

## **Agrichemical Warehousing Standard Association**

# **WAREHOUSING STANDARDS BULLETIN**

**UPDATED JANUARY 2011**

**NUMBER 6**

### **AGRICHEMICAL PRODUCTS: FIRE CONTROL TACTICS**

Analysis of major fires over the past 15 years that involved pesticides in pre-packaged containers indicate that these products in and of themselves do not constitute a special risk when stored in industrial warehouses. In no case was there any evidence to suggest that the pesticide, even with a flammable formulation, provided the source of ignition or cause of the fire. Occasionally however, pesticides do become involved when a fire erupts in a facility; when this occurs, special fire control tactics are required.

Experience from documented incidents involving pesticides in structural fires has shown that standard fire fighting techniques can create additional and more serious problems than that posed by the original fire.

A typical industrial occupancy, storing or processing pesticides will have a combination of various formulations which can range from relatively non-toxic, non-flammable products to those which are either extremely toxic, highly flammable or both. It must be assumed when developing and implementing emergency response plans for these facilities that fire control and extinguishment tactics must address the worst of these products.

### **ENVIRONMENTAL CONCERNS**

Historical evidence has shown that environmental damage, resulting from fires involving pesticides, increases in proportion to the volumes of water used in an attempt to control and extinguish the fire. First and foremost is the fact that the resulting effluent is normally heavily contaminated with toxic compounds and is extremely difficult to contain on other than very heavy clay soils with diking. Secondly, products of incomplete combustion due to low temperature burns, tend to be substantially more toxic and less stable than the original compounds.

Air quality during a pesticide fire, at or near ground level, will deteriorate dramatically as the combustion temperature is reduced. A combustion temperature of 982° Celsius, for example, provides complete thermal decomposition of pesticides with resulting emissions of primarily carbon and water. At this temperature, all contaminants are carried high into the atmosphere where dispersion ensures that toxic levels at or near ground level do not occur.

As the combustion temperature is reduced, various noxious and toxic gases can be created; in addition, steam generated from the addition of water to the fire carries contaminated particles into lower levels of the atmosphere where they return quickly to the ground. As an example, air dispersion models run on pesticides indicate that where exit temperatures drop from 650° Celsius to 400° Celsius, the level of ground level contaminants rises by a factor of three.

## **LIFE SAFETY CONCERNS**

Protection of first responders and the public is a major concern with fires involving pesticides. Historically, pesticides have not been the cause of serious casualties amongst the public and first responders who have been adequately trained.

As demonstrated in the previous discussion on air quality, the management of respirable contaminants at ground level hinges on the temperature of combustion, and the exit temperature from a structure. Where fires have been allowed to burn at high temperatures, the risk has been lowered significantly.

First responders at an incident involving pesticides must be protected with a minimum of self-contained breathing apparatus and standard turn-out gear. If a facility is fully involved or free burning, life safety is greatly enhanced by remaining outside the structure upwind of smoke and exhaust gases to protect exposures of other buildings, while the pesticides structure burns itself out.

## **FIRE CONTROL TACTICS**

Fire control tactics where pesticides are involved, should follow protocols developed by the National Fire Academy of the U.S. Federal Emergency Management Agency. Where an incident cannot be addressed at the incipient (initial) stage, and where it is possible to ventilate and **controlled burn**, these policies must be given serious consideration. You should discuss this approach with local fire departments and your insurance carrier, and recommend it for their serious consideration in the event of a fire.

Supporting Documentation:

# JG Henderson & Associates

Fire Service Studies & Evaluations – Fire Investigations  
Fire Risk Assessments & Audits – Fire Expert (Litigation) Services

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Mr. Don Earl, A. Assistant Director  
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5775 Yonge St., 8<sup>th</sup> Floor, North York,  
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December 22, 2008

## Re: The Biedermann Fire

Dear Mr. Don Earl:

The following are my responses to the questions raised in your email of November 20, 2008.

