To: Mayor and Members  
Committee of the Whole  

From: Jim Kay  
General Manager / Chief  
Hamilton Emergency Services  

Telephone: (905) 546-3343  
Facsimile: (905) 546-3344  
E-mail: jkay@hamilton.ca  

Date: July 21, 2008  

Re: Biedermann Fire - Staff Review and Comments on the Office of the Fire Marshal (OFM) Reports and Addenda (HES08012) (City Wide)  

Council Direction:  

Not applicable.  

Information:  

Overview  
The purpose of this report is twofold. The first is to provide an overview of the recently released Office of the Fire Marshal (OFM) reports concerning the investigation of the Biedermann fire. The OFM reports consist of an Executive Summary, two (2) separate reports and two (2) addenda. Secondly, staff from the five (5) City Departments involved in the incident has prepared a summary document addressing comments pertaining to the OFM reports and actions taken since the event.  

This report complements the preliminary staff report (CM07035) and presentation made to Committee of the Whole (CoW) on November 12, 2007 and the six (6) electronic updates provided to all of Council.  

On June 19, 2008 Hamilton Emergency Services (HES) received permission from the OFM to release the information to Council contained within the OFM Reports.  

Staff is providing an overview of each report and addenda.
### Appendix Title / Date

<table>
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<tr>
<th>Appendix</th>
<th>Report Title / Author</th>
<th>Date Produced</th>
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</thead>
<tbody>
<tr>
<td>Appendix A to Report HES08012</td>
<td>City of Hamilton Departments Summary of Comments Related to OFM Reports and Addenda, and Actions Taken</td>
<td>July 17, 2008</td>
</tr>
</tbody>
</table>

The following Departments/Divisions were consulted and/or provided comments where applicable to Report HES08012:

- Hamilton Emergency Services – Fire Services
- Planning & Economic Development – Building Services
- Planning & Economic Development – Development Planning
- Public Health – Health Protection
- Public Works – Water & Wastewater Division, Regulatory Services Group

The following is a summary of the OFM reports. Many of the comments provided below are excerpts from the actual reports and staff has summarized other comments for the sake of brevity.

- Given that the incident involved multiple agencies and resulted in intense media coverage and public concern, the OFM elevated this event to a "Major Fire Investigation".
- The OFM conducted an origin and cause investigation and determined that the fire originated in the south west area of the shipping/receiving section of the building.
- The fire “cause” was found to be “undetermined”.
- Considerable firefighting run-off entered the natural environment and resulted in a fish kill in nearby Spencer Creek.
- A strong Fire Department response was unable to arrest the fire growth because of combustible construction, the fire load of combustibles present within the plant and the absence of an automatic (fire) sprinkler system.
- Availability of information pertaining to the involved site at the time of dispatch and at the scene would have assisted with decisions affecting firefighting safety and consideration of the impact of the fire on the community and natural environment.
- The OFM investigation is closed.


- Correction to the two (2) dates identified in the Fire Investigation Report dated January 3, 2008:
  - Page 4, paragraph 3, the correct date is 7-7-26
  - Page 5, paragraph 1, the correct date is 7-7-27


- The fire took place on Thursday, July 26, 2007.
- The total fire loss is estimated at $1,500,000.
- The plant was closed and unoccupied at the time of the fire. Last employee left the building at approximately 4:30 p.m. on July 25, 2007.
- Fire was called in by a witness from the business across the road.
- Firefighters found the building (all doors) secure on arrival.
- The fire burned for approximately 16 hours.
- There was significant water runoff from firefighting activities to storm drains at the curb; total amount of runoff removed by Echelon Response & Training Inc. was reported by Biedermann to be 330,000 litres.
- The storm drains enter into Spencer Creek and subsequently into Cootes Paradise Waterways.
The south side of the building (area of fire origin) was the shipping and receiving area. The north side of the building contained raw material storage / mixing / packaging.

The report provides a listing of chemicals stored in the scene obtained from employee interviews, computer printouts, and Ministry of the Environment (MOE) information.

The building was alarmed with intrusion alarms and heat detectors. The alarm system was activated during this occurrence.

The most severe fire damage was uniformly above floor level in the south side. Fire damage decreased east towards the front and north. The fire wall running east-west prevented significant fire spread north. Material located away from the walls in the centre of the south suffered the least damage in the fire area of origin. Paper packaging of bagged material was not scorched and appeared in good condition compared to roofing material in the same area. This is evidence of a fire that stayed high throughout the south area of origin.

Electrical ignition sources could not be eliminated due to conditions at the scene during the investigation.

Open flame ignition from items such as matches or lighters as a result of arson cannot be confirmed or eliminated. The sequence of events regarding fire spread, timelines of witness accounts, and alarm activation strongly discounts this type of event.

The cause of the fire is undetermined.


Original report based on best information available at the time. An on-site visit immediately after the fire was not possible. Since release of the Report, additional information has come to light.

Originally the occupancy was identified in the December 18, 2007 report as a “medium hazard industrial occupancy (F2)” as per the Building Code. However, based on new information this is being changed to a “low hazard industrial occupancy (F3)” as per the Building Code.

The design of the fire wall between the north and south part of the building is consistent with a 4-hour fire wall.

The previous two (2) pieces of information eliminates the Fire Code requirement for an approved fire safety plan for the building.

Acknowledgement of the bow string roof truss construction at the rear of the south building.

In discussions with company (Biedermann) and Fire Department staff, acknowledgement that the Fire Department was made aware of pesticide contents of the building shortly after arrival.

The Fire Department noted from conversations with attending plant personnel that the total estimated amount of pesticide involved in the fire in the south building was 100 pounds. The Fire Department also noted from attending plant personnel that the quantities of the concentrated pesticides in the north building was much greater. Therefore, the fire attack was focused on preservation of the fire separation and extinguishment of the fire on the south side.
Due to the fire damage and hazardous conditions at the site, no attempt was made by Mr. Horne to confirm the quantities or locations of chemicals present at the time of the fire. Mr. Horne did not evaluate the plant for compliance with Part 4 of the Ontario Fire Code.

**OFM Report prepared by David Horne, Applied Research, OFM on December 18, 2007**
(Appendix F to Report HES08012)

- Scope of report to report on the impact of the fire on the community and natural environment and to review the list of chemicals provided by the OFM Fire Investigator for spontaneous heating potential as a possible ignition source.

- It should be noted that no site visit was made by Mr. Horne and that the list of chemicals and quantities had been under continued updating and that the list provided in the Fire Investigation Report dated January 3, 2007 should be referenced for the “authoritative” list.

- The business did not apply pesticides or sell product to the public, and hence did not fall under the Pesticides Act administered by the MOE.

- The fire separation constructed within the Biedermann building was effective in combination with Fire Department suppression operations in confining the fire to the south side of the building. Considerable firefighting runoff entered the natural environment. This resulted in a fish kill in a nearby stream.

- A strong Fire Department response was unable to arrest fire growth in the south side of the building. Combustible construction and the fire load of combustibles present were significant.

- Responding firefighters were not aware that the scene involved pesticides. The availability of this information at the time of dispatch and at the fire scene would assist with decisions affecting firefighting safety, and allow for earlier consideration of the impact of fire on the community and the natural environment (see addendum for clarification).

- Confinement of the fire to the south side of the building saved even greater impacts that would have occurred to the community and the natural environment if the north portion of the building had been destroyed. However, significant impacts to the natural environment did occur with the escape of firefighting runoff beyond the property boundaries.

- If an automatic (fire) sprinkler system had been present at the plant, it is reasonable to assume that the fire would have been controlled with much smaller quantities of water and that the building south of the fire separation would not have been consumed in the fire. The Ontario Fire Code did not require automatic sprinkler protection for this building specific to occupancy.

**Recommendations:** (provided by David Horne in his report)

1. Where significant storage or use of high hazard chemicals are conducted within a building, key protection features are necessary to allow an opportunity for fire control and to minimize the impact on the community and the natural environment. Protective features should include:
   - On-site retention of firefighting water,
   - Building construction providing a fire resistance rating of at least one hour,
   - Fire separations of at least two hours separating chemical storage areas from the remainder of the plant,
An automatic sprinkler system for the entire building, and
A fire alarm system connected to a supervisory service which monitors both fire alarms and the sprinkler system.

2. Steps should be taken to ensure responding firefighters are provided with key information while enroute to the fire with further detail available on the fireground to assist fire command and emergency operations.

3. The option to use sanitary sewers to carry firefighting runoff to diversion storage for subsequent treatment before release back into environment should be evaluated.

Please see Appendix A which represents the Summary of Comments provided by the various City Departments involved related to the OFM reports and addenda.

_______________________
Jim Kay
General Manager / Chief
Hamilton Emergency Services
## Biedermann Packaging Fire
### Staff Review / Comments on Office of the Fire Marshal (OFM) Reports/Addenda

<table>
<thead>
<tr>
<th>OFM REPORTS &amp; ADDENDA</th>
<th>Hamilton Emergency Services</th>
<th>Public Works – Water &amp; Wastewater-Regulatory Services</th>
<th>Public Health – Health Protection</th>
<th>Planning &amp; Economic Development – Building Services</th>
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<tbody>
<tr>
<td><strong>The OFM Investigation Report clearly indicates that the fire damage was uniformly above the floor level and that the fire stayed high throughout the south area of origin. The report also indicates that product away from the walls in the south area suffered the least damage and that paper packaging of bagged material was not scorched and appeared in good condition. These findings are consistent with the position that the Department presented to Council (Report CM07035) “given that the main areas of involvement were the roof and upper structures of this building, it was considered to be a large structure fire with a pesticide exposure problem.”</strong></td>
<td><strong>Recommendation #3 (pg 21)</strong></td>
<td>PHS reviewed the OFM report dated January 8, 2008. This report listed different chemicals and quantities which were alleged to have been present in the fire on the south side of the building. This was contrary to the information provided to PHS on the day of the fire as to the type and amount of product in the south side of the building. The addendum to the OFM Report indicated that the Report did not specifically mention that the Fire Dept was notified at the time of the fire as to the limited amount of product present in the south side. The addendum quotes, “My report did not provide information of the quantity of active pesticide ingredients reported to the fire department by Biedermann personnel at the fire.”</td>
<td><strong>Last paragraph on page 10 of the report:</strong> “...200 mm masonry wall... provide a fire separation with a 4 h fire-resistance rating and a 900 mm parapet... as a firewall on the Ontario Building Code.” <strong>200 mm masonry wall will provide 4 h fire-resistance rating provided the masonry is in compliance with certain applicable standards.</strong></td>
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<tr>
<td></td>
<td>The product listing in the Investigation Report has been deemed to be the authoritative list by the OFM; however, to our knowledge,</td>
<td>Due to the design of the separate sewer system in that area, the sanitary sewer is a relatively enclosed system and can only be accessed via manholes in the street. It would have been impractical at the time of the fire for the scene responders to construct a transitory system to collect the firefighting water from the entire site and divert it to the sanitary sewer. If this had been accomplished, the firefighting water would likely have entered the</td>
<td><strong>Regarding occupancy classification – Whether F3 or F2</strong></td>
<td>For the reconstructed portion of the building with building area being 1452 m², 1 storey and facing 1 street; the design engineer chose to design as a separate building with F2 medium hazard occupancy where combustible construction is permitted.</td>
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the listing of product, quantities and location have not been verified. In fact, the “authoritative list” significantly differs from the list provided by Biedermann senior staff to the firefighters on scene at the time of the fire. The “authoritative list” is also different from the “As of April 21, 2007” listing of product that Biedermann provided to the Department on August 24, 2007 (after the fire) that they reported was in their emergency plan prior to the fire. Both the so called “authoritative list” and the “as of April 21, 2007” list are different again to the product list that Biedermann provided on April 17, 2008 identifying what was in both buildings at the time of the fire.

