Louisville Fire and Rescue
Metro Arson Squad
501 Ashland Avenue
Louisville, Kentucky 40214
(502) 574-3721

Investigation Type: Structure Fire
Department/District: Okolona Fire Department
Address: 4000 Buechel Bank Road Building 6
Date: Friday, April 03, 2015
Time: 6:51
Incident Number: 15-80-000597
Census Tract: 110.020
Lead Investigator: Major G. Henry Ott
Assisting Investigators: None

Arson Response
Dispatched: 05-Apr-15 7:00:00 AM
Arrived: 7:01
Cleared: 0:00
Requesting Individual: Chief Gosnell
Requesting Company: Okolona FD
Platoon: 2nd Platoon

Weather Information
Weather Conditions: Raining
Temperature: 60
Wind Direction: Northwest
Snow Accumulation: 

Synopsis
FBI Classification: C. Storage
Heat Source: Undetermined
Material First Ignited: Undetermined
Cause Classification: Undetermined
Cause: 9 - 00: Other Ignition Factor - Ignition Factor undetermined or not reported

Conclusion
After an extensive investigation which resulted in the elimination of many causes, a final determination could not be made between some type of an electrical failure or a lightning strike. As a result, the cause is listed as undetermined as required by NFPA 921.

Signature: [Signature]

-1-
### Incident 15-80-000597 Structure Information

**Building Condition**

- **Number of Levels:** 2
- **Year Built:** 1956
- **General Condition:** Occupied Good
- **Building Construction:** Protected Noncombustible

**Exterior Observations:**
- Operating warehouse

**Interior Observations:**
- Organized operating warehouse

### Fire Damage

- **Origin Level:** 1
- **Origin Area:** Storage Area
- **Fire Spread:** Fire spread from southwest corner of building to the north and east destroying the warehouse portion of the building.

<table>
<thead>
<tr>
<th>Structure Value</th>
<th>Estimated Structural Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>$50,000,000</td>
<td>$50,000,000.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Content Value</th>
<th>Estimated Content Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>$60,000,000</td>
<td>$60,000,000.00</td>
</tr>
</tbody>
</table>

### Utility Systems

- **Heating System:** Gas Heating
- **Heat location:** Multiple
- **Electrical Supply Entrance:** North side
- **Panel Location:** Multiple
- **Panel Components:** Breakers
- **Supplemental Heaters:** None located
- **Supplemental Heat Location:** N/A

### Protection Systems

- **Sprinkler System:** Yes
- **Smoke Detectors:**
  - Entry Alarm: No
  - Activated: No

**Alarm System Comments:**
Incident 15-80-000597 Narrative

Investigator:  Major G. Henry Ott
Date:  Friday, April 03, 2015

Narrative:
For the narrative of this investigation, see the supplemental report dated July 24, 2015.
July 24, 2015

Re: Fire Investigation
Location: 4000 Buechel Bank Road
Date: 04/03/15
Time: 0651
Incident: 15-80-000597-90

William F. Bowman, Lt. Colonel
Fire Marshal

Sir:

The following documents and summarizes the investigation of the above captioned incident.

**Initiation**

On Friday morning, April 3, 2015 MetroSafe, the unified dispatch system for the city of Louisville, received a 911 phone call at 06:50:32 from Karen Elbert, an operations manager for Derby Industries at GE Appliance Park. She reported that there was a "huge" fire in AP 6, which is Building 6 of GE’s Appliance Park. Derby Industries utilizes space as a warehouse that supplies parts to General Electric. At 6:50:58 MetroSafe would receive a second call from Nathan Allen, another Derby employee, who would report a warehouse fire in Building 6. MetroSafe would create an incident for dispatch at 06:51:21. At 06:58:01, a third call would be received by MetroSafe from GE Security, the on-site security force that self-monitors the internal alarm system. That call would come eight minutes and fifty four seconds after the security force received a water flow alarm on the system identified as P2-2635.

The location of the fire is mostly within the Okolona Fire Protection District. Their predetermined dispatch policy is to start four engines to a report of a commercial structure fire.

As a result, the MetroSafe Computer Aided Dispatch (CAD) system recommended the four closest available staffed engine companies based on their AVL/GPS or if they were recommendable, but the particular apparatus did not have AVL/GPS their actual station locations would be used. Those companies were two engines from the McMahan Fire Department and one engine each from the Jeffersontown and Fern Creek Fire Departments. Major Jody Craig, the on-duty operations commander for Okolona, would respond as the command officer from Okolona and would assume the role of Incident Commander upon his arrival.

It should be noted that at the time of the incident, a large portion of the metropolitan area of Louisville had suffered a significant rain incident with up to nine inches falling in portions of
Jefferson County starting at 0234 hours. As a result, there were substantial flooding related incidents reported in numerous areas. This included Okolona, Highview, and Buechel, all fire districts that surround GE. (Regarding water related incidents, the Buechel Fire Department responded to 14 incidents, Highview responded to 19 incidents, and Okolona responded to 65 incidents.)

At the time of the incident, Okolona had four staffed companies on duty however all were out of service. Unit 8032 was out of service on a water rescue, 8033 and 8051 were out of service on water leaks, and 8053 was out of service on a gas leak.

At 06:58:12, Unit 5502, a command officer (Amback) with the McMahan Fire Department arrived on the scene six minutes and thirty nine seconds after the run was accepted by MetroSafe. Major Craig would arrive at 06:58:55. The first engine, Unit 5551, arrived on the scene at 06:59:07.

McMahan companies responding on the west side of Building 6, reported heavy smoke coming from the southern end of the west side of the building and companies on the south side of the building reported heavy fire in the west end of the warehouse. Major Craig would establish a command post on the southern side of the building at 07:03:00 and using the incident command system assigned an Operations leader (Schmidt 7101), a Division 1 leader (Bayens 1105) and a Safety officer (Amback 5502). An interior attack using a 2 ½ inch handline through an open overhead door was started but at 07:09:01 the building was evacuated by order of Major Bayens because of the fire conditions. At the same time, significant water supply issues were beginning to present themselves.

A second alarm would be requested at 07:04:17, a third alarm at 07:07:39, and a fourth alarm at 07:23:01. At 07:45:53 Command would request a fifth alarm.

As a result, at 07:49:52 Command would request a box alarm dispatch from the Louisville Division of Fire that would be supplemented by multiple extra pieces of equipment and command officers as the incident continued.

Eventually the fire would be stopped at the eastern portion of the structure near the office area and at the warehouse annex on the north side of the building. The fire would eventually be controlled later that afternoon, with total extinguishment of hot spots completed four days later.

Multiple command officers reported that their strategy was to stop the spreading fire with master streams at the south door where the initial attack was made, with lines from the north at loading dock 10, and from multiple locations at the east end the building.
Investigative Request

While monitoring radio communications, the undersigned self-initiated and requested all on-duty Metro Arson Bureau members respond to the scene. Upon arrival, a quick briefing was held with Major Craig who reported that everyone was out of the building and the fire was heaviest just to the west inside an overhead door on the south side of the structure. Given the size of the incident Major Craig requested that an investigation be initiated. Eventually, all eight sworn members of the Bureau in town would be on scene that day.