### Question 1:

*Assess the adequacy of the Emergency Response Plan (ERP) Biedermann Packaging Inc. and their preparedness in the context of the nature of their facility and type of chemicals/materials handled in the plant as it relates to the fire that occurred at 36 Head St., Dundas on July 26, 2007, including measures to address the management of the firefighting runoff water and secondary containment, as well as the location of material to implement the ERP in the event of a fire.*

This question encompasses not only the ERP but also the compliance of the Biedermann facility to the applicable codes; namely, the Ontario Building Code (OBC) and the Ontario Fire Code (OFC). Therefore, my response includes a discussion of these references.

Upon conducting a Building and Fire Code compliance audit, I have concluded that the Biedermann Plant was in compliance with both the OBC and the OFC. In fact, the facility exceeded the minimum requirements of these Codes in several areas that ought to have had a very positive impact on mitigating the extent of fire and environmental damage during this fire. These additional risk mitigation measures included:

1. A firewall that divided the Biedermann Plant. Although a firewall was not required in the design of the plant, a 4-hour firewall was incorporated. This passive fire protection measure had a significant positive impact on the fire incident as it significantly reduced and even prevented the fire from spreading to the north building where a considerable amount of pesticide product was located.

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If the fire had of spread to the south building and in the absence of an environmental mitigation plan by the IC, it could be anticipated that the contamination would have been much more severe as more than double the amount of fire flow would have most likely been used to contain the fire. The south side of the plant represented less than 50 percent of the total area of the plant; hence, less than fifty percent of the building's total fire-load. The inclusion of this fire protection measure would make the fire much easier to contain and much safer on the fireground for the attending responders.

2. Biedermann initiated and funded HES-Fire to conduct a Code compliance audit. Rarely do the managers of a low hazard industrial occupancy (Group F, Division Occupancy) request and fund such a safety audit. This provided the HES-Fire an opportunity to identify and request (issue a compliance order if necessary) the correction of any non-code-compliance issues that may have existed. However, HES-Fire reported that only minor non-code-compliance issues were observed and corrected. This demonstrates the safety culture that was practiced by management and their employees.
3. Facility familiarization tours were provided by Biedermann to the HES-Fire. This is a significant risk reduction measure although it appears that the full benefits were not achieved as the information appeared not to have been passed from HES-Fire (Fire Prevention) to the HES-Fire Operations. Even though this would have been an ideal opportunity for HES-Fire to develop a pre-incident plan to this facility for their responses to this facility, they failed to take this opportunity to better prepare for a response to the Biedermann facility.
4. An inventory of the pesticide products was provided to the HES-Fire. (It appears that the inventories were passed to the Fire Prevention Cell who may not have passed it on to operations, however, this has not been confirmed).
5. Biedermann installed a spill containment system that was capable of containing approximately 210,000 gallon of liquids (This containment was not required by the applicable Building and Fire Code). Such a system is rarely incorporated unless it is required by applicable codes.
6. An ERP was developed in 1999 and the Plan was revised in 2005. Neither an ERP nor a Fire Safety plan was required for this facility by the applicable codes. This Plan had all of the elements normally found in such plans where they are required, plus the above noted actions of Biedermann complimented their ERP.

Therefore, based on the foregoing I can only and objectively conclude:

- Although an EMP was not required by the applicable Building and Fire Codes, Biedermann developed an ERP. In conducting an analysis of the adequacy of the plan, I found it to be a comprehensive document that addresses all of the critical elements of an ERP.
- Although the Biedermann facility did not require (by Codes) a containment system, they incorporated one into their plant that has a capacity of approximately 216,000 gallon. This was a very significant conservation mitigation measure as it would give the IC additional time to set-up their conservation containment strategy.
- Containing runoff (fire flow) water from a firefighting operation is the sole responsibility of the attending fire department. (with the assistance of other specialist when available and requested by the IC).