(Note - the different versions of product lists as noted above raise questions about the existence of a substantiated “authoritative list” of what product was in the south and north building at the time of the fire.)

Dundas diversion tank which is designed to receive flow when the capacity of the Dundas WWTP is exceeded.

Had the firewater in its entirety been diverted to the sanitary sewer, depending on the duration of the fire and the resulting fire flows as well as the community’s use of the system at that time, the total volume of flows would likely have exceeded the diversion tank capacity. This would have resulted in an overflow to the receiving water that would contain not only the contaminated fire water, but also untreated sewage.

If the firefighting water from the Biedermann property had entered the Wastewater Treatment plant, the contaminated water would likely have seriously impacted and possibly destroyed the microorganisms / biomass in the treatment plant which would have resulted in complete treatment process failure. The re-growth of biomass could take up to eight weeks and during that period the resulting environmental damage from untreated or partially treated sanitary flows entering the receiving water would have been significant.

This information was critical to the public health risk analysis performed to determine if any risks to exposure from the smoke existed.

There appears to be confusion to the amount of pesticide product that was present in the south side and the amount present in the non burning north side. There appears to be agreement from the OFM in the report and the addendum that the greater amount of product was present in the non burning side of the building.

requirement for the re-constructed building will have no difference whether it is used for F2 or F3 occupancy. However, notwithstanding the above, the building is actually built with noncombustible construction.

Existing 4 h fire-resistance rated firewall

There is no information on the existing fire separation with 1 m parapet to confirm that it is a 4 h fire-resistance rated fire wall. (The building plan submitted for the reconstructed building shows this existing wall with a fire rated door on each of the openings

For the reconstructed building, the exterior building face adjacent to the existing building is composed of a 2 h fire-resistance rated 10” block wall to the underside of the roof.

For the exterior building face of the existing building, the approved building plan requires the professional engineer to verify it has a 2 h fire resistance rating with non combustible building face.

The existing building and the reconstructed building are
<table>
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<th>Public Health – Health Protection</th>
<th>Planning &amp; Economic Development – Building Services</th>
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<tr>
<td><strong>Addendum to the December 18, 2007 Report prepared by David Horne, Applied Research, OFM on May 21, 2008 (Appendix E to Report HES08012)</strong></td>
<td>It is the position of the Water &amp; Wastewater Division that not only is it impractical to divert firewater from any building site in the City to the separate sanitary sewer, where a combined system does not exist, but undesirable to receive such water at any of the City’s Wastewater Treatment Plants.</td>
<td></td>
<td>considered to be two separate buildings, each designed to be constructed with exterior abutting walls having 2 h fire resistance ratings and non-combustible construction on the building face.</td>
</tr>
<tr>
<td>In the February 5, 2008 Update #2 to Council, Chief Kay reported that during the Department’s preliminary analysis of the report that the Department had found some discrepancies that had raised a few questions requiring answers. Department staff met with the OFM to seek clarification to the questions raised in our analysis of the report.</td>
<td></td>
<td></td>
<td><strong>Considered as two buildings</strong></td>
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<td>The addendum published on May 21, 2008 provided the clarity to the discrepancies and questions that had come from the Department’s analysis.</td>
<td></td>
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<td>See previous comment.</td>
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<tr>
<td><strong>OFM Report prepared by David Horne, Applied Research, OFM on December 18, 2007 (Appendix F to Report HES08012)</strong></td>
<td>The discrepancies and questions raised during the Department’s analysis were dealt with in the addendum produced by Mr. Horne.</td>
<td></td>
<td><strong>Additional Information</strong></td>
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<td>Except for a portion of the floor area in the existing building, a sprinkler system under a building permit issued on May 13, 2008 as voluntary upgrade will be installed to cover the reconstructed building and the existing adjacent building. Once the sprinkler system is installed and operational, the reconstructed building and existing building can then be treated as one building under Part 11/Part 3 of the Ontario Building Code, which means that the two separate building walls with 2 h ratings and non-combustible construction on the building face are no longer required, nor would a 4 h fire wall be required. Having said this, the 2 h rating walls have already been constructed.</td>
</tr>
<tr>
<td>Department/Division Actions Taken</td>
<td>Since the July 26, 2007 fire, HES-Fire has taken the following actions:</td>
<td>No actions to be taken</td>
<td>Environmental toxicologist reviewed the list of chemicals provided in the report alleged to have been present in the south side of the building. Based on this new information PHS was able to determine that the risk to the public from exposure to pesticides might have been increased as compared to the information of the quantities and types of chemicals present reported at the site during the fire. Due to this conflicting information PHS is not able to make a definitive risk statement, although all real time indicators from the MOE air monitoring at the site indicated no increase risk present at the time of the fire. The Addendum appears to indicate that the amount of product in the south side during the fire was consistent with the information provided to PHS at the time of the fire. This would lead PHS to be of the opinion that the risk to the public’s health from exposure to the smoke during the incident was likely minimal.</td>
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<td>1. Sent a letter to Planning on December 6, 2007 to be passed on to the Ministry of the Environment (MOE) and Biedermann that contained recommendations (these were made from a due diligence perspective only; the Department does not have legislative authority to demand action) from HES-Fire as part of the site plan approval process for the rebuilding of the south facility. The recommendations included:</td>
<td>a total flood, automatic extinguishing system that would eliminate the need to apply water during firefighting operations and remove the need for firefighters to operate inside the building</td>
<td>Environmental toxicologist reviewed the list of chemicals provided in the report alleged to have been present in the south side of the building. Based on this new information PHS was able to determine that the risk to the public from exposure to pesticides might have been increased as compared to the information of the quantities and types of chemicals present reported at the site during the fire. Due to this conflicting information PHS is not able to make a definitive risk statement, although all real time indicators from the MOE air monitoring at the site indicated no increase risk present at the time of the fire. The Addendum appears to indicate that the amount of product in the south side during the fire was consistent with the information provided to PHS at the time of the fire. This would lead PHS to be of the opinion that the risk to the public’s health from exposure to the smoke during the incident was likely minimal.</td>
<td>No actions to be taken</td>
</tr>
<tr>
<td>• a total flood, automatic extinguishing system that would eliminate the need to apply water during firefighting operations and remove the need for firefighters to operate inside the building</td>
<td>that the existing building (not damaged by fire) be similarly outfitted</td>
<td>The Addendum appears to indicate that the amount of product in the south side during the fire was consistent with the information provided to PHS at the time of the fire. This would lead PHS to be of the opinion that the risk to the public’s health from exposure to the smoke during the incident was likely minimal.</td>
<td>No actions to be taken</td>
</tr>
<tr>
<td>• if the above two recommendations are not acted upon, to install a secondary containment system</td>
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<td></td>
<td>No actions to be taken</td>
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to prevent and/or minimize the flow of pesticides and firefighting runoff water during emergency conditions.

The Department continues to follow up on this correspondence with the MOE and Biedermann.

The Department has indirectly learned that a sprinkler system is being installed in the reconstructed building on a voluntary basis.

2. The Department has met with the MOE and shared information regarding the location of pesticide storage. The Department has completed tactical surveys (fire suppression plans) on five (5) properties in the City where volumes of pesticides are stored. These surveys are being done on a priority basis as resources are available. Information regarding these properties has been updated in our dispatch system so responding crews will be made aware that they are responding to a facility that has pesticide storage.
3. Initiated meetings with the MOE to look at piloting a process to have product information readily available to fire crews arriving at one of these sites.

4. Investigating IT solutions to be able to provide property and tactical information to front-line firefighters.

5. Initiated a review process of our tactical survey program to ensure it is meeting our operational needs.

6. Updated the Department’s notification protocols for informing Public Works, Public Health and Community Services in the event of an emergency incident.

7. Arranged for the MOE to work with other area departments regarding this fire with the intent to share lessons learned.
Executive Summary

Investigation No.: 145-015-2007
Occurrence Date: 26-Jul-2007
Alarm Time: 01:41:00
Street #: 36
Street: Head Street
Apt #:
City: Dundas
Municipality: Hamilton
Province: ON

John Benedetti
FI Coordinator

08/01/07

Bernie Silvestri, P. Eng.
Assistant Deputy Fire Marshal

01/07/08

Case #: 10140
Printed on: 07-Jan-2008 09:34 by JUSTICE/CLARKC
EXECUTIVE SUMMARY

Preliminary Circumstances:
At 1:41 am on July 26th, 2007 the Hamilton Fire Services responded to a fire at Biedermann Packaging Incorporated located at 36 Head Street, Dundas (City of Hamilton). This factory, which contained numerous chemicals, was primarily involved in the manufacturing and packaging of pesticides/insecticides for rodents. The ensuing fire resulted in roof collapse at the south section and burning of hazardous materials.

A significant amount of contaminated water run-off from firefighting activities entered storm drains. The storm drains emptied into nearby Spencer Creek resulting in the death of a large number of fish and other water borne organisms.

The scene was declared a HAZMAT incident requiring the involvement of multiple agencies and resulting in intense media coverage and public concern. As a result, this matter was elevated to a “Major Fire Investigation.”

Components of a Major Fire Investigation and Conclusions:
Office of the Fire Marshal (OFM) Fire Investigator Tom Hutton conducted an origin and cause investigation and determined that the fire originated in the southwest area of the shipping/receiving section of the building. The cause of the fire was “Undetermined” as electrical ignition sources and the intentional application of an open flame to materials present could not be eliminated. (See Fire Investigation Report.)

Officials from the Ministry of the Environment (MOE) attended the fire incident to undertake water and air sampling. Results from air quality testing taken between 9:01 am and 1:17 pm on July 26th, 2007 were considered safe and evacuation of residents was deemed unnecessary.

