recycling Facilities**

MnTAP maintains this list of mercury recycling facilities solely as a service to Minnesota companies. This is not a complete list of facilities and does not represent an endorsement by MnTAP. MnTAP, by providing this list, does not represent that the services

do or do not ensure compliance with environmental and safety laws in any specific application.

DFG Mercury Corp.  
Evanstown, IL  
847/869-7800  
[dfgoldsmith.com](http://dfgoldsmith.com)

Mercury Waste Solutions, Inc.  
Roseville, MN  
651/628-9370  
887/636-6514  
[www.mwsi.com](http://www.mwsi.com)

## **For More Information**

MnTAP has a variety of technical assistance services available to help Minnesota businesses implement industry-tailored solutions that maximize resource efficiency, prevent pollution and reduce costs. Our information resources are available online at [mntap.umn.edu](http://mntap.umn.edu). Or, call MnTAP at 612/624-1300 or 800/247-0015 from greater Minnesota for personal assistance.

*This project was conducted in 1995 by MnTAP intern Charlie Radman a Biosystems and Agricultural Engineering student at the University of Minnesota.*