**Question 2:**

- *Assess the implementation of the ERP by Biedermann at the time of the fire at 36 Head St., Dundas on July 26, 2007.*
- *Did Biedermann take sufficient action to control the firefighting runoff water?*

The third operational priority of a fireground operation is property (environmental) conservation. Protecting air, ground, and water is an integral component of all hazard material responses by the attending fire department. During a fire emergency operation, the fire department's IC is in charge of the scene. Non-emergency personnel do not take part in such operations unless under the direct supervision and authority of the IC. Therefore, it is my opinion that the responsibility for mitigating the run-off water from the operation was solely that of the IC. However, in many similar incidents, an IC will liaison with a building owner for the purpose of: gaining insight into the facility's design and construction type, its layout, the fuel loading, gaining an understanding of the operation including the type and quantity of hazardous materials located on the property. Often where such occurs, the IC gains a more in-depth understanding of the hazard, and knowledge of the resources and expertise that the building owner may have that can assist in the fireground operation. Even when lists of the HAZMAT materials are supplied and/or available to an IC, this contact is made with plant managers/operators as such inventories are never static. Therefore, contact is made to confirm current quantities and location of the various products.

It is **never** the responsibility of a building owner to *take action to control the firefighting runoff water* while a fire emergency is in progress unless a specific action is requested and directed by an IC.

During all fires and hazardous material emergencies, the IC is in full and complete charge of the fireground perimeter. However, after liaison with other specialists including building owners, the IC may request and direct a specific action to be taken. Where such may occur, it is under the direct authority and supervision of the IC.

**Question 3:**

*Did Biedermann adequately advise the Incident Commander of the products that were stored in the south building (particularly Diazinon)?*

The IC stated in his report that he knew at the front end of the operation that he was fighting a fire in a pesticide plant. Moreover, the IC's personnel (fire prevention and operational tours) visited the plant and knew or ought to have known that the plant contained pesticide materials that could be harmful in large quantities to the environment. As a result, the IC ought to have been addressing the contaminated firefighting runoff when he developed his initial fire attack plan notwithstanding his full knowledge of a particular pesticide that may or may not be directly involved. Therefore, as the IC knew that this was a HAZMAT operation from the very beginning it was his responsibility to address it as such in his strategic operational plan.

Again, if an IC feels she / he does not have sufficient information regarding a HAZMAT operation, contact is made with HAZMAT specialists and other personnel including building owners and plant specialist that may provide the required information. This process is common practice as ICs attending a HAZMAT operation routinely seek out the plant specialist and managers to obtain all of the information that is possible.

It is my understanding that plant personnel were available at the very front-end of this incident.

**Question 4:**

*Was it foreseeable by Biedermann that HES-Fire would use 5,000,000 L of water to extinguish the fire at their facility?*

Under no circumstances was it foreseeable by Biedermann personnel that HES-Fire would use 5,000,000 L of water to contain and extinguish this fire. In fact, if a fireground specialist, in the preparation of a pre-incident plan and using one of the industries accepted methodology to determine the fire flow requirement for this facility, less than one-quarter of fire flow that was used would have been identified in the calculation. Moreover, as the fire was fought in a defensive mode of operation, all that was necessary with respect to fire flow, was containing the fire from spreading – not extinguishment.

**Question 5:**

*If Biedermann had informed the Incident Commander that Diazinon was stored in the south building and was informed of the increased environmental risk of this product, is it likely that the IC would have altered or used a different fire attack plan?*

No. For reasons as discussed in question 3, IC knew that he was attending a hazardous material incident. If additional information was required, he ought to have sought out that information. However, notwithstanding the above, once having established that the incident was a HAZMAT pesticide response, even though one product may be more harmful to the environment than another, an IC

does not have anyway of knowing how much runoff water of the lesser hazardous product is required before serious or even equal damage occurs. Containing fire flow runoff is a concern at all HAZMAT operations and the strategic attack plan that is developed by the IC at the very beginning of the operation must address this operational requirement. The failure to address this issue at the time the attack plan is developed is to ignore one of the basic and fundamental requirements of the fireground operational priorities.