The Hamilton Fire Services used approximately 5 million litres of water during suppression activities. There were no plant floor drains and the building was constructed with sills to provide containment. According to the plant emergency manual, total site containment including the building and outside storage area was 986,000 litres. The total amount of firefighting run-off collected by vacuum trucks was approximately 330,000 litres. The outflow from street storm sewers was into Spencer Creek.

Random water samples from Spencer Creek were collected by MOE between July 26th and July 30th. The samples were analyzed for pesticides; specifically malathion, diazinon, carbaryl and bendiocarb. Values that were obtained were either below detection limits, or in the case of diazinon, described as trace amounts. However, these samples were taken several hours and days after initial run-off.

OFM Applied Research Engineer David Horne was assigned to report on the impact of the fire on the community and the natural environment. He reported that 200 mm fire separation constructed within the building was effective in combination with fire department suppression operations in confining the fire to the south side of the building.
Executive Summary

However, as a result of suppression efforts, considerable firefighting run-off entered the natural environment and resulted in a fish kill in nearby Spencer Creek.

A strong fire department response was unable to arrest fire growth because of combustible construction, the fire load of combustibles present within the plant and the absence of automatic (fire) sprinkler systems.

Finally, responding fire crews were not aware that the fire scene involved pesticides. The availability of this information at the time of dispatch and at the fire scene would have assisted with decisions affecting firefighting safety and allow for earlier consideration of the impact of fire on the community and the natural environment. (See Report of D. Horne, P Eng)

Case Status:
The OFM investigation is closed.
March 20th, 2008

SUBJECT: AMENDMENT TO FIRE INVESTIGATION REPORT

Address: 36 Head Street, Dundas
Date: July 26th, 2007
Occurrence # 145-015-2007

Please be advised that the following amendments are being made to Fire Investigator Tom Hutton’s report pertaining to the fire at the above noted location:

Page 4, paragraph 3, the correct date is 7-7-26

Page 5, paragraph 1, the correct date is 7-7-27

Tom Hutton
Fire Investigator
Fire Investigation Report

Investigation No.: 145-015-2007
Occurrence Date: 26-Jul-2007
Alarm Time: 01:41:00
Street #: 36
Street: Head Street
Apt #: 
City: Dundas
Municipality: Hamilton
Province: ON

[Signatures]

Tom Hutton
Fire Investigator

Jim Fisher
Supervisor

Date: 8-1-08
Date: 10-Jan-08
Fire Investigation Report

Investigation No.: 145-015-2007

Major Occurrence: ✔
Explosion ☐ Fire Fatal ☐ Non-Fire Fatal ☐ Serious Injury ☐ Large Loss ☑ Fire Safety Issues ☑

Fire Investigator: Tom Hutton
Fire Investigation Supervisor: Jim Fisher

Occurrence Date: 26-Jul-2007
Alarm Time: 01:41:00
Street: Head Street
Street #: 36
City: Dundas
Apt. #: 
Municipality: Hamilton
Postal Code: 

Attending Fire Department: Hamilton Emergency Services - Fire
Attending Police Department: Hamilton Police Service

Fire Cause: Undetermined
Property Type: Chemicals

Property Loss: $1,000,000
Content Loss: $500,000
Exposure Loss: $0

Total Loss: $1,500,000

Scene Release Date: 27-Jul-2007
Status: Release
Report Approved Date: 21-Nov-2007
Fire Investigation Report

Investigation No.: 145-015-2007

1 Introduction

1.1 Response Criteria

Hamilton Fire Service responded to a large loss HAZMAT scene located in a light industrial area of Dundas. The Ontario Fire Marshal (OFM) responded to this fire occurrence at the request of the Hamilton Fire Service.

1.2 Preliminary Information

A fire occurred at a packaging company mainly involved in mixing and packaging pesticides/insecticides for rodents. Hamilton Fire Prevention Division inspected the premises on October 5, 2005. There were no deficiencies noted at that time.

The plant was closed and unoccupied at the time of the fire. The last employee locked and left the building at approximately 1630 hours 2007-7-25. The building appeared secure upon Fire Department arrival. This will be confirmed through statements.

The fire activated an interior alarm. A witness (person #9) from across the road called in the fire.

The building is a single storey concrete block with a flat tar a gravel roof. It faces east on the west side of the street and is located in a light industrial area of Dundas. There is a firewall separation approximately centre. This wall separates finished from unfinished product. Offices are located at the front. The south side of the building containing finished product was the area of fire origin.

The roof had collapsed into the south section. The collapse combined with product storage resulted in the fire burning for approximately 16 hours. An excavator was utilized to access the scene for suppression activities.

The water used during suppression cross contaminated finished and unfinished product as well as pyrolysis by-products.

There has been significant water runoff from firefighting activities that entered storm drains at the curb. The Fire Department reports approximately 5,000,000 litres of water was used during suppression.

Documents from Beiderman report a site containment area of approximately 217,00 gallons of liquid. As of 0900hrs on July 27, 2007 there was approximately 168,000 litres of runoff removed from the site by Echelon Response & Training Inc. The total amount of runoff removed by Echelon Response & Training Inc. as reported by Biederman was 330,000 litres.
Fire Investigation Report

Investigation No.: 145-015-2007

The storm drains empty into Spencer Creek and subsequently into Cootes Paradise waterways. Cootes Paradise empties into Hamilton harbour. Ministry of the Environment attended and provided air and water monitoring.

The scene was declared a HAZMAT incident. A meeting was held with Police, Fire, Ministry of the Environment, and Public Health regarding concerns over the air quality. Public Health and the Ministry of the Environment did not identify any air quality concerns.

Ministry of the Environment reported water discoloration and large numbers of dead fish in Spencer Creek. The contaminants moved downstream into Cootes Paradise. At 1700 hours 2007-7-25 MOE advised the writer that these findings had been reported to Hamilton Public Health. Ministry of the Environment sampled water from the affected areas. The public frequents the affected areas.

Police interviewed witnesses.

Environmental clean up at and around the scene is continuing and being co-ordinated through MOE.

There were no injuries reported except some contaminant exposure to approximately 3 firefighters. This has not required medical attention at the time of writing.

The initial reported chemicals were 1-45 gal drum Diazinone, 12-45 gal drums of Malathione, 5000-6000 lbs of dry pesticide in 2 45 gal drums and 3-4 pallets Cabaryl & Rotenone, undetermined quantity of Zineb, and a fungicide. A detailed list collected through the investigation is found under scene description.

Agencies Involved with personnel on site:

Public Services:

Hamilton Fire Service
Hamilton Police Service
Hamilton Public Health & Community Services
Ministry of the Environment (MOE)
Office of the Fire Marshal
Private Services:

Echelon Response & Training Inc.
Hamilton Fire Service provided assistance for a HAZMAT team on 7-7-26 to access the building for remote scene examination.

1.3 Investigative Authority

The fire was investigated under the authority of the Fire Prevention and Protection Act.

1.4 Involved Agencies

Hamilton Fire Service attended for suppression activities.
Hamilton Police Service attended to provide security and interviewed witnesses.
Hamilton Public Health & Community Services attended to monitor health concerns.
Ministry of the Environment (MOE) attended to monitor and co-ordinated environmental contamination from runoff.
Office of the Fire Marshal conducted a cause and origin investigation

Echelon Response & Training Inc. attended to evacuate water runoff from drains and waterways.

2 Scene Description

Front of building looking northwest
The building was a single storey concrete block walled structure that faced east on the west side of the street. The main building had a flat tar a gravel roof. The south side area of fire origin had a wood truss/deck roof structure. There was a steel "butler" style addition on the west centre. The west-north addition was concrete block with a peak steel covered roof.

The building was serviced with natural gas, water, and hydro.

The building contained partitioned rooms organised into 3 main areas as follows:

North Side - product mixing/packaging/storage
South Side - product shipping/receiving/short term storage
East (Front) – offices/lunch room/washrooms

The south side shipping/receiving area (fire origin) was mainly open and unpartitioned except a narrow area at the front (east) for offices. The open area was used for product shipping/receiving and short-term organizing/storage in preparation for shipping.

Products were shipped through overhead doors at the west end of this area and a loading dock approximately centre along the south side. There was steel storage racking along the north and south walls.

The north side contained partitioned areas for raw material storage/mixing/packaging. This included material grinding and mixing machinery as follows:

Heat Shrink Tunnel
Packers
Mouse Treat Machine
King Line
King Valve Packer
Sevin Dust Collector
Sevin Grinder
Sevin Mixer
40 ft (3) Powder Mixer
200 ft (3) Powder Mixer
20 ft (3) Powder Mixer
200 ft (3) Rodenticide Mixer
Pellet Mill
Bulk Filler (powder)
Extruder (powder)

Product packaging was also located in this area. Agricultural products listed below were stored in
the northwest.

A talc bin was located immediately outside this area in the northwest.

A small partitioned maintenance area was located immediately west off the south side
shipping/receiving area.

The firefighters found all doors secure upon their arrival. This information was confirmed through
witness statements.

There were 3 man-door entrances on the front (east side). The north side contained 1 man-door
entrance. The south side contained 3 man-door entrances and 1 overhead door. The loading dock
on the south centre contained 2 overhead doors.

All doors were steel clad except 1 front entrance door that was aluminium framed commercial
glass.

The building had a functioning intrusion alarm system that was monitored/serviced through ADT
Security Services Canada Inc. ADT reports the system was armed at 1635hrs on July 25, 2007. At
0135hrs on July 26, 2007 an alarm was received from the fire side of the building. At 0137 ADT
called to report this to a Beiderman representative. At 0140 ADT records communication failure at
Beiderman. This time line is accurate with witness accounts of the fire and Fire Department
notification times.

