

Fumigants & Pheromones

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Routing:

A Newsletter for the Insect Control & Pest Management Industry

Throwing Out the Garbage

Insects breathe differently than humans. They don't breathe through their mouths, they breathe through openings on their abdomen called spiracles. That's why you can put a grasshopper's head under water for hours and it still will survive.

Insects use these spiracles to control the waste gases that they produce. Carbon dioxide (CO_2) is the main waste gas that the insect needs to expel. But it must expel this CO_2 without losing too much precious water (H_2O). Tiny guard cells act as sensors to trigger



Insects open their spiracles to expel waste gases. If the spiracles stay open too long the insect will dehydrate, become stressed and die. This biological trigger can be used to speed up a fumigation.

the spiracle to open and rid itself of the waste gases. When insects lose their water reserves they become stressed and eventually die. Carbon dioxide fumigations (45-60% CO_2 for 2-5 days) kill by dehydrating the insects with inflated levels of CO_2 that causes the spiracle to stay open.

Carbon dioxide levels of 3-5% force the insects' sensors to record high levels of CO_2 and the spiracles are told to stay open. In a normal situation the spiracles would only be open for less than a second and then they would close.



Two hour treatment with CO_2 and pressure.

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Heat Treatment Checklist

by **Bobbie Gannon, Quaker Oats**

A couple of weeks prior to scheduled heat treatment, the following items need to be addressed:

1. **Maintenance** will need to check and repair unit heaters to assure that there are no steam leaks.
2. **Clean up:** Unit heaters need to be cleaned so that air will flow through the coils freely. Overhead beams and hard to reach areas where dust could have accumulated will need to be cleaned so that it won't provide insulation for the insects.
3. **Temperature** recording sheets need to be prepared. Maps designating the thermometer locations need to be charted.

To Do's Checklist

- ✓ All heat sensitive items must be removed including: tools, cleaning supplies, plastics, aerosol cans, weigh scales, fork trucks/batteries, etc.
 - ✓ All heat sensitive ingredients must be de-elevated to shipping/storage or relocated to an area that will not be heated.
 - ✓ It is necessary to remove all CO₂ fire extinguishers. It is not necessary to remove the Halon extinguishers. They will withstand the heat.
 - ✓ All windows and doors must be closed.
 - ✓ Compressed air lines should be shut off.
 - ✓ Water hoses should be turned off.
 - ✓ Conveyor belts need to be loosened to prevent stretching.
 - ✓ Efforts made to lower contents in bins, conveyers and portable tanks.
 - ✓ All electronic equipment should be turned off.
 - ✓ All dust and debris should be cleaned up to prevent harborage areas.
- Before the heat is turned on, thermometers need to be hung at eye level. Once heat has been turned on, it is time to begin recording temperatures. It is important to use the "buddy system" when going into the heated areas. Employee safety is

the primary consideration. Temperatures should be read and periodic monitoring of equipment will need to be done every two hours minimum or, if man-power permits, every hour. Be sure that employees understand first aid for heat exhaustion and know that it is important to drink plenty of liquids [Gatorade is good here]. There should be emergency procedures available.

- After the heat process is complete, the heat source is turned off. Thermometers are removed during the last heat reading. If time permits, it is a good idea to allow the building to cool down slowly to prevent thermal shock. If time is not in your favor, turn on window fans and air intake units. Windows that are screened can also be opened. Areas that have been blocked to prevent heat loss will need to be opened.
- After the building has been allowed to cool, it is a good idea to bring in the shipping crew to begin elevation of ingredients in preparation for start-up of production. Maintenance will need to tighten belts that were loosened and lubricate some of the equipment and to be available if there are any mechanical breakdowns.



Estimated Cost of Heat Treatments

The estimated cost for doing a heat treatment will vary from one location to another. There are charts available for doing an estimate.

When buying equipment it is important to question the heat resistance of the particular equipment.

The cost of the actual heat treatment process:

Gas thermos 4-people (5-6 shifts)
Water Supervisory personnel
Electricity

There are also costs after the heat:

- Maintenance
- Product re-location
- Evaluation of mortality
- Follow-up documentation

Advantages & Disadvantages:

Advantages

- Less costly than fumigation after capital cost is recovered.
- Less use of insecticides.
- Don't have to seal building (saves 500+ man-hours).
- Will penetrate cracks/crevices.
- Safe (no exposure to insecticide/no residue left on equipment).