A systematic investigation began using the scientific method as a guideline. No preconceived conclusions as to the cause of the fire were drawn at that time.

Initial Scene Assessment

The undersigned initially completed a 360 degree tour of the building checking access, entrance and security of the building. It was determined that all of the exterior man doors were unlocked and accessible, which is a normal condition. Most semi loading dock doors were blocked with trailers on the north and west sides, with the semi docks on the south side of the structure unblocked but the doors initially closed. (GE Security would open most of the semi doors on the south side before the electric overhead door openers lost power.) At the time of the undersigned arrival, the fire was heaviest in the southwest corner of the facility.

As other members of the Bureau arrived they began documenting the conditions of the exterior of the building on all four sides of the structure. An interview team was established to interview and obtain statements from those persons that were in the building at the time of the fire. As other investigators responded to the scene, they were assigned tasks as needed.

An initial assessment of the structure as required by NFPA 921, revealed multiple safety concerns, the first being that it was multiple hours before the fire would be knocked down and then several days before all of the smoldering spots on the property were completely extinguished. Until the stability of the building could be determined, access to the structure was limited.

It was noted that the gas was turned off to the entire plant at the main station near AP33 and the electric for the structure isolated at the boiler house by General Electric personnel using the magnablast breakers on the distribution network. This occurred at approximately 0815.

At approximately 1000 hours on the day of the incident, a Facebook posting was identified that showed the fire in its very early stages. The LMPD (Louisville Metro Police Department) Real
Crime Information Center was contacted and provided intelligence identifying the person responsible for the post. Eventually the actual person who took the photograph (Childress) was located and interviewed by investigators. (When she took the photograph, she was standing outside the repack area in the take cover hallway, looking south, down the aisle between row ABA and ABB.)
Within 24 hours, a Derby Industries employee provided a video (Allen) that showed the fire and its location. The video appears to start in the aisle between ABC and ABD and then move to the right to the aisle between ABB and ABC, where the view was very similar to the photograph that had been obtained. At that time Mr. Allen was standing in the take cover hallway. A sketch provided by Derby Industries to investigators, was used to place a possible area of origin and that information was used to assist the planning of suppression in activities extinguishing the remaining fire.

Based on that information, the portion of the building where the fire originated was identified as the southwest corner of the structure.

The main scope and objective of the investigation was to determine the origin and cause of the incident along with identifying the responsibility for the damages which occurred. (NFPA 921 1.1) Another scope of the investigation was to determine what fire prevention issues played a role in the cause or contributed to the growth or extinguishment of the fire. (NFPA 1730 8.7.52)

At the time of the initial incident, Major Craig reported that firefighters had experienced water supply problems, which played a significant role in their inability to control and extinguish the fire. Additionally they reported that the sprinkler system was not containing the fire when they arrived.
Because the fire continued to smolder in areas under structural collapse, as well in portions not accessible by master streams, the undersigned authorized and coordinated heavy equipment in making access paths into the structure from the south side to the center, and then in a westerly direction to allow access by firefighters. Prior to that entry all sprinkler risers and mill water loop supplies were identified and excavation was not allowed in those areas.

At approximately 1700 hours on the original day of the incident and from that point forward, the undersigned was included in all joint incident command meetings, as well as providing information regarding on scene security and access for the purposes of the investigation. The Metro Arson Bureau maintained twenty four hour scene control while the Okolona Fire Department provided suppression support until the conclusion of the scene investigation. Each time members of suppression entered the structure Arson Bureau members were consulted and advised on the scope of their activities.

This same process was used regarding contractors on the scene who provided generators, food, bathroom facilities, and lighting.

To prevent access from all other parties, a fence was erected around the north, east and west sides of the property and doorways from the office portions of the building were secured closed and locked. Within a day, the office portion at the east end of the property was returned to the control of General Electric.

Given that the scene investigation lasted for several months, weather conditions were monitored for the safety of the individuals processing the scene and adjustments made as needed. Additionally, monitoring for contaminates was conducted multiple times a day and the information readily supplied to investigators and other parties who would enter the scene. At no time once the interior scene exam was initiated did the level of contaminates exceed the daily permissible exposure limits. Arson Bureau members flooded the interior of the building to assist with the containment of the dust.

To support the investigative needs of all interested parties, a joint exam was conducted of the scene. Interested parties, upon notification and provision of basic information to GE legal counsel, were allowed participation in the investigation. Prior to approval for team participation, each member was required to take a GE approved safety briefing and agreed to conduct themselves in an appropriate manner. Investigative team members, both public and private, entered the property surrounding the structure via a security guard controlled access point and attended daily morning briefings and evening briefings if needed. At those meetings, participants were asked if there were any complaints, which were resolved immediately.

An Arson Bureau commanding officer was present at the scene on all days where activities took place to address the desires or wishes of all of the involved parties. Legal counsels for different
parties were also granted the same access. The only parties denied access to the portion of the building where the fire originated were claims adjusters not directly related to the origin and cause of the incident. Instead, they were given private tours of the area where the bulk of the materials were stored.

On days when operations were conducted by the investigative team, a sign in sheet system was used.

The only disputed area among the private investigators, mostly fire protection engineers, was that of the Mill Water plant, and that was at the direction of GE. While an initial tour was conducted, and the Bureau allowed unlimited access, the Bureau had hoped to gain additional insight as to the Mill Water plant operations from fire protection engineers not directly related to GE.

During the investigation, Bureau investigators provided general information as it was developed to all of those present at the incident scene and set up a web based manner to share information. Plans thought important to the investigator were uploaded early and then an extensive number of the written interviews were also provided. Initially the web site was going to be controlled by General Electric but to prevent any accusations of bias; the Metro Arson Bureau maintained the website.

On June 18th, the property would be released by the Louisville Metro Arson Squad and the Okolona Fire Department.

**Property Description**

**Overall Plant**

General Electric Appliance Park is a large industrial manufacturing complex that contains seven large structures with more than 30 other smaller structures that support the manufacturing of appliances. The complex occupies 87.64 acres of land, and for the purposes of tax assessment, something General Electric pays close attention too, is assessed at 2.1 million for the land and 12.6 million for the improvements for a total value of 14.7 million dollars for the entire complex.

Buildings 1 thru 5 actually, or have, manufactured product and Building 10 is for the storage of manufactured goods. Building 6, where the fire occurred, is mainly used for the storage of parts that are received, sorted, and then moved into the first five buildings; however, many parts are shipped to other companies outside the plant that sell GE parts to repair their products. Other buildings important to the investigation were the Mill Water Plant (Building 23), the Boiler House (Building 20), the Executive offices (Building 35) and the old fire department building (Building 28). It was observed that an overhead conveyor system is in place that connects the major manufacturing buildings with Building 10, the warehouse.
Construction for the property began in the early 1950’s, and the six main buildings on the property are very similar in design and exterior appearance. Common to the six original large buildings are two story office areas along the eastern side of each structure. When originally constructed, the property was designed to be self-supporting containing a pumping station, water treatment, power plant, rail yard, fire department, and security force.