The following is a list of chemicals stored in the scene obtained from employee interviews,
computer printouts, and MOE information:

South Side Fire Area:

<table>
<thead>
<tr>
<th>Names</th>
<th>Active</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zineb</td>
<td>Zineb 80%</td>
<td>895kg</td>
</tr>
<tr>
<td>Copper</td>
<td>Tri-Basic Copper Sulphate</td>
<td>1,156kg</td>
</tr>
<tr>
<td>Fopet</td>
<td>Folpet 50%</td>
<td>825kg</td>
</tr>
<tr>
<td>Sulphur</td>
<td>Sulphur 92%</td>
<td>115kg</td>
</tr>
</tbody>
</table>
Fire Investigation Services

Fire Investigation Report

Investigation No.: 145-015-2007

| Pellets                  | Bromadialone .005% | 3,107kg |
| Block                    | Bromadialone .005% | 12,638kg |
| Pellets                  | Bromadialone .005% | 5,991g  |
| Blocks                   | Bromadialone .005% | 4,356kg |
| Boric Acid               | Boric Acid 99%     | 1,574kg |
| Celatom                  | Diatomaceous Earth | 11,430kg |
| Celite 209               | Diatomaceous Earth | 5,532kg |
| Wilson Slug Pellets      | Metaldehyde 2.75%  | 3,624kg |

Finished Product for Shipping:

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<thead>
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<th>Active</th>
<th>Quantity</th>
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<tr>
<td>Grain Dust</td>
<td>Diatomaceous Earth</td>
<td>5,040kg</td>
</tr>
<tr>
<td>Diazinon 5g</td>
<td>Diazinon 5%</td>
<td>9,405kg</td>
</tr>
<tr>
<td>Treated Seed</td>
<td>Chlorophacine .005%</td>
<td>403kg</td>
</tr>
<tr>
<td>Warfarin Pellets</td>
<td>Wafarin .025%</td>
<td>888kg</td>
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<tr>
<td>Warfarin Pellets</td>
<td>Wafarin .025%</td>
<td>2,364kg</td>
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<tr>
<td>Bromone Blocks</td>
<td>Bromadialone .005%</td>
<td>1,872kg</td>
</tr>
<tr>
<td>Bromone Blocks</td>
<td>Bromadialone .005%</td>
<td>1,431kg</td>
</tr>
<tr>
<td>Bromone Pellets</td>
<td>Bromadialone .005%</td>
<td>756kg</td>
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<tr>
<td>Warfarin Meal</td>
<td>Wafarin .025%</td>
<td>960kg</td>
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<tr>
<td>Bromone Meal</td>
<td>Bromadialone .005%</td>
<td>180kg</td>
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Storage Room:

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<th>Quantity</th>
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<tr>
<td>Sevin 99%</td>
<td>7,625kg</td>
</tr>
<tr>
<td>Rotenone 6.6%</td>
<td>1,225kg</td>
</tr>
<tr>
<td>Captan (BP)</td>
<td>23kg</td>
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<tr>
<td>Folpan</td>
<td>1,000kg</td>
</tr>
<tr>
<td>Captan (SP)</td>
<td>125kg</td>
</tr>
<tr>
<td>Malathion 25w</td>
<td>18kg</td>
</tr>
<tr>
<td>Malathion Tech 95%</td>
<td>200lt Steel Drum</td>
</tr>
<tr>
<td>Diazinon Tech</td>
<td>200lt Steel Drum</td>
</tr>
<tr>
<td>Methyl Nonyl Keytone 95%</td>
<td>200lt Steel Drum</td>
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<tr>
<td>Rozol Mineral Oil Conc</td>
<td>200lt Steel Drum</td>
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<tr>
<td>Rozol Dry 2%</td>
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<tr>
<td>Chemical</td>
<td>Quantity</td>
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<tr>
<td>Piperonyl Butoxide Tech 80%</td>
<td>200lt Steel Drum</td>
</tr>
<tr>
<td>Pyrocide 175 – Pyrethrin 20%</td>
<td>200lt Steel Drum</td>
</tr>
<tr>
<td>Pyrenone</td>
<td>200lt Steel Drum</td>
</tr>
<tr>
<td>Pyrethrins</td>
<td>200lt Steel Drum</td>
</tr>
<tr>
<td>Contrac Red Conc</td>
<td>200lt Steel Drum</td>
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<tr>
<td>Bromadione Conc. 1% Dry</td>
<td>25kg</td>
</tr>
<tr>
<td>Bromadione Conc. 2.5%</td>
<td>4lt</td>
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<tr>
<td>Retenone</td>
<td>3,000kg</td>
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<tr>
<td>Folpan 50WP</td>
<td>140kg</td>
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<tr>
<td>Boric Acid</td>
<td>200kg</td>
</tr>
<tr>
<td>Sulphur H-50 92%</td>
<td>1,000kg</td>
</tr>
<tr>
<td>Warfarin Tech</td>
<td>50kg Steel Drum</td>
</tr>
<tr>
<td>Carbaral 99% (Sevin)</td>
<td>4,000kg</td>
</tr>
<tr>
<td>Strychnine</td>
<td>10kg</td>
</tr>
<tr>
<td>Dodine Tech</td>
<td>500kg</td>
</tr>
<tr>
<td>Copper Oxicloride</td>
<td>10kg</td>
</tr>
<tr>
<td>Thiophanate Methyl (NF-44)</td>
<td>500kg</td>
</tr>
<tr>
<td>Manzate 200</td>
<td>100kg</td>
</tr>
<tr>
<td>Ziram Tech</td>
<td>20kg</td>
</tr>
<tr>
<td>Quintozene 99%</td>
<td>500kg</td>
</tr>
<tr>
<td>Methyl Bromide</td>
<td>50lb Tank</td>
</tr>
<tr>
<td>Gasoline</td>
<td>15lt</td>
</tr>
<tr>
<td>Propane</td>
<td>126kg Steel Tank</td>
</tr>
<tr>
<td>Helium</td>
<td></td>
</tr>
</tbody>
</table>

Agricultural Products:

- Wheat Starch
- Wheat Shorts
- Corn Flour
- Chopped Corn
- Oak Flour
- Canary Seed
- Rolled Oats
- Apple Palmace
- White sugar
- Icing Sugar
- Walnut Shell
- Salt
Fire Investigation Report

Person #7 advised the following materials were on the south side area of fire origin at closing time:

- 20 full pallets Predator Rodenticide blocks
- 6 full pallets of Predator Rodenticide pellets
- 2 or 3 skids of King Rodenticide pellets and blocks
- 12 skids of Diazinon 5g (finished products)
- 6 skids of packaged Rodenticide
- Several pallets of Protect It

**Raw Material**

- Rolled oats
- Corn Meal
- Sugar
- Celatom
- Clay
- 25 pallets Drywall compound
- Compost
- Durabond

**Packaging**

- Thousands of shippers and cartonettes.
- Cardboard
- Empty fibre drums
- Skids of garbage
- 1 skid of Copper Sulphate

There were 2 propane-fueled forklifts located on the south side. 1 was located near the west rear and the 2nd was near the front east.

The building was alarmed with monitored passive infrared intrusion alarms and door contact. There were also numerous fixed 135-degree heat detectors throughout the building that were linked with the alarm control panel. An audible siren was also activated upon alarm activation. The alarm system and siren were activated at the time of this occurrence.
3 Fire Scene Analysis

3.1 Fire Origin

3.1.1 Exterior Fire Patterns

East Side (front)

Fire burned the eaves from the south end to approximately the front entrance near the firewall separation.

North Side

There was no fire damage at the north side.

West Side (rear)

Fire had discoloured the steel siding from the inside high and caused the steel roof to collapse in the southwest. The loading dock doors were discoloured from the interior fire from top to bottom. The roof and eaves around this area were consumed by fire directionally from the inside.

South Side

The south suffered fire damage high at the eaves with this area being consumed by fire from front to rear. Fire exited windows high along this side at the west end. Soot exited vents near floor ground level along this side at the west end.

3.1.2 Interior Fire Patterns

Interior scene examinations were limited to observations from safe distances around the perimeter and HAZMAT Team photo/video.

The most severe fire damage was uniformly above floor level in the south side. Fire damage decreased east towards the front and north. The firewall-running east – west prevented significant fire spread north. Material located away from the walls in the centre of the south suffered the least damage in the fire area of origin. Paper packaging of bagged material was not scorched and appeared in good condition compared to roofing material in the same area. This is evidence of a fire that stayed high throughout the south area of origin.
The roof collapsed onto the south side and required heavy equipment to uncover burning areas. Fire patterns were significantly disturbed and unable to be interpreted beyond severity of exposure/consumption.

Fire entered the south centre loading dock high in a southerly direction from the area of origin. This caused mainly high heat and charring damage. There were remains of 45 gal steel drums along the southwest area of fire origin. There were also a large number of steel drums located along the south wall area of the steel “Butler” addition immediately west of the area of origin.

The north side offices/lunch room/processing area suffered soot and water damage.

Electrical conductors, receptacles, and panels were observed scattered throughout the fire debris in the area of origin.

3.1.3 Area of Origin

South Side area of origin looking east

The fire originated in the southwest area of the shipping/receiving section of the building.

3.1.4 Fire Spread

Fire did not spread beyond the building. Fire was mainly contained to the south section. See Interior Fire Patterns Section.
3.1.5 Fire Spread (exposure)

3.2 Ignition Sources
  3.2.1 Consideration of Ignition Source

Electrical, open flame, and chemical reaction ignition sources were considered during this investigation.

3.2.2 Isolation of Ignition Source

Electrical ignition sources cannot be eliminated due to the hazardous conditions at the scene during the time of the investigation. Heavy equipment used during suppression also destroyed the evidentiary value of some of these items.

A chemical reaction from chemicals on site has been eliminated after consultations with OFM Support Services Engineering Section.

There have been no reported open flames appliances/items within the fire environment. Open flame ignition from items such as matches or lighters as a result of arson cannot be confirmed or eliminated. The sequence of events regarding fire spread, timelines of witness accounts, and alarm activation strongly discounts this type of event.

4 Fire Cause Analysis
  4.1 Validation and Testing of Hypothesis

Potential ignition sources could not be eliminated due to fire damage.

Witness information and scene examination conclude a fire originating in the south side. Alarms to the alarm company are first recorded in “zone 4” of the building. This is the accounting office area at the southeast. This office is inside the south side and immediately adjacent to the large shipping and receiving area. Witness’s report seeing smoke coming from the roof at the south approximate center.

The zone 4 alarm activated at 0135 hrs then restored itself at 0136 hrs. It activated again at 0137 hrs and restored itself at 0137 hrs. It activated at 0138 hrs, restored itself, and activated again. At 0140 hrs a communications failure was reported for zone 4.
This is evidence of fire/heat breaking into the accounting area.

The time line for the cycling of the alarm/alarm restoring and communications failure from the same zone are evidence of the intermittent disruption in background recognition by the passive infrared detectors. This is evidence of fire gradually breaking into zone 4, being recognized by the system (alarm activation/restoring), and finally destruction of wiring by fire. Alarm activation by an intruder would have caused the alarm to be in total activation mode. Also, no door contact alarms were activated.

Open flame ignition to the interior south side would have required a break and enter into the building. There was no evidence of a break and enter at any of the doors or windows of the building. The roof can be accessed from ground level along the north side fenced area. Once on the roof there is heat ducting that provides access to the interior north side. The south side roof was destroyed.

There was no evidence of a break and enter to the building. Police have interviewed witnesses and persons of interest and concluded no further investigation is warranted at this time. Police have not provided the writer with any evidence leading to a criminal occurrence related to this fire. The business was closed at the time of the fire and had been vacant for several hours before the fire was discovered.

5 Conclusion

The cause of the fire is undetermined.