Disadvantages

- Not all areas can be heated.
- Need to fog areas that can't be treated.
- Not recommended for wooden structures.
- Buildings must be designed to tolerate high heat.
- Thermal shock to building and equipment.
- Heat can cause paint to peel from equipment and walls.
- Humans need to be careful against heat exhaustion.

Conclusions: It is important that we understand that heat treatments are not a panacea for insect control. It must be used along with other sanitation/housekeeping controls, regular plant inspections and selective insecticides. Without a balanced program, pest control will fail.

Bobbie Gannon is a 20 year veteran of heat treatments. She is the sanitation coordinator for Quaker Oats in Danville, IL. She treats about 25,000,000 ft. each year with heat. Bobbie was a guest speaker at the 1999 Freez'em or Fry'em Workshop.

John's Soapbox



Choosing a National Fumigation Vender?

Is there a national fumigation service provider? No, there are two or three companies that falsely promote their services as national. Some of these service providers do have national pest control services but only provide fumigations in a few states. Another well-known fumigation company claims to provide national fumigation services with only a few operational offices. Fumigation Service & Supply, Inc. has performed fumigations from coast to coast and Canada to South America but, does that make us a national or international fumigation service provider?—*No.*

We understand the business advantage of large customer companies consolidating buying power. For most of the traditional “things” purchased—great savings can be garnered. Consolidating service providers is a little more difficult. To identify and manage a consistent scope of work to be performed while accounting for the same savings for non-traditional services is difficult and time consuming. Fumigation services take these challenges many steps beyond those of traditional service providers like electricians, plumbers, and even rodent control. Fumigation presents the unique challenge of creating a deadly environment in buildings or storage areas, not to mention the risks of product contamination, bystander poisoning, environmental risks, and more.

Regional based fumigation

companies play a large role in the market for these reasons:

1 Geographic Advantages— proximity to the fumigation site is critical to emergency response and quality management issues. When an emergency occurs and immediate response is required, how long will it take the broadly distributed “national fumigation company” to respond with a knowledgeable point person? When customer employees are concerned about fumigant odors—how long will it take for a service provider to respond? Would a single national fumigation contractor provide quality management gas reading to insure an effective fumigation? Regional based fumigation companies have been safely and successfully doing all of this and more for decades.

2 History—the site fumigation lessons learned over the years and the unique characteristics of each structure to be fumigated have great value. When “national fumigation” companies take over new fumigations the customer will ultimately pay for the costly lessons relearned by broadly distributed service providers.

No “national fumigation company” provides the customer attention and support that regional based companies provide.

Why are these “national fumigation companies” not gaining these national customers on their own merits of price competitiveness and quality service? By courting the corporate office and ignoring the facility network they acknowledge

their inability to obtain the business on the capability of their field services.

3 Innovative Technology— When has a “national fumigation company” brought innovative ideas to the fumigation industry? Immerging technologies have traditionally come from or through regional based companies:

- **1979 The J-System—**now a globally used system for fumigating grain—Jim Cook, Cook Fumigation
- **1987 Methyl bromide commercial use with Carbon Dioxide—**used to lower the amount of methyl bromide required and enhance the effects of methyl bromide—Fumigation Service & Supply, Inc.
- **1994 Combination Fumigation Technique—**use of Heat, Carbon Dioxide, and Low Levels of Phosphine—Fumigation Service & Supply, Inc.
- **1996-2000 ECO₂FUME—**Cylinder based phosphine manufactured by Cytec Industries and introduced into the US market by Fumigation Service & Supply, Inc.
- **1996 Turbo Horn Generator—**Phosphine generating device—Fosfoquim [Chile].

Why are these “national fumigation companies” not working with new fumigation technologies like cylinder based phosphine [ECO₂FUME] sulfuryl fluoride [Profume] and driving safety, efficacy and quality improvements in our industry?

Regional fumigation companies keep their finger on the pulse of the fast pace changes of local and national regulatory issues, insuring total regulatory compliance for each fumigation.