A residential neighborhood commonly referred to as Buechel is located north of the plant. Access to this area is along Buechel Bank Road. Located to the west of the property is another residential neighborhood which was originally known as Black Mudd but is now more commonly referred to as Newburg. Access to the plant along the west side is via Shepherdsville Road. To the south of the property are smaller commercial structures, situated along Poplar Level Road. For the longest period of time, the eastern side of the plant was undeveloped; however, GE sold some of the property that was developed as privately owned warehousing. Just outside of the original property to the east are small neighborhoods and Mercy Academy, a girl’s Catholic High school. (At the time of the fire school was out because it was Good Friday.)

A rail line enters the property from the south side and moves to a switching yard near the north center of the plant, which then feeds into different portions of the property including each of the main manufacturing buildings.

In general, the area surrounding the plant is enclosed with an eight foot fence, with barbed wire across the top. The majority of the people on the property park in a mile long parking lot on the eastside of the plant outside the fenced area. From that location, people enter the secured area on foot thru turnstiles. Truck traffic for the property enters along the north side off of Buechel Bank Road at Gate 3, which is manned by security personnel. Other vehicles, including executives who park close to the individual buildings, enter thru Gate 1, which is the offices of the security force, located near the center of the eastside of the property. It is within these offices that security monitors the alarm systems, dispatches officers as needed, and processes visitors. It was noted that portions of the fence had been damaged or openings were observed.

Also important to the investigation were gates on the property that are no longer operated on a daily basis or manned by security.

Just south of the southeast corner of Building 6 is Gate 5. Officers were responding to this location to open the gate; however arriving firefighters would cut the locks off.

A second gate of importance was Gate 4 at the corner of Rangeland Road and Old Shepherdsville Road. As the fire would burn and firefighters were in search of a water supply outside the plant, plans were made to lay a supply line west from the building of origin to this gate; however, they were abandoned because of the flooding over the roadway from the water retention pond GE maintains.
Building 6

The involved building sits at the southern end of the main row of buildings.

For the purposes of this investigation, the north side of Building 6 is just south of Building 5, the east end of the building fronts the main parking area, the south end of the building towards Poplar Level Road and the western side of the property faces towards Old Shepherdsville Road.

It was determined that General Electric uses a marking system based on columns used for the steel support system. The main steel forming the exterior wall running east to west on the south side of the building is considered column A. One hundred feet to the north is column B, continuing to column G which makes up the north wall of the building. Starting again in the southeast corner are the rows, with the first row running north to south labeled 1. Moving from east to west, marked in odd numbers were the rows continue to row 47. These east to west columns are 20 feet apart. This system was helpful in discussing items with GE, who used the number system freely in conversations. At times, Derby would also use some of the same numbers to report water leaks within the building; however, Derby had their own number system.
In general, the building measures 600 feet north to south and 1000 feet east to west. A smaller structure, called Building 6A (Annex), sits to the north of the main building and measures 100 feet north to south and 520 feet east to west. In total, the building is reported to contain 700,121 feet of space and is over two stories in height.

The building was constructed in four different phases. The original building, which was the eastern half of the structure, was constructed in 1956. In 1967 the western half of the warehouse was constructed, which started at the south side west overhead door at column A27. In 1965, the eastern half of Building 6A was constructed and in 1968 the western half of Building 6A was added.

About one sixth of the property is occupied as the two story offices at the eastern end of the building. With few exceptions, the rest of the structure is used as warehousing or related operations, with a small portion dedicated to labs.

Along the eastern side of the structure, there is a set of doors which are the main pedestrian entrance to the building. Employees and visitors park in the main parking area, walk thru the turnstiles and enter thru these doors. Almost all Derby employees enter thru the doors, walk thru the office area entering the warehouse, make a quick turn north and then west, and enter the Derby access hallway/area. On the north and south ends of the two story office section are additional doorways that all provide access to the building and then stairwells that provide access to the second floor of the office building.

Along the north side of the eastern end of the building are several man and overhead doors that provide access into the warehouse portion that was occupied by GE, including the Building 6 maintenance offices and a work shop for another GE business involving power solutions.

Because it suffered minor smoke damage, the entrances and exits of building 6A will not be detailed; however, access into the building, allowed access into a walkway running east and west that was separated by fencing topped with razor wire along the north side of the Derby warehouse space.

Along the western end of the north side of the structure was a set of 10 semi loading docks and a man door which were used as the receiving department for Derby. At the time of the fire, almost all of the docks were occupied; however, one truck was allowed to pull away as the fire burned. West of dock #10, was a man door that led into the unloading dock area. Just to the west of this doorway were the administrative offices for Derby.

In the center of the western side of the plant are two semi doors with a double wide sized doorway that entered what was described as a “take cover area”. The doorway, large enough to
allow entrance with a four wheeler, ran 250 feet west to east and consisted of concrete block walls with a poured second floor over top.

On the south end of the west side was another set of three semi docks and another man door. This area made up the shipping department for Derby Industries.

On the south side of the structure was a small two story addition that contained an abandoned railroad dock. Within this section was a large overhead door which is the location where the initial attacks were attempted by firefighters. It is important to note that there was a large green commercial dumpster with compactor located just west of the overhead door that would be mentioned by many employees as a reference point. A man door was also present that allowed access to a small second floor that contained a surplus of overhead lighting. The first floor contained several outdoor cooking grills and damaged product.

Near the eastern end on the south side of the main building were three more loading docks as well as an overhead door where an additional attack on the fire would be initiated.

It did not appear that there were any recent changes to the occupancy usage, and the structure size was consistent with measurements provided by PVA. For all practical purposes, the building was unsecure at the time of the fire.

**Building Systems and Ventilation**

Originally, the warehouse portion of the building was used to manufacture room air conditioners.

At that time, a key component to the process was a Mill Water supply that was used for multiple purposes, including cooling heavy machinery. Water for this activity is collected from the roofs and parking lots on the GE property and then drained to the Mill Water plant. At that point it is stored in four large holding tanks, each holding 1,000,000 gallons. Pumps are in place that returns this water to the different buildings.

As the manufacturing process developed and changed, there was no longer a need for the Mill Water supply in the manufacturing process, but it was still needed to provide water for the plant wide fire protection systems including hydrants, risers and sprinkler systems. The fire suppression system serves the entire complex, including the six largest buildings, via underground mains, which are aged. Plant personnel, truck drivers and security personnel reported that the underground mains fail five to six times a year.

The Mill Water system enters Building 6 at two different un-valved locations and completes a loop around the interior of the entire warehouse portion of the Building. Because it is no longer in use, plant officials believe that it was turned off at valves within the interior of the plant at
ceiling level. Because of the age of some of the valves, there was leakage of some water into the internal piping, allowing them to fill with water.

A test of the Mill Water hydrant system 13 days after the incident revealed that two hydrants could be opened before going below 20 PSI, the cutoff for use by a fire apparatus. It was also noticed that when water flowed from the hydrants, the audible alarm did not sound in the Boiler House.