This finding is further supported in the National Fire Protection Association 921 Guide for Fire and Explosion Investigations 2004 Edition, Chapter 19.2.1.4 that states, "Whenever the cause cannot be proven to an acceptable level of certainty, the proper classification is undetermined."

6 Factors Beyond Origin and Cause

Applied Research Engineer Dave Horne is filing a separate report regarding identifying any concerns beyond origin and cause.
Fire Investigation Services

Fire Investigation Report

Investigation No.: 145-015-2007

FIRE CAUSE

Fire Cause: Undetermined
Motive:
Explosion Type:
Fuel Involved:
Property type: Chemicals
Ignition Source: Undetermined
Fuel of Ignition Source: Undetermined
Area of Origin: Product Storage (inc prod to be assembled, sold, shipped etc)
Object First Ignited: Undetermined
Incendiary Device: None detected

STRUCTURAL DATA ELEMENTS

Complex: Not Applicable
Building Status: Normal (no change)
Occupancy Status: Not Applicable
Construction Date: 1945-1975
Number Storyes: 1.0
Building Area: 4,501-10,000 sq M (48,349-107,642 sq ft)
Floor Construction: Non-combustible
Ceiling Construction: Exposed wood joists
Roof Construction: Combustible
Interior Construction: Masonry or concrete
Level of Origin: 1st Floor
Flashover: Unknown

Fire Spread: Spread beyond room of origin
   Fire Spread Reason(s): Interior walls not a complete enclosure

Smoke Spread:
Fire Investigation Report

Investigation No.: 145-015-2007

Smoke Spread Reason(s): Interior walls not a complete enclosure

FIRE ALARM
Device Closest to the Area of Origin: Presence undetermined (scene too damaged)

HUMAN BEHAVIOR
Number Persons in Structure: 0
Number Persons Escaped:
Building Safety Plan: No
Plan Posted: No
Followed Escape Plan:
Alcohol a Factor:
Smoking a Factor:
May 23, 2008

Fire Chief Jim Kay
Hamilton Fire Services
55 King William Street
Hamilton, ON L8R 1A2

Dear Sir:

SUBJECT: Address: 36 Head Street, Dundas
Date: July 26, 2007
Occurrence 145-015-2007

Enclosed please find an Addendum to the December 18, 2007 report prepared by Dave Horne, P. Eng. pertaining to the fire at the above noted location. The signed copy of the initial report had previously been forwarded to you on April 16, 2008.

If you require any further information or have any concerns about the contents of this Addendum/Report, please feel free to contact the author or by calling (705) 725-7160.

The Fire Investigation Reports, and the information contained therein, is being provided within the provisions of the Freedom of Information and Protection of Privacy Act (FIPPA) and shall not be disclosed, photocopied or given to any other persons unless you have the consent of the Office of the Fire Marshal or are permitted by law.

Yours truly,

Bernie Silvestri
Assistant Deputy Fire Marshal
Fire Investigation Services
/cc
Encl.
Addendum to the December 18, 2007 Report  
May 21, 2008

Purpose of Addendum

In the first instance I believe it is important to reinforce that my original report was based on the best information available at the time. Others provided nearly all of this information, as an on-site visit immediately after the fire was not possible because of hazardous conditions at the site. After the release of my report to involved parties, additional information came to light.

Additional conversations were held with Jim Winn, Chief Fire Prevention Officer, and Frank Pauls, Fire Prevention Inspector of the Hamilton Emergency Services-Fire.

A follow up visit was also made to the Biedermann plant on March 14, 2008 to obtain additional information on building construction details and plant operations. The following individuals were consulted: Glenn Biedermann, President, Bruce Hale, General Manager, and Brian Peirce, Technical Director.

Occupancy Classification and 4-hour Firewall

According to information originally related to me by the fire department based on their file information for the north addition to the building, the occupancy classification was identified as “medium hazard industrial occupancy” (F2) as per the Building Code. However, based on new information made available to me including observations made by the fire prevention inspector and a combustible loading calculation of less than 50 kg/m² made by Brian Peirce, Biedermann Packaging, I believe that the actual use of this building was consistent with a “low hazard industrial occupancy” (F3) as per the Building Code.

My original report noted that the north and south portions of the building were provided with a fire separation with a parapet. However, Brian Peirce, Biedermann Packaging, identified that this wall was constructed to the more stringent requirement of a 4-hour firewall with a parapet of about 1 m. Although it was not possible to confirm all construction details of the wall, my visual observations of this wall leads me to believe that this design is consistent with a 4-hour firewall.

The above two pieces of new information impact my analysis by allowing the structure to be considered as two separate buildings. This affects the occupant load calculations based on floor area and, thus, eliminates the Fire Code requirement for an approved fire safety plan for these buildings.
Building Construction

Information provided by both the Owner and the Fire Service indicates that the rear portion of the roof on the south side was constructed of bowstring roof trusses. This was reported to be where District Chief Gallacher observed the fire.

Biedermann Staff Arrival at Fire

Biedermann Packaging Inc.’s General Manager, Bruce Hale, noted that he was present at the plant 3 minutes after arrival of the first responding pumper and Biedermann Packaging Inc.’s Technical Director, Brian Peirce, noted that he was present at the plant 11 minutes after the arrival of the first responding pumper. These arrival times would not necessarily be captured on the fire department radio log.

In discussions with company and fire department staff, I believe that the fire department was made aware of the pesticide contents of the building shortly after their arrival.

Pesticides Reported to Fire Department at Time of the Fire

My original report noted that Biedermann personnel who returned to the site (at the time of the fire) identified to the fire department that the site contained pesticides and that the quantity of pesticides was much greater on the north side of the fire separation. My report did not provide information on the quantity of active pesticide ingredients reported to the fire department by Biedermann personnel at the fire. The fire department believes that this information would be valuable in understanding the fire suppression tactics during the fire. The information related to active pesticide ingredients is provided in the following two paragraphs.

The fire department noted from conversations with attending plant personnel that the total estimated amount of pesticides involved in the fire in the south building was 100 pounds. The pesticides were described as being mixed with various inorganic materials such as clay and dirt and organic materials such as sugar and corn. The concentration of raw pesticide in each bag was identified as 0.005 %. The pesticides were identified as warfarin and bromadioline that are rodenticides (rat and mouse killers).

The fire department also noted from attending plant personnel that the quantities of concentrated pesticides in the north building was much greater. These quantities included 1-45 gallon drum of malathion (liquid insecticide), 12-45 gallon drums of diazinon (liquid insecticide), and 5000 to 6000 pounds of dry pesticide (carbaryl and rotenone) stored in 2-45 gallon drums and 3 or 4 pallets.

Therefore, the fire attack was focused on preservation of the fire separation and extinguishment of the fire on the south side.
Due to the fire damage and hazardous conditions at the site, no attempt was made by me to confirm the quantities or locations of chemicals present at the time of the fire.

**Flammable and Combustible Liquids**

My original report stated “The plant was not evaluated for compliance with Part 4 of the Ontario Fire Code.” For clarification, this statement should read “I did not evaluate the plant for compliance with Part 4 of the Ontario Fire Code.” My reason for not evaluating compliance was my inability to visit the site due to hazardous conditions that were present at the time. As a result, I was unable to independently verify the existence and location of products in the facility at the time of the fire.
December 18, 2007

| Location | Biedermann Packaging Inc.  
|-----------|-----------------------------|
|           | 36 Head Street  
|           | Hamilton (formerly Town of Dundas), Ontario |
| Date of Fire | July 26, 2007 |
| Investigation Number | 145-015-2007 |
| (Investigator: Tom Hutton) | |
| Report by | David Horne, P.Eng.  
|           | Applied Research, O.F.M. |
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3. MOE draft toxicity test results  33
**Scope**

To report on the impact of the fire on the community and the natural environment that occurred at Biedermann Packaging Inc. on July 26, 2007.

To review the list of chemicals provided by Tom Hutton, Fire Investigator, for spontaneous heating potential as a possible ignition source.

**Note:**

1) **Matters related to cause and origin of the fire at Biedermann Packaging Inc. are covered by the Fire Investigation Report of Tom Hutton, OFM Fire Investigator.**

2) **No site visit was made by this report writer (David Horne). This was due to the possible toxic hazards at the site following the fire. Office policy requires both appropriate safety protective equipment to be worn at a fire scene and training in its use.**

3) **Because of damage to building contents including records, the list of chemicals and quantities had been under continuing update. The Fire Investigation Report of Tom Hutton, OFM Fire Investigator, should be referenced for the authoritative list.**
Introduction

A fire occurred on July 26, 2007 prior to 1:41 a.m. at the premises of Biedermann Packaging Inc. The premises were located at 36 Head Street, Hamilton (formerly Town of Dundas), Ontario. The one storey building was approximately 3,350 m² in building area and had a masonry fire separation with a parapet across the width of the building. The building was without automatic sprinkler protection. The building was provided with offsite monitoring of passive infrared motion detectors, door contact sensors and heat detectors.

The portion of the building that lay to the south of the fire separation suffered roof collapse and was consumed in the fire.

Biedermann occupied its premises for the reformulating and packaging of pesticides (rodenticides).

Upon completion of his investigation, OFM investigator, Tom Hutton, announced that the fire cause was undetermined.

During the course of the fire, the Hamilton Emergency Services--Fire reported that it applied approximately 5 million litres of water. A portion of this firefighting water entered the local waterways known as Spencer Creek and Cootes Paradise as runoff. This resulted in death to various waterborne life forms in the Creek including fish.

There were no evacuations of persons although some businesses in the local area were closed the day of the fire and the following day.

The author of this report began information collection on August 1, 2007. Entry was not made onto the property. The following individuals provided assistance and information either during meetings or in subsequent telephone conversations:

Tom Hutton, OFM Fire Investigator,
Bruce Scott, OFM Fire Protection Engineer
Frank Biancucci, Fire Prevention Officer, Hamilton Fire Department
P. Gallacher, District Chief, Hamilton Fire Department
K. Craig, Superintendent of Water Distribution, City of Hamilton
N. Winters, Pollution Abatement Officer, City of Hamilton
K. Mehood, Superintendent of Plant Operations, City of Hamilton
J. Macionis, Senior Environmental Officer, Ministry of Environment
W. Alvey, Investigator, Ministry of Environment

Additional information was gleaned from media reports.
Site Details

(a) Neighbourhood

The population of the former Town of Dundas was approximately 25,000 in 2006. The former Town was known as the valley town with its location between the two faces of the Niagara Escarpment, and bordered by the Desjardins Canal and Cootes Paradise wetlands on the east and conservation areas to the west. The community was typical to established communities of its size and age. There was an old downtown core with stores and businesses along Main Street.