John Mueller

Methyl Bromide Phase-out

The pesticide methyl bromide is being phased out internationally under the Montreal Protocol. Methyl bromide has been used for over 50 years to control insects, nematodes, pathogens, and weeds. It is used for soil fumigation before planting many fruits, vegetables, ornamentals, and agricultural nurseries; post-harvest fumigation of commodities in storage and prior to shipment; for structures like flour mills and food processing plants; and for government-required quarantine treatment to prevent the spread of regulated exotic pests.



Methyl Bromide

The Montreal Protocol is a treaty signed by over 160 countries to protect the stratospheric ozone layer, which protects the earth from harmful solar radiation. The Protocol controls global production and trade of ozone-depleting substances.

The Parties to the Protocol classified methyl bromide as an ozone-depleting substance in 1992 and agreed to the current phase-out schedule in 1997.

Under the Protocol's provisions; developed countries are scheduled to reduce methyl bromide consumption (production plus imports minus exports) from a 1991 baseline by 25% in 1999, 50% in 2001, 70% in 2003, and 100% in 2015.

Developing countries are scheduled to freeze consumption in 2002 at 1995-98 average and reduce consumption from that baseline by 20% in 2005 and 100% in 2015.

Quarantine and preshipment uses are exempt from the phase-out. The

meaning of preshipment is 21 days prior to shipment.

For more on the economic implications of the Methyl Bromide Phase-out contact the USDA at: www.ers.usda.gov.

Phase-out in Turkey

David Mueller of Insects Limited, Inc. has written a project to phase-out methyl bromide in the dried fig sector in Turkey for the World Bank. The promising alternatives include (1) Three different applications of CO₂ that will be tested for this project: CO₂ and heat, CO₂ and pressure (20-30 bars), and CO₂ and vacuum. (2) magnesium phosphide in combination with heat in chambers and under tarpaulin.

Carbon dioxide as an alternative technology to methyl bromide has been proven recently in Israel on dried figs and Tunisia for dried dates. Carbon dioxide is an inert gas that kills pests by asphyxiation and dehydration. Sudden pressure changes in CO₂ will also cause the pests to die. Carbon dioxide can be used in lower concentrations in combination with conventional



Turkish Ozone Team at Aegean University of Agriculture in Izmir: (l-r) Prof. Dr. Aksoy, Aegean University, Basar Ekim, Technology Development Foundation of Turkey, Dr. Sacide Karabat, Taris (Union of Agricultural Co-operatives); Necdet Unverir, Taris

fumigants to help speed up the time of treatment by allowing the fumigant to enter the pest more rapidly. Carbon dioxide is a slow killing alternative when used by itself. In combination with heat (>92 F/ 35 C) the treatment time can be 2-5 days to reach a 95% mortality of stored product insects.

Magnesium phosphide is a fast reacting solid formulation which produces hydrogen



Sorting dried figs in Turkey. A phase-out of 50 tonnes of methyl bromide is proposed by 2003.

phosphide or phosphine (PH₃). Phosphine is a proven technology in storage, including commodities, structures, containers, chambers, vehicles, and stacks under tarpaulin.

Phosphine resistance management should always be a part of any pest management program. Phosphine is not an ozone depleting substance and will transform into phosphoric acid within 1-5 days when exposed to sunlight. Magnesium phosphide treatments in most cases require 48-96 hours depending on the temperature and relative humidity. Since short exposure times are important with methyl bromide alternative technologies, a demonstration with inflated temperatures and/or CO₂ levels could lead to a faster exposure time with magnesium phosphide.

In addition, the project will include activities for ensuring a proper technology transfer, through training programs and dissemination of information directed at the actual methyl bromide users in the dried fruit and nut industries. The project will last 26 months. The project will lead to the phase-out of 50 tonnes of MBr in this sector by the year 2003. Cost: \$522,500.

Phase-out in Malaysia



Malaysia Ozone Team; (l-r) Mrs. Aminah Ali, Department of the Environment, Ozone officer, Mohammed Hussein, entomologist, Dept. of Agric., David Mueller, entomologist, Insects Limited, Inc. Timber and cut lumber is a \$5 billion business employing over 200,000 people in Malaysia. This project will lead to the phase-out of 53 tonnes of methyl bromide.