During interviews, it was also revealed that as the fire burned and the Boiler House/Mill Water plant operator responded to the Mill Water plant, the fisher valve was still dumping water into the holding tanks, even though there was a great need for water to extinguish the fire.

Domestic water is provided to the plant by the Louisville Water Company, mainly to be used for drinking and sanitary needs. It was determined that the property contains approximately 11-13 domestic supplied fire hydrants that surround the main buildings and warehouse. Neither the Louisville Water Company, nor the local fire districts, maintains the hydrants. Overall, the hydrants were found in poor conditions. The domestic hydrant on the south side of Building 6 was not used because it was found flowing water thru the cap and could not be turned off because the stem was broken. Firefighters could not turn it off to uncap and then use. The domestic hydrant on the north side of the plant was marked with an out of service tag.

Electrical power for the involved property is provided by the Boiler House (Building 20).

From the Boiler house, a 13.8 KV line enters the building at the southeast corner of Building 6A and then travels into Building 6, taking two routes as it feeds into the power vaults located on the roof of the building. When originally constructed, there were eight vaults on top of the building; however several of them have been taken out of service.

The important feed for this investigation is the supply that feeds Vault 8, then Vault 7, then Vault 5, all above the roof of the building. At this point, the supply moves under the roof as it exits Vault 5 and runs in the area where the fire was originally discovered. At that point the circuit, while under roof, moves east to the southeast corner of the warehouse where it goes underground and feeds Building 35. (The second circuit that enters building 6 goes from Vault 4 to Vault 3, to Vault 1 and then Vault 2).
Once inside the building the power is stepped down, starting within the vaults, thru a multitude of transformers, buss bars, and breaker panels as needed. Any attempts to analyze the conditions of the panels were fruitless as almost all of the interior components were consumed during the fire.

The only areas of the building that were air conditioned were the Derby Offices, the cleaning company offices and the eastern office section. Roof mounted units were noted for most of these different sections. The warehousing section was not air conditioned.

The only heat appliance important to this investigation was a very large gas fueled heater located in the warehouse section on the south side just west of the overhead door (A-31). After the fire it remained undamaged but was important because many Derby employees used it as a visual reference. (The gas supply had been turned off a few weeks earlier as outdoor temperatures began to rise.)
The building has a fire alarm system that is controlled by a Simplex system. Multiple Simplex nodes are present; however, the main panel is located in the security force offices at Gate 1. The system controls multiple sensing devices within the building including pull stations and water flow alarms. The initial report of this incident was a water flow alarm on P2-2635 at 0649 hours.

Fire extinguishers were noted placed around the structure, and while a few were gathered at the beginning of the incident, none were discharged on the burning fire.

Of important note to the suppression operation is a 12,000 gallon tank of Cyclopentane which was located on the north east exterior of Building 6, between Building 5 and 6. This tank, if exposed to fire, would have created an even more significant, possible devastating event, and was a key focus of firefighters at the time of the fire.

**Building Occupancy**

The building is owned and partially used by General Electric.

The office area on the eastside of the building includes accounts payable for this plant as well as other plants in this region. (A portion of this function on the second floor center of the eastern office area protrudes into the second floor area of the warehouse and had suffered significant damage.) Another large function is the offices that direct and support the customer service operations for General Electric worldwide. There were also several testing labs noted, including one actually located in the warehouse portion of the building.

Within the warehouse, GE has a maintenance department in the northeast corner which was noted early on in the investigation when a full sized pickup was found outside the maintenance area, totally consumed by the fire. To the north of the maintenance department was a small area which was used by another GE partner that sold and maintained large electrical switchgear.

General Electric also had a fenced in section just inside the warehouse near the center main doors. This area was called "Stratosphere" and was used to rework parts. Just south of this area was an area that was leased to Xerox that provided the major printing operations for the entire park.

On the western end of the building were two businesses that occupied space. The first was the Newbold Cleaning Company that supplied cleaning services for the entire plant. Their management offices could be entered along the hallway which ran across the western interior wall of the plant. To the east of the cleaning company operations was a room that was used by JJI, the company that provided mail services to the plant. Within this room, parts that are returned by customer service representatives, would be sorted and then returned to the particular building where the item had been used in the manufacturing process.
The rest of the space was used by Derby Industries. Their main on-site management operations were just to the west of the receiving department which is on the north side of the building at F35. Small offices were also located in the southwest corner for the shipping department along the south wall at A45.

South of the take cover area (D37 to D47) was a large two-story area, with a smaller area to the east on the first floor known as the repack area. It was within this area that parts were managed by Derby that either needed to be returned, or in some cases, minor changes or repairs made to the construction of the part and it returned to the warehouse floor for future use. The eastern most part of this area was known as the pump room, and some of the doorways had been recently covered with Grainger noise absorbing material.

In the area of the C and D columns, between rows 23 and 27, Derby Industries operated a maintenance department, which for the most part was fenced in. It appeared that the main focus of the area was maintaining all of the forklifts and tow motors used in the day to day operations. The area was also used for the storage of light bulbs that Derby used within the facility. (At the time of the fire there was no motorized equipment within the area of origin, and while there was welding and cutting machines available in the maintenance area, no operations were taking place or had been undertaken in the area of origin.)

The final area of importance was the “cage” area which is located on the south side center of the building between A and B columns, between rows 15 and 19. It was in this area that a small smoldering fire was discovered on March 3, 2015.

Information (Data) Collection

Beginning at the time of arrival on the scene, and over the next two and a half months, information was gathered regarding the incident from observations and multiple sources both inside and outside the plant.

Because the collapse of the building was affecting the fire suppression system regarding Building 35, General Electric, under supervision, was allowed to cap four mill water lines and two sprinkler riser lines the weekend after the fire that could not be turned off. By capping the lines, the fire protection system was allowed to build pressure for the rest of the plant and allow it to be occupied and manufacturing restarted.

On Monday, April 6, 2015 entry was made into the building and multiple reconnaissance tours were conducted to gather information important to the investigation.
One of the goals at this stage of the process was to determine what role the front office portion of the building as well as the annex section possibly played in the incident. Initially, from time to time, GE personnel were allowed access to the building to remove critical information while escorted. Once it was determined that there was no relationship to the origin and cause of the incident, those areas were returned to General Electric about Wednesday April 8th with the understanding that the investigators joining the investigation at a later time would be able to access the buildings for documentation purposes.

For the remainder of the investigation, two operations continued; one to complete follow-up and conduct interviews, both on and off the property, and the other to complete an area of origin investigation. The debris examination was conducted in a planned and systematic manner, using layering to identify the available fuels and their forms and the possible ignition sources within the area of origin. As is a standard operation of the Louisville Metro Arson Bureau, the investigation worked from the area of least damage to the area of greatest damage.

**Exterior Exam**

The exterior examination of the warehouse revealed that the outer walls along the south side consisted of four different types of exterior coating. The ground level covering was constructed of a brick facing, small paneled windows (12' by 10") in the center of the wall, metal siding for the next quarter of the wall and more window panes at the upper portions of the building. (Firefighters reported that they were able to watch the fire spread thru the building via the exterior windows.)