The property where the fire event occurred was located in an industrial area northwest of the downtown core. This industrial area was located approximately 250 m below and south of the Niagara Escarpment. The Spencer Gorge/ Webester's Falls Conservation Area was located approximately 500 m to the north. The Dundas Golf and Curling Club was located approximately 250 m south west of the property and the Greenville community residential started approximately 750 m to the north east on the escarpment. A mix of residential, commercial and institutional properties of the former Town of Dundas commenced approximately 125 m to the east and 400 m to the south of the property. McMaster University and McMaster Health Centre were located approximately 5 km to the east.

Spencer Creek flowed from the Spencer Gorge south through the industrial area passing approximately 100 m east of the Biedermann Plant. Spencer Creek then followed through the former Town of Dundas in a generally easterly direction for approximately 4 km to the Cootes Paradise water body. Cootes Paradise drained into the Hamilton Harbour which was part of Lake Ontario.

Head Street where the fire occurred was serviced with both storm sewers and sanitary sewers. The wastewater treatment plant for this area was located in Dundas near the Desjardins Canal.

The Dundas wastewater service area had portions where the sanitary sewers also carried storm sewer water. The Dundas service area also received sanitary sewer flows from the Flamborough area. A diversion reservoir had been provided on the municipal system for those times when sanitary sewer flows were greater than the treatment plant’s capacity.
Selected portions from the City of Hamilton (Dundas).

Path of Spencer Creek in vicinity of fire scene (36 Head Street) is indicated. Plan is not to scale.
(b) Yard Details

The 0.77 hectare property fronted approximately 61 m along the west side of Head Street. The property inclined downward from north to south and from back to front. The yard had paved parking areas at the front of the building and paved and cemented lanes and loading docks at the south and north ends of the building. Gravel road beds and parking areas were present at the north side and rear of the building. An outdoor storage area at the rear of the property was provided with a concrete base with ramped-up access and perimeter sills for containment.

Access to the property was obtained from two, paved, dead-end streets. Head Street to the east was the main entrance to the building and MacNab Street to the west provided rear access to the property. Hydrant protection was available at the rear and front of the property. Electrical power to these streets was distributed over hydro poles.

Some portions at the rear of the yard appeared to be secured with fencing. The storage area with the concrete base was secured with chain-link fencing and topped with barbed wire.
Small Industrial Buildings

MacNab Street  (Dead end)

(Curling Club)

36 Head Street  (Dead ended approx. 150 m →)

(Approx. 3,350 m² Building Area)

200 mm masonry fire separation with parapet

Formulating, Raw material storage, Packaging and Offices

Shipping, Receiving, Storage and Offices

1 storey

Hydrant

Biedermann Packaging Inc.
36 Head Street, Hamilton (Dundas), ON
Fire Occurrence on July 26, 2007

Portion of Building with direct fire damage

Direction of Land Slope

Plan Not to Scale

(El-Met-Parts Inc.)
(Laminations for small electrical motors)
(c) Water Supply

The municipal water supply that fed hydrants in the Dundas industrial area was filtered water from Lake Ontario. The filtration plant served extensive areas of the City of Hamilton and was located on Woodward Avenue in Hamilton.

To balance the water distribution system in Dundas, a gravity reservoir was located part way up the escarpment near Woodley Lane which was above the elevation of the industrial area and Head Street where the fire occurred. A 400 mm water main ran from this reservoir along MacNab Street and 300 mm water main ran from this reservoir along Head Street. These mains fed hydrants at the rear and front of the property.

During the course of the fire a request was made by Hamilton Emergency Services--Fire to increase the pressure at hydrants at the fire scene. This boost was accomplished from the Osler pumping station feeding into the Dundas area.
Building Details

(a) Construction

The building was approximately 3,350 m² in building area. Original construction was reported to be in the 1960's with later additions. The building was one storey in height and the roof was mainly flat. There was a 200 mm concrete block separation wall with a parapet running east to west in the building and was constructed as a fire separation. The fire occurred in the portion of the building lying south of the fire separation. The roof over the southern portion of the building was combustible and the walls were of masonry construction.

The building was constructed to provide 150 mm sill at openings to contain spills or firefighting water. Total site containment capacity was 966,000 L (217,000 gallons). No floor drains were present in the building.

(b) Detection & Notification

The premises were monitored by ADT Security Services Canada Inc. Monitored detection devices included the following:
- Passive Infrared Motion detectors,
- Door Contact Sensors, and
- 135°F Fixed Temperature Heat (Fire) Detectors.

(c) Suppression Equipment

The property was provided with portable fire extinguishers.

The building was not protected with automatic sprinkler protection.

Original building construction was reported to be in the 1960's which predated introduction of the Ontario Building Code. It was also reported that later additions were made to the building after the Ontario Building Code was introduced.

Under the current Ontario Building Code, O. Reg. 350/06, it is possible to construct a building with 3,350 m² building area for a Group F, Division 2 occupancy (medium hazard industrial occupancy) without automatic sprinkler protection. In this F2 occupancy, the 200 mm masonry wall would need to be constructed to provide a fire separation with a 4 h fire resistance rating and a 900 mm parapet to be considered as a firewall in the Ontario Building Code.
Occupancy Details

(a) Occupancy Description

The property was occupied principally for reformulating and packaging of pesticides (rodenticides). The business did not apply pesticides or sell product to the public, and hence did not fall under the Pesticides Act administered by the Ministry of Environment (MOE). The Pesticides Act has licensing and inspection provisions.

Space on the south side of the fire separation wall where the fire occurred was occupied for storage for shipping, shipping and receiving, and offices. Space on the north side of the fire separation wall was occupied for storage of pesticides, reformulation operations, packaging and offices.

There were approximately 25 employees who worked at the business and on the day before the fire, plant workers had left at approximately 4:30 p.m.

The authoritative list of chemicals and their quantities at the building are provided in the Investigative Report of Tom Hutton. Totals included approximately 62 metric tons and 9-200 litre steel drums. These quantities included reformulated products with low concentrations of active ingredients.

An earlier list of products obtained from Fire Investigator Tom Hutton on August 1, 2007 (see Appendix) was reviewed for possible spontaneous heating potential as a possible ignition source. Material Safety Data Sheets that were believed to be representative of these products and which could be retrieved from available internet sources were assembled and their reactivity data reviewed.

The product list had about 80 materials of which 57 MSDS-sheets were collected by OFM Fire Protection Engineer, Bruce Scott. The materials were used as raw ingredients to manufacture pest control products.

The types of materials included the following:
- natural organics, such as wheat and oats,
- organic chemicals, both solid and liquid, and
- inorganic fillers such as clays,
- and elemental sulphur.

Only two items had low flash points, gasoline and denatured alcohol. It was possible that one of these low flash point products had been removed from the premises prior to the fire following an earlier fire prevention inspection by the Fire Department.
None of the organics appeared to be oxidizers, subject to polymerization, nor unstable chemicals. One of the active ingredients reported to be present south of the fire separation was Zineb 80W, a fungicide. A Material Safety Data Sheet for Zineb 80W (zinc ethylene bisdithiocarbamate) provided the following reactivity information related to its stability:

- unstable in air, moisture and heat;
- prolonged storage decomposition is reduced by stabilizers;
- decomposes on heating; and,
- in the presence of moisture, it is spontaneously combustible.

There was approximately 895 kg of Zineb 80W stored in this portion of the building.
Discussion

(a) Fire Events

A 911 fire call was received at 1:41 a.m. from a worker at El-Met-Parts Inc. which was located across the road from Biedermann Packaging Inc.

After arrival at the scene, the first responding fire department pumper (truck) reported at 1:51 a.m. that fire was present in the southwest corner of the building. District Chief P. Gallacher observed after his arrival at 1:53 a.m. that fire was venting from the southwest corner of the building, that fire was visible within the roof structure as seen from the south side windows, and that fire was showing at the bow section of the roof.

A fire attack was mounted from the front and rear of the building using aerial lines, deck guns and hand lines. During the initial period of the fire, a multiple alarm assignment was requested. The first partial roof collapse on the south side of the building (south of the 200 mm fire separation) was reported 15 minutes after the arrival of the first responding pumper. The second partial roof collapse on the south side was reported 4 minutes later.

Discussion with plant personnel who returned to the site identified that the site contained pesticides and this was recorded in the fire department event chronology at 36 minutes after the arrival of the first responding pumper. Plant personnel also identified that the quantity of pesticide was much greater on the north side of the fire separation. The fire attack was focused on preservation of the fire separation and extinguishment of the fire on the south side. This extinguishment was hampered because burning combustible storage was shielded under fallen roof sections.

The period of greatest firefighting water application was about three hours from approximately 2:00 a.m. to 5:00 a.m. on July 26. A transition period reflecting fire conditions occurred between approximately 5 a.m. and 6 a.m. from the use of attack lines to the use of 65 mm overhaul hand lines. The Hamilton Fire Department Response Report recorded that during the course of the fire that 3 aerial streams, 4 monitors, 3-65 mm and 4-38 mm hand lines were used. The fire department estimated that approximately 5,000,000 litres of water was pumped during the course of the fire.

The Fire Department remained on scene until 5:22 a.m. July 27, 2007. The fire did not spread across the 200 mm fire separation into the north section of the building. Two small rekindles occurred during the morning hours of July 28, 2007 that required a fire department pumper response. The two incidences were extinguished with hand hose and a total of 650 L of water.
(b) Environmental and Community Safety Impacts

At the time of the fire department response, the District Chief reported the weather to be foggy with visibility estimated at 500 m. During the course of the morning as recorded on the fire department event chronology, the winds remained under 10 km/h with wind direction swinging from the southwest to the east.

Conditions reported by Environment Canada at 2 a.m. for Hamilton Airport were temperatures at 17°C with winds at 4 km/h from the northeast.

The Appendix Item 2 in this report contained two Ministry of Environment wind frequency rose charts for the Hamilton area. The time period spanned from 2:00 am to 10:30 am on July 26, 2007. The charts showed generally light winds (less than 10 km/h with brief periods between 10 to 20 km/h). Winds were shown to be mainly from north east to north west. Approximately 20% of the time, winds were from the south east on the Peters Corners wind frequency rose.

The largest quantity of the estimated 5,000,000 L of water pumped on the fire was delivered over an approximate 3-hour period from fire department arrival until about 5 a.m. in the morning on July 26, 2007. There were no plant floor drains and the building was constructed with sills to provide containment.

Total site containment including the building and the outside storage area with the concrete platform was identified in the plant emergency manual as 217, 000 gallons (986,000 L). The outdoor storage area was unaffected by the fire and the storage volume in the south portion of the building was partially filled with roof, building and contents debris. The outflow from street storm sewers was into Spencer Creek which was located where Mill Street crossed the waterway just east of Head Street.