A project to phase-out the use of methyl bromide on Malaysian timber has been submitted by UNDP and accepted by the Executive Committee of the Multilateral Fund. David K. Mueller of Insects Limited, Inc. visited the Malaysian timber industry and proposed the following MBr alternatives. The alternative technologies include heat kiln technology; sound integrated pest management programs, the use of sulfuranyl fluoride (VIKANE™), and phosphine under tarpaulins. Cost: \$403,975.



An alternative project in Vietnam on rice will lead to the phase-out of over 600 tonnes of methyl bromide. The growing, harvesting and transportation of rice is still totally done by hand. Vietnam feeds its 80 million people and exports 20% of the world's exported rice.

Phase-out in Philippines



Philippines; David Mueller, Insects Limited, Inc. and Mrs. Lydia Magnaye, Site manager for methyl bromide phase out overlooking a 6000 hectare banana plantation near Davao. This project will help phase out 50 tonnes of methyl bromide.

A project to demonstrate the technical feasibility of several cultural and chemical alternative technologies for controlling Moko disease (*Ralstonia solanacearum*), an important disease affecting banana production in the Philippines. The project will train the technical staff who will provide information and technical advice to banana farmers cultivating an area of more than 50,000 acres. Information tools for farmers and extension agents will be prepared and widely disseminated through agricultural extension channels and workshops. Better ways to detect Moko disease with proven diagnostic



Thailand; (l) Chamlong Lapas, Department of Agriculture is the site manager for a methyl bromide demonstration project on rice near Bangkok. Thailand exports 40% of the world's exported rice. This project will help phase-out 1000 tonnes of methyl bromide.

technologies will help evaluate the effectiveness of present rice hull burning practices. Cost: \$231,000.

Other projects proposed for UNIDO by David Mueller: Ivory Coast on cocoa (pending), Vietnam on stored rice (accepted), Thailand on stored rice (accepted), Jamaica on tobacco (not eligible). In all there are over 100 projects (80% UNIDO, 15% UNDP, and 5% World Bank) for methyl bromide phase-out and demonstration in developing countries. The Multilateral Fund is available for supporting those developing countries that want to protect the ozone layer from harmful ozone depleting substances but need assistance from the fund to meet their phase-out obligations. A total of 63 million US dollars are budgeted for the next two years to assist countries with the phase-out of methyl bromide. Developed countries (A2) are not eligible for this assistance.

If your company is interested in finding out more about methyl bromide alternatives or would like consultation on your phase-out program, contact David Mueller at 1-317-896-9300 or insectsltd@aol.com.

New PROFUME™ From Dow

Freshly harvested, American-grown walnuts may be able to meet European Union import standards despite the impending withdrawal of the methyl bromide fumigant today used to keep the nuts pest free.



Scientists with USDA's Agricultural Research Service in Fresno, CA, have shown that fumigating freshly harvested walnuts with an alternative chemical, sulfuryl fluoride, kills any live codling moths or navel orangeworms in their larval stage. That's the only life stage that could hitchhike on harvested walnuts.

EU nations-key importers of American walnuts-currently require methyl bromide fumigation. However, the chemical is scheduled for phase-out by 2005 because of evidence it contributes to depletion of Earth's protective ozone layer. Sulfuryl fluoride is not an ozone depletor.

Dow AgriScience of Indianapolis is actively working to research and register sulfuryl fluoride (Profume™) for a Federal label for non-food and food uses. Vikane is presently used as a structural fumigant for termite control and could be used in the future to fumigate flour mills and empty food processing facilities.

Fumigation Service & Supply, Inc. of Westfield, Indiana has been asked by Dow to help test Profume this summer in an empty flour mill. These tests could lead to a better understanding of this fumigant and provide data for the EPA registration.

Methyl Bromide Alternatives Newsletter gives details about other efforts at the agency and elsewhere to find alternatives to methyl bromide. The newsletter is on the web at: www.ars.usda.gov/is/np/nba/mebrhp.htm

Reldan Outlook Appears Ominous

By Pat Kelley

Reldan, a product registered in 1985 as a valuable insecticidal tool because of its ability to be applied directly on wheat, rice, barley, oats and sorghum, has been pinpointed by the Environmental Protection Agency as a pesticide which is "In Reassessment." This comes after a widespread "OP (organophosphate) Review" by the EPA of most of the OP pesticides still on the market. The active ingredient in Reldan is chlorpyrifos-methyl, which is an organophosphate.