On the western side of the structure, the brick covering was in place; however, the majority of the rest of the structure was covered with metal sheeting. On the northern side, there was brick lower covering, small metal windows, and the metal sheeting for the upper half of the wall covering on the western portion of the north wall. On the eastern side of the north wall, there was the brick lower covering, small windows, metal sheeting, and small windows from about midpoint of the building to the east. The office portion of the building had a continuous row of windows for both the first and second floor within the brick covered walls.

The roof was flat and consisted of a layered system of foam, membrane and gravel.

A review of the exterior along with aerial photographs revealed that the heaviest amount of fire was in the western third of the plant. When a comparison was made of the electrical vaults located on the roof of the buildings, vaults 5, 7 and 8 suffered the most damage and collapse. This observation was confirmed by information from both employees and firefighters.
While 8 semitrailers were located at the receiving docks (north Side), two were at the south side, and four were at docks on the west side, their position did not affect the overall outcome of the incident as they remained undamaged.

Overall, the exterior grounds were well maintained.

It should also be noted that once the fire department was able to establish a positive water supply off site later in the incident, they were able to stop the spread of the fire as it moved from West to east, and south to north.

It is important to note that when the undersigned walked the entire exterior of the building, at no time were any of the sprinkler gongs, which number between 15 and 20, sounding. Interviews of the first arriving companies confirmed the same information in that the sprinkler gongs were not sounding.

Also observed during the exterior examination were the post indicator valves, especially those on the south side of the building. Firefighters would report that when they arrived they believed the PIV's were in the open position. The PIV valves would be ordered closed because of building collapse, the lack of sprinkler performance, and water coming from the connections at floor level along the south side of the building where collapse had occurred.

Because of the critical damage, access for an examination of the roof could not be conducted for safety reasons but both helicopters and drones were used to visually inspect the areas.

**Interior Exam**

Observations confirmed that the structure was used as a large parts supply distribution facility. Both the shipping and receiving docks suffered minor damage and the products in eight semi trailers located at the receiving dock on the north side of the facility were returned to Derby after thorough documentation.

Prior to entry into the structure, Derby Industries was able to provide a diagram, that while very general in nature, provided a reasonably accurate layout of the interior of the Building.

Product entered and exited the building from two basic loading dock areas. There was limited damage to the shipping area and it along with the associated offices were found organized and free of trash. The only complaint uncovered about trash was that some pallets and wrapping from pallets was left in front of a security “clock” area on the south side that security requested be cleared. A GE maintenance man reported that extra pallets had once been stacked in front of the furnace on the south side of the building but they were immediately removed at his request.
Observations of what remained after the fire indicated a clean and organized operation by Derby Industries. When questioned, the GE employee responsible for the relationship between General Electric and Derby provided that there were no issues with Derby and that he did not believe that General Electric could take over the function and do it as well as Derby was able to.

There were two types of storage within the building; bulk storage and rack mounted shelf storage.

Bulk storage, which took up more space than that of the rack storage, amounted to a pallet with a bulk container containing product located directly on the floor. Those bulk container pallets were never stacked, and were responsible for the largest portion of the eastern half of the warehouse. Examples of the storage would be plastic pellets, appliance doors, appliance insulation and full large pallets of small screws.

The other manner of storage was steel metal rack shelving. The metal shelving were standard warehouse rack shelving that stood anywhere from 16 feet tall to at least 24 feet tall. Not all of the end pieces were bolted to the floor via a base plate. The end pieces contained welded vertical and diagonal braces for support.

The two vertical end pieces were joined together horizontally by use of a metal beam.

The box style beams had a lip at the interior of the face which would allow for the placement of shelving panel that could have been wood, metal bars, or metal grids. The beam was attached by the end pieces via two hooks that would engage the end of the beam with the end piece and then screws attached that would lock the beams in place.

The racks were placed in rows, mostly north to south, with another row that would back up to the first, with a distance of about eight to ten inches between each rack. A brace would then be attached to stabilize the two units to each other. The next set of racks was offset a distance which would allow the easy use of a forklift, placing and retrieving the product.

Derby Industries had a standard numbering system for their shelving and as an example; the fire is believed to originate near ABC-115/118-B. Regarding the main racking system, in the northwest corner, the first rack of shelves began and was labeled AAA. This set of shelves ran from the north wall of the warehouse in a southerly direction to a bulk storage area where this section terminated. The next row, to the east was row AAB, the next AAC until the lettering sequence got to AAZ. The next row after AAZ would be ABA which would continue in the same pattern. The next row at that point would start at ACA and this sequence continued across the warehouse to the eastern wall, in all areas where rack shelving was used.
There were three basic interruptions, or breaks, in the row of racks. One was for those required where a vertical structural support for the building roof was located. The second was for walking and forklift travel, and the third for offices, bathrooms, or the Derby maintenance shop.

Along each row, there was a second number. Again, in the furthest northwest corner, the first set of shelves at AAA was position 1. Just south of it was position 2. Both of these two positions were located between each of the vertical end pieces and connect by the above mentioned beam. This numbering system would go to the south with a total number of positions of 120, which was the southernmost position. In effect, 120 pallets could be placed next to each other from the very northern side of the warehouse and terminated near the south end.

At each rack location, there were also four or five levels of product. These positions were labeled as A, B, C, D, or E. Level A was directly on the floor. Level B was at about shoulder level or five feet. While most of the plant only had level D product, late in the investigation it was determined that there were Level E racks, taller than those in the area of origin located to the east of the Derby maintenance area. In those cases, product within the racks was substantially elevated from the ground. Because of the damage and loss of metal strength, the best measurement placed the E racks at 26 feet or higher. Remains of some wiring harnesses were found hanging from the top beams indicating that there was product on the top level of the E rack.

Product movement reveals that it is shipped to the warehouse from across the world, which is a federal trade zone, and is delivered on the north side at the loading dock area. Rather than pay the standard import tax, the parts are maintained within Derby's trade zone warehouse until actually needed on the assembly line. The parts are then moved out of the warehouse, and GE pays for the parts at a reduced tax rate.

Based on the eight trucks that were present at the time of the fire, the following are examples of the product in general, which were found in all areas of the warehouse:

1) Some product arrived on wood pallets that were stacked three pallets high for a total of about five and a half feet in height. All three of the pallets were manufactured with wood. The three units were then banded together using plastic bands. On each of the pallets were cardboard boxes, and the entire unit was wrapped in plastic clear shrink wrap. When one of the boxes was opened, 40 metal appliance doors were found, each door wrapped in a protective skin. Each door was then separated from the others in the box using a piece of cardboard.

2) Another wooden pallet contained 10 relatively thin boxes stacked to a height of about five feet. The entire pallet was wrapped in shrink wrap. Each of the ten boxes contained 13 smaller boxes that contained plastic and metal parts that were all wrapped in a plastic bag.
3) A wood pallet contained stacked small cardboard boxes wrapped in plastic with the pallet capped in a cardboard top with the boxes being lidless containing rail upper rack assembly with plastic and foam protection.