The Fire Department’s Event Chronology recorded that a call was made to City Works at 2:24 a.m. July 26, 2007 to provide notice that firefighting water runoff was flowing into the storm sewers. At the same time, it was recorded in the Chronology that this was a fire in a pesticides plant and that on-site firefighting crews were required to wear full protective clothing and self-contained breathing apparatus. The Ministry of Environment’s (MOE’s) Spills Action Centre was subsequently notified at 2:50 a.m. The Event Chronology recorded that the City’s Water Works Department was checking the runoff at Spencer Creek at 4:14 a.m. and that MOE was at the scene at 5:07 a.m. on July 26, 2007.

No attempt was made to divert firefighting runoff into the sanitary sewers.

Fire Investigator, Tom Hutton noted that at the time of his arrival at the scene at 9:12 a.m. on July 26, 2007 that firefighting runoff was being recovered by means of
vacuum trucks. Locations included street sewers grates and at the storm sewer outflow into Spencer Creek at Head and Mill Streets. Information relayed by the Fire Investigator identified that as of 9:00 a.m. on July 27, 2007, 168,000 L of firefighting runoff had been collected. The total amount of firefighting runoff collected by Echelon was 330,000 litres as reported to the Fire Investigator.

Fire Investigator, Tom Hutton, reported that MOE had reported to him (on the day of the fire--time not specified) that there was discoloration in the water in Spencer Creek and that there were large numbers of dead fish. MOE also noted that the discoloration was moving downstream into Cootes Paradise. The Fire Investigator further reported that MOE advised him at 5:00 p.m. on July 26, 2007 that Hamilton Public Health was made aware of these findings. At 5:57 p.m. on July 26, 2007, Hamilton Fire Department provided permission to MOE and Echelon Response and Training Inc. to do firefighting water extraction from the Biedermann building.

Results from MOE douse (fire extinguishing water) water sampling for pesticides at various locations on July 26th, 27th and 30th are provided in the Appendix. Pesticides tested for were malathion, diazinon, carbaryl and bendiocarb. Values that were obtained from samples from within Spencer Creek were either below detection limits or, in the case of diazinon, described as trace amounts. Draft toxicity test results from MOE are also provided in the Appendix.

MOE also attended the fire incident to undertake air sampling. Their sample times spanned from 9:01 a.m. to 13:17 p.m. on July 26, 2007 and were conducted both on the site and off the site. The results of the air measurements are provided in the Appendix.

A meeting was held at 11:15 a.m. on July 26, 2007 which included staff of Hamilton Public Health, Hamilton Fire Department, Ministry of the Environment, and Office of the Fire Marshal (Tom Hutton). Results from air quality testing taken to that time were reviewed and it was found not to contain any unusual contaminants that would not be expected at a normal structure fire.

After consideration of the air quality test results, conditions were believed to be safe within the community and evacuation notices were deemed unnecessary.

Electrical power was interrupted to several business on Head Street as a result of the fire. This power was returned at approximately noon on July 26, 2007 to affected businesses other than Biedermann Packaging. It is understood that a few plants including Anderson Water Systems to the south remained closed on Friday, July 27th, 2007.

Media described significant numbers of fish being killed by the contaminated firefighting water entering the creek. In addition to the loss of fish, there was loss of other water borne organisms that support the food chain for fish. This could affect the ability to reestablish preferred fish species such as trout.
Many of the chemical products at the building had the potential to be toxic to fish and/or aquatic life. Meisterpro’s Crop Protection Handbook and material safety data sheets available from internet resources were reviewed to prepare a list of these chemicals which included the following:

- tri-basic copper sulphate
- folpet (folpan)
- bromadiolone
- diazinon
- carbaryl (sevin)
- rotenone
- captan
- malathion
- pyrethrin
- strychnine
- dodine
- thiophanate-methyl
- mancozeb
- ziram
- pentachloronitrobenzene (PCNB, quintozene)
(c) Fire Code

At the request of the owners, the Fire Prevention Division of the Hamilton Fire Department undertook a fire prevention inspection of the property during October 2005. The property was found to be clean, well maintained and in compliance with the Fire Code.

Fire Safety Plan
The Ontario Fire Code, O. Reg. 213/07, in Division B, Section 2.8, “Emergency Planning”, stated that medium hazard industrial occupancies with an occupant load in excess 100 were subject to the requirements of the Section. The requirement to provide an approved “Fire Safety Plan” was found in Subsection 2.8.2.

Section 1.4 of the Ontario Fire Code defined occupant load to mean the number of persons for which a building or part thereof was designed. For other than assembly occupancies (e.g. churches, schools), the Ontario Fire Code was silent on the means to establish design criteria. Accepted practice was to refer to original Ontario Building Code design criteria under which the building or addition was constructed. Design criteria for occupant load for industrial occupancies such as Biedermann were unchanged over the past several editions of the Ontario Building Code.

The Ontario Building, O. Reg. 350/06 as amended, in Division B, Subsection 3.1.17. “Occupant Load”, Sentence 3.1.17.1.(1) required that the occupant load of a floor area or part of a floor area, or of a building or part of a building not having a floor area shall be based on .... (c) the number of persons,

(1) for which the area is designed, or
(2) determined from Table 3.1.17.1. ...

Table 3.1.17.1. required that where the use of the building was industrial an occupant load of 4.6 m² per person was required for manufacturing or process rooms and an occupant load of 28.0 m³ per person was required for storage spaces (warehouse). With a building area of 3,350 m², an occupant load in excess of 100 persons was obtained.

The building was occupied by approximately 25 persons. No record was provided by Hamilton Emergency Services—Fire that an occupant load under 100 had been designed for the building and approved by the City. Hence, a Fire Safety Plan under Subsection 2.8.2 of the Ontario Fire Code approved by the Chief Fire Official was required. Biedermann Packaging Inc. did have a comprehensive Emergency Response Plan but no record was provided by the Hamilton Emergency Services—Fire that the Plan had been approved by the Chief Fire Official.
Flammable and Combustible Liquids
Part 4 of the Ontario Fire Code regulates the storage, handling, processing and use of flammable and combustible liquids. Flammable liquids are defined as liquids that have flash points less than 37.8 °C and a vapour pressure not more than 275.8 kPa at 37.8°C. Combustible liquids are liquids that have a flash point at or above 37.8°C and below 93.3°C. Part 4 also regulates liquids with flash points greater than 93.3°C when stored, handled, processed and used at temperatures above their flash points.

The report of OFM Fire Investigator, Tom Hutton, provided an inventory of products in the building. The report indicated that a 200-litre steel drum of both methyl nonyl ketone and pyrethrins were present.

These chemicals were listed in the following references as having flash points in the combustible liquids range.
- Pyrethrins (Meisterpro Crop Protection Handbook)—Flash point 71°C

Two additional chemical products, pyrenone and pyrocide, in separate, 200 litre steel drums also contain pyrethrins. Dependent on the mixture and the percentage of pyrethrins, it is possible that their flash points would be in the combustible liquids range.

The Investigator's report also noted the present of gasoline in a 15 litre container. Gasoline is a flammable liquid with a flash point of −40°C.

The plant was not evaluated for compliance with Part 4 of the Ontario Fire Code. It was noted from a September 2003 Biedermann Report that the facility was purchased from the Nu-Gro Corporation in 1999. The facility was converted from a liquid and powder pesticide plant to a powder only plant at that time. The section of the building that was involved in the blending of powders was designed for flammable liquid blending and filling, whereas the powder filling area was designed for that purpose.
Observations:

1. The 200 mm fire separation constructed within the Biedermann building was effective in combination with fire department suppression operations in confining the fire to the south side of the building. Considerable firefighting runoff entered the natural environment. This resulted in a fish kill in a nearby stream.

2. A strong fire department response was unable to arrest fire growth in the south side of the building. Combustible construction and the fire load of combustibles present were significant factors.

3. Responding firefighters were not aware that the fire scene involved pesticides. The availability of this information at the time of dispatch and at the fire scene would assist with decisions affecting firefighter safety, and allow for earlier consideration of the impact of fire on the community and the natural environmental.
Conclusions:

1. The fire separation was an important barrier to the spread of fire throughout the building. According to information provided by a Biedermann representative to the fire department at the time of fire, the quantities of pesticides on the north side of the building were much greater. Confinement of the fire to the south side of the building saved even greater impacts that would have occurred to the community and the natural environment if the north portion of the building had been destroyed.

   However significant impacts to the natural environment did occur with escape of firefighting runoff beyond the property boundaries.

   Working automatic (fire) sprinkler systems of adequate design have had a high success rate in controlling fires which are often confined to a small area within a building. In the event that automatic sprinkler protection had been provided at the Biedermann plant, it is reasonable to assume that the fire would have been controlled with much smaller quantities of water and that the building south of the fire separation would not have been consumed in the fire.

   If the automatic sprinkler system was connected to an alarm panel monitored by an alarm service, prompt notification of a fire condition could be transmitted to the fire department. This would allow the fire department an opportunity to extinguish and overhaul the fire that was being controlled by the automatic sprinklers. This would also have eliminated or minimized the negative impacts from firefighting runoff beyond the property boundaries with the existing building containment provisions and with the smaller quantities of water needed for control, extinguishment and overhaul. The Ontario Fire Code did not require automatic sprinkler protection for this building specific to its occupancy.

2. The availability of current information on the building and occupancy features could serve to improve safety for firefighters and enhance fire suppression operations. Advice provided by the communication centre to firefighters while enroute to the fire and more comprehensive information available at the fire site would assist in making fire ground decisions. Needed information would include at least the following items:
   - hazardous materials and quantities,
   - protection features,
   - emergency procedures,
   - and contacts.

   Secure, outdoor cabinets accessible to fire department emergency responders would be a means to hold this information.
Recommendations:

1. Where significant storage or use of high hazard chemicals are conducted within a building, key protection features are necessary to allow an opportunity for fire control and to minimize the impact on the community and the natural environment. Protective features should include:
   - on-site retention of firefighting water,
   - building construction providing a fire resistance rating of at least one hour,
   - fire separations of a least two hours separating chemical storage areas from the remainder of the plant,
   - an automatic sprinkler system for the entire building, and
   - a fire alarm system connected to a supervisory service which monitors both fire alarms and the sprinkler system.

2. Steps should be taken to ensure responding firefighters are provided with key information while enroute to the fire with further detail available on the fireground to assist fire command and emergency operations.

