



Focus

Imported Cadmium-Contaminated Zinc Sulfate Used in Fertilizer and Other Products

Introduction

In 1998, Washington became the first state in the nation to adopt standards for metals in fertilizers. Two years later when cadmium-contamination was discovered in zinc sulfate from China used as ingredient in fertilizer, Washington state officials were pleased that the standards were in place. Without such standards, severe worker exposure to cadmium, contamination of farmlands, and negative publicity for Washington farm produce could have resulted.

The Washington State Department of Ecology's (Ecology) intent in publicizing this information is to further educate and inform citizens, fertilizer manufacturers and regulatory agencies in other states about the potential for contamination of fertilizer products and to prevent similar occurrences in the future.

History

In February 2000, a private fertilizer company in Washington state that distributes zinc fertilizer in the Western U.S. and Canada called the Washington State Departments of Agriculture and Ecology. The company informed state officials that it had retested its product for metals and discovered some of the product had high cadmium levels, higher than what is allowed by state standards. (The fertilizer company had tested its products for metals when it registered them for sale in Washington state in July 1999, but at that time these products met metal standards. Since that time the company changed where it purchased the raw material for their product.) Once the company discovered the high cadmium concentrations, they closed their facility and issued a stop sale and recall for their fertilizer products made from the contaminated material.

Company operations were closed for several months for facility clean up. Worker exposure to cadmium was a major concern, and a Washington State Department of Labor and Industries investigation was conducted. State agency officials tested both the fertilizer products and the raw zinc sulfate in them. The results of the various tests are in the chart on the next page.

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Chinese Zinc Sulfate Test Results

Source	Total Cadmium (ppm)	TCLP Cadmium (ppm)
Contaminated Fertilizer Products⁽¹⁾		
· Product 1	2,260	78.8
· Product 2	2,170	81.4
· Product 3	2,370	101
· Product 4	10,600	426
Zinc Sulfate used as raw material		
· Sample ID #11-3-7	18,900	667
· Sample ID # 6-1-3	164,000	7,150
Composite Sample of the Zinc Sulfate		
· Sample #1A	135,000	5,690
Port of Seattle (raw material)		
· Sample 1 (Container G)	46,400	2,130
· Sample 2 (Container G)	72,800	3,500
· Sample 3 (Container T)	215,000	5,670
· Sample 4 (Container T)	199,000	5,760

PPM= Parts per million TCLP= Toxicity characteristic leaching procedure

⁽¹⁾ It is not known if any of the fertilizer products were land-applied or if they were all successfully recalled.

The results confirm the company’s findings. Some of the raw material tested as high as 20 percent cadmium (200,000 ppm). Since cadmium does not occur at these concentrations in natural ore, it is assumed that the cadmium was added to the zinc sulfate. However, it is not clear if the zinc sulfate was deliberately contaminated or not.

Are High Cadmium Levels In Fertilizer a Health Concern?

Health concerns due to cadmium and other heavy metals in fertilizer are discussed in the report, *Screening Survey for Metals and Dioxins in Fertilizer Products and Soils in Washington State, April 1999* (Ecology Publication #99-309). This report can be accessed at: <http://www.wa.gov/ecology/biblio/99333.html>.

It summarizes the health impact due to cadmium exposure as follows, “Cadmium accumulates in the kidney where it can remain for many years and exposure to cadmium over a long time can cause irreversible damage to the kidneys (Goyer, 1996). Cadmium affects how calcium is used by the body and cadmium exposure has been associated with bone deformities. Occupational exposure to airborne cadmium has been associated with chronic pulmonary disease and emphysema.”

Worker exposure to cadmium is a significant concern. The Occupational Safety and Health Administration (OSHA) has requirements for limiting worker

exposure to cadmium fumes and cadmium dust. The National Institute for Occupational Safety and Health currently recommends that workers breathe as little cadmium as possible.

Is there a potential for adverse exposure for the general population from eating foods high in cadmium through plant uptake? With many caveats, yes, the risk exists. Some of the factors that influence plant uptake of cadmium are soil acidity, type of plants, soil type, and other soil nutrients. Other factors that influence an individual's absorption of the cadmium include the percentage of high cadmium food in an individual's diet and the general health of the exposed individuals. The scientific community is debating the severity of the risks. However, because of the risks, Canada and some European nations, and Washington state have chosen to set limits for certain metals, such as cadmium, in fertilizers. Cadmium is a common contaminant of some fertilizers (e.g., phosphate fertilizers), although at much lower levels than the contaminated zinc sulfate fertilizer discussed here.

Environmental Protection Agency (EPA) Addresses This Issue Nationally

Investigation of the Chinese cadmium-contaminated zinc sulfate fertilizer is being handled by EPA's Office of International Relations. According to a May 23, 2000 *New York Times* article, an unpublicized government investigation has found, "as much as 1.3 million pounds (of contaminated material) entered the U.S. at 10 different ports since the contaminated shipment was detected in November 1999." The material has turned up in California, Oregon, Washington, and Mississippi for use in fertilizer and animal feed. It is not known how much, if any of this contaminated material was actually made into product and sold.

Prevention Strategies

The following strategies are for fertilizer companies, states and the home gardener/farmer to insure they do not end up with similar or other contaminated material:

Fertilizer companies: Companies should test raw materials regularly, especially when the source of a raw material changes, and verify it against the product specification sheet. One fertilizer company that uses a zinc sulfate raw material from China tests each load of raw material in China prior to shipment to the U.S. In addition, fertilizer companies need to comply with OSHA requirements to protect their workers from cadmium and other metals.

States: State fertilizer registration programs should encourage or require testing and/or set standards for metals in fertilizers. Some raw material for fertilizers is coming from countries that have less strict environmental standards than the U.S. Environmental officials are aware that one of the easiest ways to illegally dispose of a waste is with illegal land applications.

Home gardener/farmers: Anyone with access to the Internet can check out Washington State's Website on levels of metals in fertilizers. Go to: <http://www.wa.gov/agr/pmd/fertilizer> for information on all fertilizers registered for sale in Washington. For information on waste-derived and micronutrient fertilizers registered for sale in Washington go to <http://www.wa.gov/ecology/hwtr/fertilizer>. Citizens from other states should be aware that the same-brand fertilizer products sold outside of Washington may contain different source materials and may have higher levels of metals in them. Citizens can directly ask the companies for levels of metals in products sold in their state. Home gardeners should be sure to store all fertilizer products safely and use them only as directed.

In Conclusion

Metal contamination of fertilizer and other similar products, including animal feeds, is always a possibility. Washington's metals standards for fertilizers provided the mechanism to catch this specific contamination problem. A situation such as the one experienced in Washington state is preventable through proper monitoring of raw materials and products. Ecology encourages other states, fertilizer manufacturers and citizens to take necessary precautions to prevent this situation from happening again.

For More Information

Contact Miles Kuntz, Department of Ecology, (360) 407-6748 or miku461@ecy.wa.gov or Department of Agriculture at fertreg@agr.wa.gov. If you need this material in an alternative format, contact Chris Chapman at (360) 407-7160 or call (360) 407-6006(TDD).