It must be remembered that the IC sets the objectives, decides on the tactics necessary to achieve those objectives, and then assigns crews to complete the tasks associated with each objective and tactic.

It is obvious that conservation was not an objective of the fire attack plan used in this fire incident even though *conservation* is one of the three operational priorities of all fireground operations. In this regard it is noted that the three operational priorities are:

1. Life-safety (occupant and attending firefighter)
2. Fire Extinguishment
3. Conservation

With respect to the first priority, this incident posed an extremely low risk to life-safety. Firstly, there were no personnel in the building at the time of the incident; hence, no rescue operation required. Secondly, the fire was declared a defensive mode of operation. This means that firefighters were not placed inside the structure where they would be exposed to toxic, superheated smoke and heat, no potential for flashover, draft, or roll-over, and no exposure to the potential of structural failure. Therefore, minimum resources and planning was required for this operational priority.

With regards to the second operational priority, fire extinguishment, this was also a low demand operational priority. When a defensive mode of operation is declared by an IC, he has made a decision that the building of fire origin is lost to the fire; that it is beyond saving. Operational efforts then are directed at preventing the fire from spreading to the exposed building(s). As the exposed building (the south building) was separated from the north building by a 4-hour firewall that had a parapet extending above the roof of the two buildings, the potential for fire extending from the south building was greatly reduced. As a result, only several aerial monitors would be required to prevent the fire from spreading to the south building. (This does not mean that the aerial monitors had to flow water constantly – only to wet down and to reduce the initial heat flux).

Therefore, as the first two operational priorities were "low demand" in both strategy requirements and in the fireground resources, it is my opinion that the IC had adequate opportunity to address the requirements of the third operational priority; *conservation*, and it ought to have been addressed from the beginning when the strategic plan was developed and implemented.

Therefore, it is my opinion that whereas the IC knew he was attending a pesticide fire and whereas the same conservation tactics were required for all pesticide contaminated runoff water, specific knowledge of one product would not have altered his tactical plan.

**Question 6:**

*Assess the actions of Biedermann at the fire scene including the management of the potential for, and actual, firefighting runoff water. (More specifically, assess the actions of Biedermann once it was known that there was a risk of firefighting runoff water, as well as the actions taken when the water first began to leave the site at 36 Head St., Dundas.*

As previously stated in the above answers, conservation is the third operational priority of a fireground operation. Therefore, it is my opinion that the Biedermann personnel did not have a responsibility for the containment of the fire flow runoff.

However, when an owner has knowledge of a specific hazard when a fire occurs in their facility, it is reasonable to expect that the information would be passed to the IC. However, I do not have any knowledge of the information that was passed to the IC or his accessibility or receptiveness.

These are my objective answers to the posed questions. If additional information or clarification is required, please contact me at your convenience.

Respectfully submitted,

Jack Henderson, Manager  
Senior Fire Protection Specialist

**JG Henderson & Associates**



## FIRE FIGHTERS GUIDANCE NOTE # 6-30

### ISSUE:    PESTICIDE STORAGE AND PESTICIDE STORAGE FIRES

#### MOE Fire Department Notification Requirements

The Ontario Ministry of the Environment (MOE) has amended a regulation made under the Pesticides Act. Section 112 of O. Reg. 63/09 requires that persons who store certain pesticides provide annual notice to the local fire department in the jurisdiction in which the pesticide is stored on an MOE supplied form indicating that pesticides are stored on the site. The form provides the local fire department with information about the identity of the pesticides, where the pesticides are located within the facility, conditions of storage and the identity of the person responsible for the pesticides.

The regulation applies to pesticide storage locations such as manufacturers and formulators of pesticides, MOE licensed vendors who sell pesticides and MOE licensed operators of a pest control business. Some pesticide storage locations such as golf courses, farms, municipal works departments and utility operations are not covered by O. Reg. 63/09 and do not require MOE operator licenses.