An industry-wide conference call on the regulatory status of Reldan was held on April 12, 2000. Among the 50 or so participating in the conference call were representatives from Dow-AgroSciences, (The manufacturers of Reldan), EPA, USDA Office of Pesticide Policy, Fumigation Service & Supply, Agricultural scientists and many industry users of Reldan.

The EPA took the stance that OP's in general and Reldan in particular had significant "data gaps" in the neurotoxicity studies which had been submitted in 1985. Dow representatives refuted that there were any significant data gaps, but were left with the decision to commit to the further neurotoxicity studies or send a letter to the EPA by April 14, 2000 with the intent to cancel the product registration. The neurotoxicity studies would have cost Dow approximately 6 million dollars over a 3-year period. This cost was not justifiable to Dow AgroSciences for the sales of a relatively minor product in its product line. From this, it has been determined that Dow AgroSciences has decided to seek voluntary cancellation of the registration of Reldan.

Dow AgroSciences has decided to seek voluntary cancellation of the registration of Reldan

Dow representatives noted that under the current scrutiny of the EPA reassessment process, for all practical purposes, this is the same as a full product re-registration.

This action does not mean that Reldan will be immediately cancelled. By applying for cancellation of the registration of Reldan, Dow AgroSciences hopes to gain some transition time to meet the needs of the grain industry until alternative methods are found.

Some alternatives, such as lower rates of Reldan in conjunction with cyfluthrin, or low doses of Reldan and diatomaceous earth/silica gel were briefly discussed. Malathion was determined to be an ineffective grain protectant due to pest resistance to that product. Both cyfluthrin and diatomaceous earth/silica gel face their own hurdles of occupational risk and in the case of cyfluthrin, a tolerance for food use.

Methyl Bromide Alternatives— Useful Websites

For information on science-based field research into practical alternatives to methyl bromide in agriculture, post-harvest, and storage/ structure, search this website: Fumigation Service & Supply, Inc., Westfield, IN, USA www.insectslimited.com with hot links to the following websites:

RUMBRA, regular methyl bromide alternative updates on-line newsletter from UNEP OzonAction Programme, Paris, France
www.uneptie.org/ozat/pub/rumba/main.html

Agriculture & Agri-Food Canada and Environmental Canada, Ottawa, Canada
www.ec.gc.ca/ozone/mbrfact.htm

GTZ Proklima bilateral agency, Eschborn, Germany
www.gtz.de/proklima

Food and Agriculture Organisation (FAO), Rome, Italy
www.fao.org/library/

Methyl bromide Technical Options Committee (MBTOC)
www.teap.org/html/methyl_bromide.html

Environmental Protection Agency, Washington, DC, USA
www.epa.gov/ozone/mbr

CSIRO Entomology Division, Canberra, Australia
www.ento.csiro.au/research/stopro/sga/sga_aug97.htm

These are a few of the many, many efforts that are being reported for alternatives to methyl bromide throughout the world. Take some time to review the work going on by these scientists, farmers, politicians, and fumigation companies. The year 2005 is not that far away and 50% phase-out is 1/1/01.



Job Opportunities

Immediate Opening...

Food Plant Pest Management Specialist:

Fumigation Service & Supply, Inc. is seeking individuals to work full time as food sanitation specialists. A good understanding of Good Manufacturing Practices, HAACP, AIB audits, entomology pest biology, food plant ecology is preferred. Some travel is required for this job. Base salary, monthly commissions, vehicle provided with generous benefit package includes medical and profit sharing pension plan and paid training available. Job is based out of Indianapolis Area. This is an opportunity to work in a beautiful new building with friendly people who always strive to be better. This is also a great opportunity to live in an affordable area of the country with excellent schools and family oriented benefits. Fax your resume to John Mueller (317) 867-5757. Confidentiality insured.

Fumigation Technicians:

Fumigation Service & Supply, Inc. is seeking individuals to work on seasonal fumigation crews (May-October). Full time positions are often offered from these positions. Fax or send resumes to: FSS, 16950 Westfield Park Road, Westfield, IN 46704, 317 867-5757, insectltd@aol.com.