The following is an example of the material stored in the building:

While the entire structure was destroyed and most of the combustible materials within it consumed, the overall housekeeping within the warehouse appeared good. This was based on the original photograph and video, observations in the shipping area which suffered less damage, and several reports from GE, Derby, and Factory Mutual employees. The only area not reflecting this was the exterior two story section on the south side where the initial fire attack was made. It appeared damaged containers had been haphazardly placed in the storage area of the building.

A search of the maintenance area revealed the same conditions. Tools appeared to be stored normally, with no accumulation of broken or what appeared to be scrapped items. A large amount of light bulbs were noted stored in an organized fashion within the maintenance area. Organized paperwork and extensive maintenance records were found concerning the Derby operations with the majority of them dealing with forklifts and other lifting equipment. (It was noted that in one case lights had been knocked off of the top of the forklift, but repaired.)

Once accessed, the receiving area was laid out as described by the workers. The construction and positioning of the rows of racking were consistent and confirmed the statements that workers gave concerning where the fire was first observed.

Again all information gathered, based on Derby employees, firefighters, GE employees and the undersigned, coupled with the video and still photograph, the area of origin for the fire was in between row ABA and ABD on the south side of the warehouse.

Based on observations in the area, the rack system was consistent with the rest of the building.
At column B-33, there was a gap between the end pieces of the racks and the vertical structure column. Much to do was made about the possible accumulation of trash in this area resulting in an accumulation of a fuel that could be ignited by a person carelessly smoking a cigarette. Because of the amount of damage, but after a very detailed search, no remains of cigarette, cigarette lighter or cigarette packaging were found.

A description of the excavation process is as follows, and summarizes the normal day to day operations.

Some of the most qualified origin and cause investigators, many with national reputations, hired by their respective clients, participated in the excavation. Initially, fire protection engineers had studied and documented the sprinkler conditions but only for a very short period of time. A grid system was created which allowed for the areas to be broke down into smaller areas, and even smaller in the event that a key piece of evidence was located such as a lightbulb. Normally, two seasoned investigators would hand sift using small handheld trowels, shovels and rakes sifting the material which would then be placed in a container marked for the specific grid.

Documentation was extremely detailed by all parties. Important identified pieces were collected and marked with an individual evidence number by a common scribe. If a specific item involved lighting, one of the country’s leading experts on lighting would excavate the area surrounding it. The above container would then be moved to a sifting location where two to four investigators would sift the material over screen and containers. Additional important items not identified by the first line excavators (or all of the other parties who were observing the sifting), was collect as evidence based on the grid.

Running vertically, at the underside of the roof’s edge, north to south, was the 13.8 KV electrical high voltage cable supply for Building 35. It was noted to have suffered critical damage and arcing along numerous locations in its path.

A large thick multi strand data cable which moved towards Building 35 was found in the area.

In the very early stages of the investigation, because of its importance as the main fuel source for the fire, Derby Industries provided a product list, initially of the area where the fire originated and then for the entire warehouse. As part of follow-up, ten random locations were chosen in four different areas of the plant, involving the rack storage and the debris found compared to inventory listing. In all incidents, the remains of the debris appeared to be the items listed.

Derby auditors believed the company had a 99% accuracy concerning the location of the pallet on the shelves, with the only differences occurring when multiple boxes made up the specific pallet which had been partially picked during the supply operations.
Excavation along the west side of the ABB aisle revealed the remains of a round garbage style container. A review of the remains within the can appeared unremarkable, but it was collected as a piece of evidence in its entirety.

Of importance to the investigation is weather. It was severe just before the fire, and a substantial amount of rain had fallen. Located at column B33 was a drain pipe which drained water from the roof to underground. Derby employees would identify multiple locations where water was discovered at the floor level as a result of leaks in the roof, and some explained the water on the day of the fire as the worst ever.

Excruciating detail was paid to the lighting within the warehouse, specifically in the rows where the incident was determined to have originated. Running overhead north to south, in the driving area, between row ABA and ABB was the conduit which supplied power to the overhead fixtures. The fixtures, which were arc tube in nature, were visible within the original photograph and video, and appeared partially operational at the time of the incident.

While all of the fixtures in the area of origin were located, identified, excavated, and collected, those actually containing bulbs were examined and the bulbs themselves, where present, were eliminated as the cause of the incident because the arc tubes were found intact. At this point in the investigation, the light bulb housing and the wiring supplying them, while collected, was not closely examined, and therefore cannot be eliminated as to the ignition source.

Based on the amount of burning in a specific location of the ABB row, including damage to the concrete floor, samples were collected and analyzed for the presence of a flammable liquid with the results being negative.

While a 5 gallon blue kerosene container was found lying on its side in the shipping area near the offices, light smoke stains and a protective pattern was visible on the top of a utility cabinet next to it. The container was old and dirty and appeared to have been knocked off the cabinet during firefighting master stream operations from the cabinet which was used to store other flammable liquids and cleaning fluids.

The HVAC system, control units, supplemental heaters, and water heaters were not located in the area of origin and when found at other locations, failed to reveal any failures responsible for the cause of the incident.

**Alarm System**

Based on a review of the Simplex system, the very first indication of a problem was a signal received from the water flow switch at P2-2635 which covers the area where the fire was initially seen by the witnesses.
Witness information

Extensive interviews were conducted with both GE and Derby employees as well as others related to the operations of the building. Witnesses outside the plant were identified, located and interviewed and some persons chose to contact the Metro Arson Bureau on their own accord. Those interviews are documented either as written reports, or in some cases taped statements which, for the most part, have been transcribed and added to this investigation. The following is a general summary of the information gathered.

The fire was first observed by an employee (Eagan) while he worked on the receiving dock on the north side of the plant. He radioed the location of the fire as the ABC aisle on the internal radio system that Derby maintained for communications of the employees.

Many Derby employees report the fire at the B or higher level on the shelves, some as high as 20 feet in the air when first noticed.

Product was being moved shortly before the fire because of the rain that had leaked into the building from the evening before. In some instances, tarps had been in place as a part of normal operations for some period of time. Derby would report roof leaking problems to General Electric at least twice a year. (Google earth images of the property on 09/22/14 would show what appears to be patches and stains on top of the patches around the electrical vault directly above the area of origin.)

None of the employees believed that the fire was incendiary in nature. The only recently terminated employee had lost his access to the plant and while he was upset that he had been let go, he spoke of no motive to set the fire. A check of General Electric access system records showed that his access card had been deactivated on April 1st at 0953.

Nathan Allen, Jimmelle Cannon, Rebecca Cravens, Jason Curry, Karen Elbert, Todd Farringham, Ted Fox, Ken Lasley, Brenda Pierce, Fernando Rodriguez, Ronnie Walker Robert White, and Billie Williams did not observe the sprinkler system flowing when they first observed the fire. There was no belief by the involved investigators that their statements were planned, or rehearsed.

Jim Estes saw sprinklers working over the fire, but they were not effective and water was not hitting the floor.

Jacob Fuller reported sprinklers working above the fire when he entered the structure as the last of the Derby warehouse employees were evacuating. He reported there was a storm at the time of the fire that was very significant and lightning was in the air around the time of the fire.
Debbie Brooks and Mike Christianson observed the sprinklers but outside the area of origin based on their column and row identification. Christianson may have seen water flow above the fire but was more familiar with the sprinkler head that discharged above his head.