Pesticide classification is different from standard Dangerous Goods (UN) or Workplace Hazardous Materials Information System (WHMIS) classifications normally referenced by fire departments at dangerous goods incidents. More information on pesticide classification is available from MOE.

It is recommended that when an MOE Fire Department Pesticide Notification Form is received by the local fire department that they coordinate a site inspection to assist these facilities with a fire safety plan. MOE Pesticides Specialists are available to accompany local fire departments on joint inspections of pesticide facilities upon request.

Some pesticide manufacturers and some large vendors already have these fire pre-plans in place based on standards from the "CropLife Canada Manufacturing Code" and the "Agrichemical Warehousing Standards Association (AWSA)". The sites would be classed as manufacturing or farm retailers and agricultural distributors. There are approximately 4 sites in Ontario that follow the CropLife Canada Manufacturing Code and 254 sites in Ontario that comply with the standards of the AWSA. Those sites store inventory in compliance the Ontario Fire Code and National Fire Code according to the hazard of the product. Included in these standards is the requirement for a site to prepare an Emergency Response Plan along with the storage layout and quantities of

the hazardous and non-hazardous products in the warehouses. A yearly sign off by the local Fire Chief is required for them to meet these industry standards.

Fire departments should also consider inspections of other facilities that may store pesticides such as farms, golf courses, public utilities, etc.

### **Fire Department Pre-Plans for Pesticide Storage Fires**

It is recommended that fire departments develop a fire pre-plan for each pesticide storage site and that a “Controlled Burn” strategy be considered by fire departments for fires that have spread into pesticide materials at these locations. This should be discussed with the owner and the insurance company providing coverage for that property.

Retail vendors who are selling ‘domestic’ pesticides will be limited in the type of pesticides available and therefore limited quantities would probably be found as part of a larger home improvement retail business. Due to the limited quantities at these retail locations, there may not be a need for a detailed pre-plan that would apply to the larger manufacturing or warehousing operations.

### **LIFE SAFETY CONCERNS**

- Protection of first responders and the public is a major concern with fires involving pesticides.
- The management of airborne contaminants at ground level hinges on the temperature of combustion, and the exit temperature from a structure. Where fires have been allowed to burn at high temperatures, the risk has been lowered significantly.
- First responders at an incident involving pesticides must be protected with self-contained breathing apparatus and standard turn-out gear at a minimum.

### **FIRE CONTROL CONSIDERATIONS**

- Where an incident cannot be addressed at the incipient (initial) stage, and where it is possible to ventilate and let burn, this approach should be given serious consideration.
- If a facility is fully involved or free burning, life safety is greatly enhanced by remaining outside the structure upwind of smoke and exhaust gases while the pesticides structure burns itself out.

## ENVIRONMENTAL CONCERNS

- Environmental damage, resulting from fires involving pesticides, increases in proportion to the volume of water used in an attempt to control and extinguish the fire.
- The resulting effluent is normally heavily contaminated with toxic compounds and is extremely difficult to contain with diking (other than very heavy clay soils).
- Products of incomplete combustion, due to low temperature burns, tend to be substantially more toxic and less stable than the original compounds.
- Air quality during a pesticide fire, at or near ground level, will deteriorate dramatically as the combustion temperature is reduced. A combustion temperature of 982° Celsius, for example, provides complete thermal decomposition of pesticides with resulting emissions of primarily carbon and water. At this temperature, all contaminants are carried high into the atmosphere where dispersion ensures that toxic levels at or near ground level does not occur.

Please see attached MOE Form “Fire Department Pesticide Storage Notification” on the next page.

### **Additional information is available from the following websites:**

<http://www.ene.gov.on.ca/en/contact/regionalmap.php> A contact list for MOE Regional and District Offices. Ask to be directed to the Pesticide Specialists.