FSS Opens New Office

We are excited to announce the start-up of our Tennessee/Kentucky regional office. The purpose of this office is to provide quality Food Safety / Pest



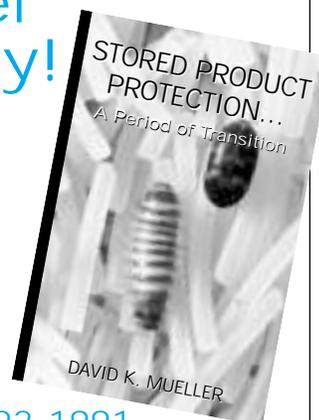
Rick Vincent

Control and Fumigation services for the Tennessee/Kentucky region. Fumigation Service & Supply, Inc. has developed a solid customer base in this region. Food Safety Specialist will be providing Food Safety/Pest Control services, while Fumigation Service and Supply, Inc. will provide fumigations for our customers. Our move to the Nashville area will expand our current customer base.

The Tennessee region is considered an agricultural and food processing hub. Rick Vincent will be in charge of this area. Rick has worked for FSS for three years and for a large food processor for 10 years prior. Rick has a total of 10 years of Food Safety experience with extensive training in AIB, HACCP, Microbiology, FDA/ GMP's. Although Rick's primary responsibility has been Food Safety, Rick also has extensive experience in fumigation. If you would like more information concerning this expansion or would like Rick Vincent to call on you, please call Rick at 1-800-992-1991.

Does your present Food Safety program achieve 900+ AIB scores and do your reports include useful information? Maybe it's time to call Food Safety Specialist.

Order today!



1-800-992-1991

Visit the BookStore at:
www.insectslimited.com

I M P O R T A N T M E E T I N G S I N 2 0 0 0



March 19-22, 2001
Thessaloniki, Greece
Mediterranean
Palace Hotel
and the University
of Macedonia

Stored Product Protection
4th Fumigants & Pheromones
International Technical Conference
& Workshop

Organized by: Insects Limited, Inc. and AgroSpeCom Ltd.
(Translated into English & Greek)

2 days in the classroom with 14 international expert speakers
1 day workshop in the field to demonstrate new technologies

Cost: 2 day conference—\$595/person; 1-day workshop—\$300/person
Total cost for three-day conference and workshop: \$775US/person
Includes receptions, 2-3 lunches, coffee breaks, conference workbooks and more.

Registration: is available now on the web www.insectslimited.com or fax 1-317-867-5757.
For more information in Europe telephone 30-31-543 125 or best@magnet.gr

Purpose: This seminar will bring together scientists and industry to present new and innovative ways to control insects in food, tobacco and grain. Major topics for this conference are: Methyl bromide phase-out; Pheromones for stored products, Food plant sanitation, Advances rodent control techniques, Grain fumigation, Hands-on workshop on new fumigation technologies including the J-System, ECO₂FUME and Profume (sulfuryl fluoride). Speakers will offer alternatives to methyl bromide. This ozone depleting substance is scheduled for phase-out in developed countries by the year 2005.

Location: Northern Greece is the main grain growing and food processing area in Macedonia. This sunny Mediterranean port city of one million has much to offer for a conference location. More information about this and other training programs offered by Insects Limited, Inc. can be found on our webpage: www.insectslimited.com

Training for the Future

"The only thing worse than training employees and having them leave, is not training them and having them stay."

September 12-16, 2000, Lisbon
Fumigation Conference & Workshop
in conjunction with the 1st International Conference of Portuguese Pest Control Professional*

Nov. 14-15, 2000, Westfield, IN
Freez'em or Fry'em Workshop*

November 15, 2000, Westfield, IN
Workshop on Advanced Uses of Pheromones*

February 7, 2001, Westfield, IN
Basic and Advanced Insect ID Workshop*

March 19-22, 2001
4th Fumigants & Pheromones
International Technical Conference
& Workshop*
Thessaloniki, Greece

**These training programs are organized by Insects Limited, Inc.*

THE NEWSLETTER

Fumigants & Pheromones is published by Fumigation Service & Supply, Inc. and Insects Limited, Inc. We hope that the information that you receive from this newsletter will help you in your business, and you, in turn, will support our business efforts. If you have an associate who would be interested in receiving this newsletter, please contact the address below. We would welcome any comments or suggestions for topics. Address correspondence to: David K. Mueller, Fumigation Service & Supply, Inc., 16950 Westfield Park Rd., Westfield, IN 46074 USA.



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