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A mill's SANITATION toolbox

by Emily Buckley

Pest management and facility sanitation issues present ongoing struggles for managers at flour mills, feed mills and other grain processing facilities. The issues surrounding methyl bromide are still of top concern to many mill managers, with the January 1, 2005 complete phaseout date quickly approaching.

Although pest control experts still emphasize the importance of integrated pest management (IPM) strategies to control insects and reduce the need for chemical fumigations, there are several treatment methods available to keep those pesky insects out of your facility.

METHYL BROMIDE IN 2004

The phaseout of methyl bromide has been an overshadowing concern for millers globally since 1992, when 160 countries signed an amendment to the Montreal Protocol environmental treaty that included methyl bromide as one of the several ozone-depleting substances to be phased out of production. For developed nations, the ban capped production at the 1991 level and has reduced production 25% in 1999, 50% in 2001, 70% in 2003, with 100% phaseout effective January 1, 2005.

Yet many millers and food processors around the world are still hoping to have access to their favored fumigant. In 2003, many countries, including the United States, Australia and Canada, submitted applications for Critical Use Exemptions (CUEs). The parties of the Montreal Protocol met last November to address these CUE requests. Unable to reach a conclusion when requests from different nations totaled more than had been anticipated, the group scheduled an "Extraordinary Meet-

ing" at the end of March 2004, to discuss the terms of the exemptions.

It was decided to allow single-year exemptions for 2005. However, the parties said it would address the United States' proposal for multi-year exemptions at its next meeting later this year.

For the milling and processing sectors, the U.S. was allowed 483 tonnes of methyl bromide in CUEs; Canada, 47 tonnes; U.K., 47 tonnes; and France, 40 tonnes. Developed countries not requesting CUE's for this sector include Spain, Portugal, Japan, Italy, Greece and Belgium.

Countries will have to resubmit critical use applications for 2006 by April 2004; these critical use nominations must prove that no comparable alternative exists, and will undergo review by the Methyl Bromide Technical Options Committee, which says that 93% of the current methyl bromide uses can be replaced by alternatives. The parties to the Montreal Protocol are also requesting countries submit a national management strategy for phase-out of critical uses before February 2006, if filing for critical use exemptions beyond 2005. *(Access www.world-grain.com to find previous* WG *articles on the methyl bromide ban.)*

Jerry Heath, Product Manager for Industrial Fumigant Company (IFC) is positive about the outlook for the supply of methyl bromide in the U.S. "Costs have been rising year by year through the phaseout, but supplies have always been adequate for the milling and food processing sectors," Heath said. "For circumstances where methyl bromide is the fumigant of choice, the outlook for adequate supplies in 2004 and the foreseeable future remains good. CUE's totaling 30% of the baseline are providing the supply that has the industry feeling good about its options in the near term."

STRUCTURAL FUMIGATION OPTIONS

While exemptions are now secured for at least 2005, longer-term availability is still doubtful. There are several options to methyl bromide for pest control in flour mills and grain processing plants, primarily the recently U.S.-approved sulfuryl fluoride, heat treatments and phosphine.

• The gas fumigant sulfuryl fluoride, marketed as ProFume, from Dow AgroSciences is probably the most anticipated new option for structural fumigations. ProFume received U.S. approval for use at the end of January 2004, and Dow expects most states to register ProFume by the end of April.

Dow is also currently working towards approval in several other countries. According to Jeffery Welker, Dow's global business leader for urban pest management, Dow is expecting approval in the United Kingdom by the end of June 2004, in Germany by the end of September 2004, in Canada by the end of 2004, in France by April 2005, and in Australia by 2006. Registration was received for use in Switzerland in September 2003, and Italy recently approved ProFume for use in mills and pasta plants.

Welker expects it could take five to six years for full registration in the European Union as a whole. Once the U.K. reviews and approves the registration, other E.U. countries will be able to review the label and grant a "provisional" registration to use until the E.U.-wide "annex" is approved.

Dow is currently training professional fumigators on ProFume use, and expects commercial fumigations to begin in April, Welker said.

"ProFume promises to be a wonderful new fumigant for the milling and processing industry," Heath said. "It will be unique in the way variables can be managed with its Fumiguide program — a software program designed by Dow to ensure precise, flexible fumigations. Profume appears to be the closest thing to a direct replacement for methyl bromide for structural fumigations," Heath said. *(For more information on ProFume, see* WG*'s April 2003 article, "Searching for Options.")*

• Heat treating a facility (raising temperatures to at least 122°F or 50°C) has long been an option, particularly where chemical-free solutions are preferred. In fact, the first report of heat being used in a U.S. flour mill dates back to 1901. The high temperatures kill or adversely affect the development of eggs, larvae, pupae and adults of stored-product insects. From set-up to cool down, the treatment typically takes 30 to 48 hours.

Dr. Bhadriraju Subramanyam, a professor in Kansas State University's Grain Science & Industry department, is an expert in heat treatments and has led several K-State training sessions on the application.