Very few people ever heard an audible alarm once the incident began, and a few only heard audible alarm sounds late in the incident. Several people reported pulling the alarms and nothing happening. It was also determined that several were in the building in the east office area and did not know of the fire until other employees, not allowed to enter the turnstiles by security, called them by phone. Others only left the building because fire trucks were arriving on the scene.

Cigarette smoking is very rare in the building as GE’s policy is that no smoking is allowed on the property and there has been a focused effort since the smoldering fire in March.

The domestic water hydrant on the south side of the building has been leaking since last fall and the one on the north side had been out of service for some time.

An unstable citizen contacted the Bureau offices and reported that small meth ghosts were responsible for the fire. A nude man found in a truck leaving the scene as the fire burned was identified, interviewed and eliminated as a focus of the investigation.

**Analyze the Data**

At this point, based on the above observations, the degree of damage, observations made by witnesses and firefighters upon arrival, and the training, knowledge, experience and expertise of the undersigned, it is the opinion of the undersigned that the fire originated in the ABB and ABC racks between locations 115 and 118.

In normal cases the type, style and form of the fuel load present would provide patterns which would exhibit smoke, heat and flame indicators which would identify the point of origin. These do not exist in this case because of the size and complete destruction of this fire. While ventilation is always important to the movement and the intensity of the fire, the fuel load had the greater effect. The spread of the fire is well documented by the helmet camera worn by the first firefighter who laid a two and a half inch line in the south (west side) overhead door, a line which was ineffective. At that time the fire was limited to about the southern end of about eight racks of shelving and the south overhead doors provides easy access to the fire.

Electrical wiring ran thru the area of origin and was found on column B-33 during the excavation. All of it was collected; however, a detailed exam was not conducted by those present. The wiring did not appear to be improperly sized, but no further determinations were made because of the wide spread melting, arcing, and metal loss.

-24-
Developing a working origin hypothesis

Using observations (Empirical Data), witness information, limited pattern identification, initial scene assessment and analyzing the information gathered, the following working hypothesis were developed.

1) Careless Smoking

On March 3, 2015, a smoldering fire was discovered involving insulation inside of a box in the “Cage” area. There was no flaming combustion. Also found in that box was the exterior wrapper of a pack of cigarettes and a cigarette butt. In the opinion of Derby employees, the cause of the fire was believed to have been the result of careless smoking, and the conditions at the time tend to indicate that. A strong management response was immediately initiated by Derby with an all hands employee meeting with everyone advised they would be terminated if caught smoking in the building. Every Derby employee, as well as some outside Derby, was aware of the policy and its serious nature.

However, in this incident, the conditions are significantly different.

At the time of the fire, only a very few people had been in the building for a short period of time and starting their activities which were either planning tasks in the office or removing product exposed to rain water coming from the roof. Employees had not been on site enough time to take a morning break.

When the building is occupied and in full operation, the ABA/ABB aisle is a highly traveled area and a direct connection between the administration offices, shipping and receiving. It is not an area where one would conceal themselves in an attempt “to sneak a smoke”. On the other hand, the “caged” area is a remote location, not on any direct aisle way and a place where someone could conceal themselves.

Regarding the pocket that is created at the column and the possible accumulation of debris that could commonly be ignited by a dropped cigarette on the floor, this is not consistent with the scene for several reasons. The first is that every witness on the scene and the video and still photograph identifies the early location of the fire multiple feet off the ground. Overall, the cleanliness, even based on observations of outside risk manager engineers, was good. Again, the other reason is the time span.

(For a comparison, the Camp Taylor Fire Protection District was contacted which has the inspection authority for the property at the Derby Headquarters on Robards Lane. The last inspections by the fire department in 2010, 2012 and 2013 failed to reveal any trash accumulation problems.)
And finally, one must consider the overwhelming amount and condition of the fuel in the area of origin. Dropping a cigarette on top of a cardboard box that is designed to contain, organize, protect, and ship product across the world and expect an ignition is unrealistic.

2) Light Bulb Arc Failure

Of great concern to all of the parties present was the possibility that an arc tube in a Metal Halide light fixture had failed and dropped super-heated smoldering metal on top of a rack which caused an ignition. Examination revealed that either the bulbs were not in place or they were found intact, eliminating the bulbs but not the fixtures.

It was noted that Derby Industries had purchased light bulbs on March 6th and 19th from S and J Lighting but it was not known if they were installed.

3) Intentionally Set fire

Equally considered at the beginning of this investigation was the possibility that this was a set fire.

Quickly, investigators gathered the identification of any personnel that were on property when the fire originated. When the list provided by security included many other individuals, the scope of the interviews was expanded.

Background checks of the employees that entered the gates at the southern end of plant entrances were conducted which did not reveal any significant arrest, none of a violent nature and none with a fire setting background. Management did not report any labor unrest and the only person recently discharged was approached and had no motive or grudge against the company. All in all the Derby employees held no ill will to their employer.

Most importantly, the scene exam failed to reveal any evidence in the area of origin that indicated that the fire was set. The video and still photo also indicate that the fire originating well off of the ground, in an open area where there is considerable traffic, not the location of a traditionally set fire.

A review of the security logs for the period just before the incident failed to identify anything remarkable. There were two previous fires on the property, one involving an ambulance engine compartment on January 29, 2015 in front of Building 28 and the other a dryer in the executive offices building (35) on March 19, 2015.

As with large scale incidents two unusual reports were received. The first was that the CEO of General Electric set the fire in collusion with companies such as Bechtel and Safeway. The second was that meth lab ghost living in the trees outside the building set the fire. Both of these reports were found uncredible.
There were no indications that there were separated and unrelated fire locations on the property and as mentioned above, the area of origin is not a concealed area, but that of a well-traveled area where it would be easier to be discovered. The lack of a pattern of similar fires occurring at other locations within the plant, also limits the possibility of a set fire.

Given the positive opinion and status of their jobs, there was no reason to suspect that Derby employees had a revenge or retaliation motive. They, like every employee on the GE property, were aware of the sale of the General Electric to Electrolux, and were focused on presenting efficient, effective, and organized operations.

At no time did any GE or Derby employee report to the Metro Arson Bureau any suspicions that the fire was set, or a specific person identified as a possible suspect.

4) Lightning

Based on weather data collected at Louisville International airport, a review shows that significant wind and rain events started on Thursday morning and continued until the fire at 0651 hours on Friday. Total rainfall for Thursday April 2nd was 1.17 inches and on Friday, a total of 5.64 inches of rain would fall. The National Weather service would publish a data map for total precipitation showing between 8 and 9 inches for the two day period in the area near GE. A significant increase in the wind on the day of the fire would begin at 0530 hours, with some wind gust reaching 35 MPH.

Several different StrikeNet lightning strike reports would be reviewed. The data was provided to the National Weather service that plotted the data for investigators showing strikes of -18kA volts in the parking lot of Building 6 and a 19.2 kA strike in the rear of Building 3.