3. The option to use sanitary sewers to carry firefighting runoff to diversion storage for subsequent treatment before release back into environment should be evaluated.
Appendix

1. Products reviewed for spontaneous heating from list supplied on August 1, 2007.

BEIDERMANN FIRE:

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<th>MATERIAL</th>
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<th>COMMENTS</th>
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White sugar
salt
agniqueANS
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Material Safety Data Sheet corn flour.htm
Safety (MSDS) data for FD & C Yellow No 6.htm
Safety (MSDS) data for FD & C Yellow No 5.htm
fd&c red 40,E-129 , C_ I_ Food Red 17 , F D & C RED
Mortarti MSDS.pdf
Safety (MSDS) data for titanium (IV) oxide.htm
MSDSHarborlite.pdf
MSDA HISIL233.pdf
terra alba 1.pdf
CALCIUM CARBONATE.pdf
xMSDS-Snowite_Oat_Fiber-9924948.pdf
Safety (MSDS) data for carbon black.htm
2. Results from MOE air and douse water sampling
From: Webb, Tim (ENE)
Sent: Wednesday, August 01, 2007 5:46 PM
To: Horne, Dave (JUS); Hutton, Tom (JUS)
Subject: Biedermann - Air and Douse Water Sampling.

Attached are the data and the map of wind speeds/directions applied to the site, but taken from the two nearest met stations. Peter’s Corners= Highways 5 and 8 intersection and Niagara/Land= north end of Hamilton on Niagara St at Land St.

Pesticide results:

<table>
<thead>
<tr>
<th>Received on</th>
<th>LIMS #</th>
<th>Compound Name</th>
<th>Malathion</th>
<th>Diazinon</th>
<th>Carbaryl</th>
<th>Bendiocarb</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-Jul</td>
<td>C153683-0001</td>
<td>Head St storm sewer cover, Dundas</td>
<td>0.5</td>
<td>0.2</td>
<td>0.2</td>
<td>1.5</td>
</tr>
<tr>
<td>26-Jul</td>
<td>C153710-0001</td>
<td>Mill Street outfall to Spencer Creek</td>
<td>150</td>
<td>380</td>
<td>3.6</td>
<td>&lt; W</td>
</tr>
<tr>
<td>26-Jul</td>
<td>C153712-0001</td>
<td>North building, Biederman Packaging</td>
<td>160</td>
<td>720</td>
<td>290</td>
<td>&lt; W</td>
</tr>
<tr>
<td>27-Jul</td>
<td>C153744-0001</td>
<td>Spencer Creek U/S of Fire</td>
<td>&lt;W</td>
<td>&lt;W</td>
<td>&lt;W</td>
<td>&lt;W</td>
</tr>
<tr>
<td>27-Jul</td>
<td>C153744-0002</td>
<td>Spencer Creek at Mill St</td>
<td>&lt;W</td>
<td>0.32, &lt;T</td>
<td>&lt;W</td>
<td>&lt;W</td>
</tr>
<tr>
<td>27-Jul</td>
<td>C153744-0003</td>
<td>Spencer Creek at Olgilvie St</td>
<td>&lt;W</td>
<td>1.3, &lt;T</td>
<td>&lt;W</td>
<td>&lt;W</td>
</tr>
<tr>
<td>27-Jul</td>
<td>C153744-0004</td>
<td>Spencer Creek at Cootes Dr.</td>
<td>&lt;W</td>
<td>2.6</td>
<td>&lt;W</td>
<td>&lt;W</td>
</tr>
<tr>
<td>30-Jul</td>
<td>C153770-0001</td>
<td>Spencer Creek U/S of Fire</td>
<td>&lt;W</td>
<td>&lt;W</td>
<td>&lt;W</td>
<td>&lt;W</td>
</tr>
<tr>
<td>30-Jul</td>
<td>C153770-0002</td>
<td>Spencer Creek at Mill St</td>
<td>&lt;W</td>
<td>&lt;W</td>
<td>&lt;W</td>
<td>&lt;W</td>
</tr>
<tr>
<td>30-Jul</td>
<td>C153770-0003</td>
<td>Spencer Creek at Olgilvie St</td>
<td>&lt;W</td>
<td>&lt;W</td>
<td>&lt;W</td>
<td>&lt;W</td>
</tr>
<tr>
<td>Date</td>
<td>Code</td>
<td>Location</td>
<td>Value1</td>
<td>Value2</td>
<td>Value3</td>
<td>Value4</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------</td>
<td>-----------------------------------------------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>30-Jul</td>
<td>C153770-0004</td>
<td>Spencer Creek at Cootes Dr.</td>
<td>&lt;W</td>
<td>0.40</td>
<td>&lt;W</td>
<td>&lt;W</td>
</tr>
<tr>
<td>30-Jul</td>
<td>C153770-0005</td>
<td>Cootes Paradise</td>
<td>&lt;W</td>
<td>0.56</td>
<td>&lt;W</td>
<td>&lt;W</td>
</tr>
<tr>
<td>30-Jul</td>
<td>C153770-0006</td>
<td>Desjardins Canal</td>
<td>&lt;W</td>
<td>0.46</td>
<td>&lt;W</td>
<td>&lt;W</td>
</tr>
<tr>
<td>27-Jul</td>
<td>C153837-0001</td>
<td>Desjardins Canal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27-Jul</td>
<td>C153837-0002</td>
<td>Cootes Paradise at mouth of Desjardins Canal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To be reported on Friday August 3 2007

The first two lines are for the douse water that had left the site, the third being still within the building. The rest are from within the creek.

**Tim Webb**
Provincial Officer
Hamilton District, West Central Region
Ministry of the Environment

Tel: (905) 521-7727
Fax: (905) 521-7806
Spills: 1-800-268-6060
Wind Frequency, Rose - 29149, Peters Corners
July-26,2007, 5 Minute Data - 0200 to 1030 EDT

Bars indicate direction wind was blowing from
| Sample Date | Site Name         | SO2 | NO2 | NO | N03 | CS2 | NOS | Hydro | p-Xylene | Toluene | anis-Xylene | o-Xylene | Ethanol | Methyl | Naphtalene | Ethylenbenzene | TotalProduct |
|-------------|------------------|-----|-----|----|-----|-----|-----|-------|----------|---------|------------|----------|---------|--------|-----------|---------------|---------------|----------------|
| 7/16/2007 9:01 | Geysersville wheat | nd  | nd  | nd | nd  | nd  | nd  | nd    | nd       | nd      | nd         | nd       | nd      | nd     | nd        | nd             | nd             |
| 7/16/2007 9:02 | Geysersville wheat | nd  | nd  | nd | nd  | nd  | nd  | nd    | nd       | nd      | nd         | nd       | nd      | nd     | nd        | nd             | nd             |
| 7/16/2007 9:14 | Geysersville wheat | nd  | nd  | nd | nd  | nd  | nd  | nd    | nd       | nd      | nd         | nd       | nd      | nd     | nd        | nd             | nd             |
| 7/16/2007 9:46 | Geysersville wheat | nd  | nd  | nd | nd  | nd  | nd  | nd    | nd       | nd      | nd         | nd       | nd      | nd     | nd        | nd             | nd             |
| 7/16/2007 10:04 | Geysersville wheat | nd  | nd  | nd | nd  | nd  | nd  | nd    | nd       | nd      | nd         | nd       | nd      | nd     | nd        | nd             | nd             |
| 7/16/2007 10:06 | Geysersville wheat | nd  | nd  | nd | nd  | nd  | nd  | nd    | nd       | nd      | nd         | nd       | nd      | nd     | nd        | nd             | nd             |

**Notes:**
- ND: Not detected
- All concentrations in parts per billion (ppb)
3. MOE draft toxicity test results
DRAFT TOXICITY TEST RESULTS

<table>
<thead>
<tr>
<th>Sample Name:</th>
<th>Head St. &amp; Spencer Creek, Dundas, Hamilton</th>
</tr>
</thead>
</table>
| LIMS Number: | C153683-0002: Spencer Creek outfall (field # SSC02)  
C153683-0003: Spencer Creek upstream (field # SSC03) |
| ATU Sample Number: | 01070231: Spencer Creek outfall (field # SSC02)  
01070232: Spencer Creek upstream (field # SSC03) |

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Sample Location</th>
<th>LC50</th>
<th>% v/v</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daphnia magna: LC50</td>
<td>C153683-0002: Spencer Creek outfall (field # SSC02)</td>
<td>LC50 &lt; 0.25</td>
<td></td>
</tr>
<tr>
<td>Daphnia magna: Single Concentration Test</td>
<td>C153683-0003: Spencer Creek upstream (field # SSC03)</td>
<td>0.0 %</td>
<td>100 % mortality in undiluted sample</td>
</tr>
<tr>
<td>Rainbow Trout: LC50</td>
<td>C153683-0002: Spencer Creek outfall (field # SSC02)</td>
<td>LC50 &lt; 0.25</td>
<td></td>
</tr>
<tr>
<td>Rainbow Trout: Single Concentration Test</td>
<td>C153683-0003: Spencer Creek upstream (field # SSC03)</td>
<td>0.0 %</td>
<td>100 % mortality in undiluted sample</td>
</tr>
</tbody>
</table>

Notes:
Above results have been QC checked but have not received final review and approval. Final reports will be provided within 14 days of this email unless otherwise indicated by Laboratory Services Branch staff.
For the eight pesticide actives based on the half-lives, these actives would be classified as non-persistent to slightly persistent (non-persistent, < 15 d; slightly persistent, 15 - 44 d). As sulphur and copper are elements, they are persistent. From publically available sources, folpet is non-persistent to slightly persistent and zineb is slightly persistent in aquatic systems. No aquatic persistence data were found for metaldehyde and bromadiolone; in soil, these actives are non-persistent (half-life < 15 d) and moderately persistent (half-life of 45 - 180 d), respectively.

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Aquatic Persistence</th>
</tr>
</thead>
<tbody>
<tr>
<td>bromadiolone</td>
<td>non-persistent to slightly persistent</td>
</tr>
<tr>
<td>copper sulphate</td>
<td>persistent</td>
</tr>
<tr>
<td>diazinon</td>
<td>non-persistent to slightly persistent</td>
</tr>
<tr>
<td>folpet</td>
<td>non-persistent to slightly persistent</td>
</tr>
<tr>
<td>malathion</td>
<td>non-persistent to slightly persistent</td>
</tr>
<tr>
<td>metaldehyde</td>
<td>non-persistent to slightly persistent</td>
</tr>
<tr>
<td>sulphur</td>
<td>persistent</td>
</tr>
<tr>
<td>zineb</td>
<td>slightly persistent</td>
</tr>
</tbody>
</table>

Aquatic persistence classification

<table>
<thead>
<tr>
<th>half-life (d)</th>
<th>Aquatic Persistence</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 15</td>
<td>non-persistent</td>
</tr>
<tr>
<td>15 - 44</td>
<td>slightly persistent</td>
</tr>
<tr>
<td>45 - 180</td>
<td>moderately persistent</td>
</tr>
<tr>
<td>&gt; 180</td>
<td>persistent</td>
</tr>
</tbody>
</table>