The Combination Fumigation Method... An Update

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Presentation Summary:

After five years and over 40 field applications with the **Combination Fumigation Method**, much data has been collected and learned from the fumigations. The **Combination Fumigation Method** of fumigation has the potential to replace 2-3% of the methyl bromide in the United States and 40% of the methyl bromide used today in Canada. To date, over 100,000 pounds of methyl bromide has been substituted by the Combination It could be a vital component in helping Canada achieve their 25% reduction of methyl bromide goal by the year 1998.

This worldwide patented technique is being utilized in flour mills, food processing plants and museums in Canada, the United States and Europe. Here are some observations from these fumigations:

Corrosion Management

-Concentration
-Relative humidity
-Protecting sensitive equipment and PLC electrical panels
-Accumulative effects in the field
-Accumulative effects in the lab

Magnesium Phosphide

- Disposal
- Release under various conditions

Carbon Dioxide

- The biggest challenge is getting the CO_2 out of the vessel (-40) and into the building (+70)...safely.
- Vessels vs. Duers
- In-line process vaporizers

Heat

- What works and what doesn't
- Type of heat
- Cost of heat

The Future

- BOC's ECO_2FUME
- Phosphine generators
- Data acquisition centers
- Pressure testing
- Bio-assays

The **Combination Fumigation Method** of fumigation is an example of people working together to solve a common problem. There are few new fumigants being developed to replace methyl bromide. Like Integrated Pest Management has taught for years, it is the combination of several low impact products that will replace more toxic and powerful pesticides. By stressing the insects with both carbon dioxide and heat, it allows for smaller amounts, below critical corrosion level, to be effective against all stages of insect life. The method can replace millions of pounds of methyl bromide each year and in most cases provide a better fumigation.

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Combination Fumigation Summaries and Conclusions:

During the past five years, 39 Combination Fumigations have been performed in North America, South America and Europe. Twenty-four of these patented Combination Fumigations have been flour mills. Over 100,000 lbs. of methyl bromide has been substituted. Some important lessons have been gathered from these experiences:

- Corrosion can be managed by protecting certain items with positive pressure from an outside air or carbon dioxide source.

- 100% mortality of mixed cultures of stored product insects was achieved.

-Relative humidity and phosphine concentration are critical to the success of the fumigation and the potential of corrosion. We can control the phosphine concentration.

-During high humidity conditions, the concentration of phosphine needs to be lowered

-Internal temperatures during the daytime and nighttime are important to maintain at a levels between 35 to 40 degrees (C).

- Carbon dioxide levels of 3-5% are difficult to achieve without excellent sealing techniques in large food processing plants.

- Carbon dioxide vessels with in-line processors are the fumigators biggest challenge to manage during the beginning of the fumigation. Taking 20 tons of -40 degree liquid carbon dioxide from a vessel and heating it up to plus 20 degrees C at a rate of 1 to 2 tons per hours is difficult.

- Vigilance by the fumigator in the first 12 hours is necessary to balance the heat, carbon dioxide, and phosphine levels.

- Much of the cost of these fumigations is in the shutdown time necessary to effect a complete desinfestation. The energy cost of the Combination Fumigation would be greater in Europe and other parts of the world. Today in North America, it costs approximately 40% more to perform a Combination Fumigation the first time than a methyl bromide fumigation. The cost goes down significantly after the initial fumigation but at the present cost of methyl bromide, it will be more expensive by 20-25%.

For more information about the patented Combination Fumigation contact:

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