<http://www.croplife.ca>

<http://www.awsacanada.com>

# Fire Department Pesticide Storage Notification



Ministry of the Environment

## Fire Department Pesticide Storage Notification (For reference in case of an emergency)

Ontario Regulation 63/09 under the *Pesticides Act* requires that:

- Any person who stores a Class 1 pesticide **MUST** give a written notice annually to the fire department responsible for the area in which the pesticide is stored.
- Every manufacturer<sup>1</sup>, licensed operator or licensed vendor who stores a Class 2, 3, 4, 5, 6, 7, or 8 pesticide **MUST** give a written notice annually to the fire department responsible for the area in which the pesticide is stored.

This form, when completed and forwarded to the local fire department, serves as the notification required under Section 112 of O. Reg. 63/09 under the *Pesticides Act*. **Retain a copy for your records.** Please notify the fire department if any of the information below changes.

**Part A**

Name of Fire Department (to which notification is being made)			Date
Address of Fire Department			Fire Department Telephone No.(s) Emergency No.
City	Prov.	Postal Code	Business No. (non-emergency)
Business Name			Operator <sup>2</sup> or Vendor <sup>3</sup> Licence Number (if applicable)
Address (street number and name or 911 emergency identification number & street name)			
City	Province	Postal Code	
Business Telephone No.			Business Fax No.
Name of Person Responsible <sup>4</sup> for the Storage of Pesticides (please print)			After Hours Contact Telephone No.
Name of Alternate Contact (please print):			After Hours Contact Telephone No.
<p>This business has a fire pre-plan on file with the local fire department under the CropLife Canada Certified Manufacturing Code or Agricultural Warehousing Standards Association audit program. <b>Yes</b> ___ <b>No</b> ___. If yes, continue to Part B only. If No, please describe the specific location of pesticide storage and conditions of storage (e.g. separate or attached facility, temporary or permanent structure, access to facility, location of nearby buildings and water sources, etc.) on the diagram of the storage area(s) in the section on the reverse side of this form. Continue to Part B and C.</p>			

**Part B.**

Pursuant to Section 112 of O. Reg. 63/09 under the *Pesticides Act*, I am providing annual notification to the local fire department that the following pesticides are stored at the address indicated on this form.

In storage (check all that apply)	Pesticide Federal Class	Federal Description	Ontario Classification under O. Reg. 63/09
<input type="checkbox"/>	Manufacturing	For use in the manufacture of a pest control product or a product regulated under the <i>Fertilizers Act</i> .	(Class 1)
<input type="checkbox"/>	Commercial or Restricted	For use in commercial activities that are specified on the label or the restricted class when the label specifies essential conditions respecting the display, distribution or limitations on the use of, or qualifications of persons who may use the product.	(Class 2, 3 or 4)
<input type="checkbox"/>	Domestic	To be distributed primarily to the general public for personal use in or around their homes	(Class 4, 5, 6, 7 or 8)

1. A manufacturer means a person who carries on business respecting the:
  - i. Formulation of a Class 1 pesticide into another pesticide,
  - ii. Manufacturing of a pesticide into a product,
  - iii. Incorporation of a pesticide into a product,
  - iv. Packaging or distribution of a pesticide or product containing a pesticide.
2. Operator means: the person(s) who has the control and management of an extermination business.
3. Vendor means: a person that is the holder of a General vendor licence allowing for the sale of any pesticide to an authorized person or the holder of a Limited vendor licence allowing for the sale of domestic pesticides to an authorized person.
4. Person responsible means: a certified outlet representative of a General vendor licence holder; or a person who is the owner or person having the charge, management or control of storage of a pesticide at a manufacturing or formulation plant; or a person having the charge, management or control of storage or display of a pesticide as a holder of a Limited vendor licence.

**Part C**

**Pesticide Storage Location(s)**

Please provide a diagram indicating the location(s) of pesticide storage within the facility, access points, and location of nearby buildings and water sources.