His work was honored in March when he was named one of eight individuals to receive the U.S. Environmental

Protection Agency's 2004 Stratospheric Ozone Protection Award for his research and education on heat treatment as a methyl bromide alternative.

Subramanyam recommends extended training before implementing heat treatments, and he warns that heat does not penetrate into products, so they still have to be fumigated.

• Phosphine is another methyl bromide option. Available in many forms, it can be used for treating bulk grain storage, finished products, commodities in transport and also structural spaces, although care must be taken to prevent corrosion to metal and electronics.

Phosphine tablets and pellets have been used for more than 40 years. "Because they are relatively easy to transport, store and apply, tablets and pellets will remain popular for do it yourself fumigations by personnel in many facilities," Heath said. "Aluminum phosphide pre-pacs, and magnesium phosphide (Fumicel) plates are especially suited for situations where spent fumigant needs to be recovered, such as from a flour bin, railcar, trailer or other space containing finished products. Magnesium phosphide (Magtoxin) is particularly suited for spot fumigations in closed equipment systems."

Cylinderized phosphine gas and phosphine generator systems are the newest applications to come out in recent years, and have several advantages over the pellets. Prime benefits are that flammability risks are reduced and there are no spent residues to remove and dispose. Personnel safety is enhanced because it's remote application eliminates the need to enter the fumigated area.

"Target gas concentrations can be achieved much faster and maintained more precisely than with solid fumigants," Heath said.

Cytec offers cylinders of combined 2% phosphine and 98% carbon dioxide under the name Eco$_2$Fume as well as cylinders of 100% phosphine gas under the Vaphor$_3$Phos name. Cylinderized phosphine is approved for U.S., Australia, New Zealand, South Africa, Cyprus and Trinidad and Tobago. Cytec also expects registration in Canada by summer 2004. In Germany, a cylinderized combination of phosphine and nitrogen is registered under the name Frisin. Cylinderized phosphine is also registered for use in Chile, under the name TK Gas.

"The cost is comparable to methyl bromide," said Subramanyam, who noted that many mills in the U.S. are using Eco$_2$Fume as a methyl bromide alternative. "There are other advantages in that there is better gas penetration and distribution, and you can heat up the mill to 90°F (32°C) to increase the kill on insects." *(For information on cylinderized phosphine treatments, see* WG*'s February 2001 article, "Eco-friendly fumigant.")*

"The combination of new (and old) alternatives and a better than expected outlook for methyl bromide has millers feeling good about their options," Heath said.

PREVENTION IS BEST TOOL

Preventing insect infestation is still the best facility sanitation tactic, experts say.

"People often forget about all the other IPM tactics on a day to day basis," said Subramanyam. "IPM is the only way you can extend the duration of treatments and their effective period."

The all-encompassing aspect of IPM can be a large hurdle for companies. "Integrating all the elements of pest management — sanitation, monitoring, facility design and maintenance and pesticide use — is extremely difficult," Heath said. "Very few facilities have all the labor and resources needed for perfect maintenance or sanitation."

While challenging to implement and enforce, IPM is fundamental to facility sanitation.

"There's no control out there that's 100%," Subramanyam said. "The key is doing more IPM, allowing for more precise, targeted fumigations to reduce fumigation frequency and costs. Preventive tactics go a lot further than responsive ones. The industry is aware of all these IPM tactics, but they are greatly underused."

Subramanyam suggests thinking along the lines of coming up with a 'pesticide' management plan (how to reduce use of pesticides) rather than a 'pest' management plan. "Instead of putting more money in fumigations, facilities should invest more money in sanitation and monitoring because infestation often comes from just a few prime sources; identifying those sources allows targeted fumigations," he said.

Many of the IPM tactics are quite simple, such as remembering to close the doors.

For processing plants, perform good inbound raw material product testing and monitoring, clean up any spills on floors and clean equipment (inside and out) as best possible. Trapping is also important; Subramanyam suggests at least 30 to 40 traps per floor. Also routinely monitor aspiration equipment and rebolt sifters to ensure proper operation, and check the tailings for insects.

Subramanyam recommends taking samples of moving mill stock in strategic points throughout the mill line, and keeping them in labeled jars for 6 to 8 weeks to monitor larvae growth. Using the flow diagram, this can pinpoint where infestation is occurring.

"If you do a good job of cleaning and monitoring on a regular basis, you should be able to keep pests under control and possibly avoid whole-facility fumigations," he said.

Facilities need to seal cracks and crevices in storage units and buildings. Also remove standing water, close doors and windows, keep lights away from entrances, maintain a vegetation-free area around your facility and storage bins, and perform regular visual inspections with record-keeping.

"Prevention, prevention, prevention — that is the bottom line," Subramanyam said. "With the current treatment options, combined with IPM strategies, there are many facilities coping well without methyl bromide." WG