Video tape was obtained from FedEx which appears to show lightning in the area between 0632 and 0646, but does not definitively show any air to ground strikes. Video tape from the Ingram Company appears to show some flashes in the air, however the camera is pointing at the ground and is not raised towards the building until a few minutes before the fire. Attempts to obtain video from Gilt were unsuccessful.

An employee at Lacross Industries (Hicks) would observe what he thought was a lightning strike to Building 6 at about 0653 hours. When provided photographs of the building, he circled the area where he believed the strikes to have occurred and sparks were seen. Those selections were directly above the area of origin as determined by investigators. A security guard (Bratcher) on the east side of the plant at Gilt Industries saw a large flash just before the fire.
5) Rain

Prior to the fire occurring, Derby had reported water leaks in the following areas, which are considered important because while these listed locations are where the water was found, they might not directly reflect the location of the actual leak. Those locations were

Pole B36
Behind the repack room B39
Along back wall by shipping by pole 37
ABB-107 and 108 by pole B33
In the middle of aisle ABD-90-A

A review of Google Earth shows what appear to be water stains on the roof, at the south end of Vault 5 which is directly over the area of origin. It also appears that a problem had occurred at this area as there is evidence of patches made to the roof. While General Electric provided a study of the area, it appears that the Google Earth image of 09/22/14 is accurate. Given the amount of rain that fell that day, witness statements, and observations, it confirms that water was leaking into multiple locations within the warehouse.

6) Electric Arc

In the process of identifying ignition sources in the area, electrical wiring was identified moving thru the area of origin, including that of the 13.8KV supply for building 35. As the scene was excavated, evidence of electric shorts was found, along with multiple examples of melted conductors. These items were collected as evidence as the exam was completed and stored for future study.

Additional hypothesis were considered; however, they were eliminated as observation showed the ignition sources were either not in the area of origin and showed no indications of failure. These included forklifts, forklift charging stations, wrapping machines, vending machines, food microwaves and office equipment.

A key step in the investigation is the determination of how safety devices may have failed and how acts or omissions of both internal and external parties had an effect on how the fire originated and spread.

General Electric, who is insured by Factory Mutual, undergoes a yearly inspection by an engineer who identifies areas where improvements can be made to protective systems. The results of those inspections are provided to General Electric and then forwarded to Factory Mutual underwriters who make decisions about coverage and insurance rates.
Factory Mutual has for 14 years, recommended that GE change and upgrade their Mill Water operation from a manual system to an automatic system and that new pumps and water mains be installed. The engineer predicted that if an incident occurred, there would be approximately one minute for additional pumps to be brought on line, or Building 6 would be destroyed by fire.

At the time of the fire, the four west pumps were out of service because of ongoing upgrades, which are part of a five year project. GE reported that they were six months into the project, with the Mill Water plant the first area of focus. (Work had been scheduled on the very morning of the fire, but was canceled earlier in the week.)

In this case, an alarm on the sprinkler system occurred and it was 19 minutes and 54 seconds before security would attempt to call the operator at the Boiler House to have the pressure increased. There would be no answer at the Boiler House. Some 38 minutes and 34 seconds later, security would, for a second time, go to the Boiler House and then escort the Boiler House operator to the Mill Water house. Once at the Mill Water house there were failures of three of the four remaining pumps.

It should also be noted that during sprinkler inspections on 11/6/2013 and 12/2/14, a report generated by Midwest Sprinkler made note of the following:

1) The water gongs and motors test were satisfactory
2) (2014) That sprinkler heads were past their accepted age and require testing
3) (2014) All of the involved valves were not opened and closed
4) The height of storage required a reevaluation of the sprinkler system
5) (2013/2014) Incorrectly reported that the occupancy hazard was the same as it was when installed
6) (2013) that the hazards are not adequately protected

While a few people saw sprinklers in areas outside the origin, or after the fire had burned to an area outside the involved riser, there are an overwhelming number of people who report that the sprinklers were not flowing above the fire at the area of origin. Those include Karen Elbert (multiple areas of taped statement 04/03/15) and Nathan Allen (taped statement a few days after the incident and on 05/06/15). Mr. Christianson thought he saw sprinklers above the fire, but was at another riser when a sprinkler flowed above him. Jim Estes, another security officer could not see if sprinklers flowed above the fire.

(After the fire, the Bureau would investigate a fire in a large sprinkled warehouse containing palletized recycled paper and a shredding operation. That three alarm fire would be held in check by the sprinkler system and then extinguished by multiple lines laid on three sides of the building from an adequate domestic water supply.)
A review of Louisville Water company maps revealed that a significant amount of water is present outside multiple locations of the plant, with the greatest water supply on the west side of the plant.

Louisville Gas and Electric (LG&E) was contacted and provided that there was no interruption of power to the plant as a result of the storm.

An evaluation of the fire suppression command and operations revealed an aggressive attempt to extinguish the fire with an interior attack which was thwarted by the lack of any positive water. It was only after companies were able to lay supply lines outside of the plant, some at distances greater than 5800 feet, were they able to stop the fire at the eastern end of the building.

In the end the fire would cause in excess of 50 million dollars in damages to the structure (GE estimate), and 50 to 60 million dollars in damage to product.
At the time that the General Electric plant was constructed, it was given self-inspection status from the State Fire Marshal’s Office. Under this status, General Electric would serve as their own fire protection authority, and in fact had their own certified, state recognized, fire department. There are apparently three other manufacturing operations in Metro Louisville (2 Ford plants and UPS) that have this same status.

Originally the Black Mudd Fire Department, later transferred to the Okolona Fire Department at the time of their merger, would have response obligations but did not complete normal fire prevention inspections of the property. The only time that the State Fire Marshal would be active on the property was regarding hazardous materials.

Starting in March of 2002, the suppression response mission of the General Electric Fire Department was dismantled. Inspection and code issues were transferred to the other maintenance sections of the company, and the local fire districts became the main responders to fire incidents on the property.

There was never a yearly inspection of the property by a local or state government fire related agency. The Kentucky State Fire Marshal reported that during his tenure, he has never heard of the “Self Inspection Status”. The only substitution for local fire prevention inspection was the Factory Mutual yearly evaluation.

(A check of permits obtained from Metro Louisville Inspections Permits and Licenses revealed that the overwhelming number of them were for asbestos abatement.)

**Testing the Original Hypothesis**

While the search of the area of origin was extremely detailed, the size and spread of the fire subsequently obliterated important pieces that would normally allow for the determination of the final cause.

Electrical failures and lightning strikes are competent ignition sources. A significant storm occurred just prior to the fire at which time lightning was observed in the area. Significant rain fell which from the accounts of many witnesses had entered the structure at multiple locations.

Using deductive reasoning the possibility exists of an electrical failure or possibly lightning in the area of origin. Either of these two possible theories could have led to the conditions that are seen in the first photograph and video of the scene. The fire grew as it would be expected, and spread as it did which was consistent with the observations made by the undersigned. The time line of events explains why this occurred.

Previous experiments and research has shown that an electrical failure, including the results of those caused by the incursion of water onto the conductors, and lightning can be a competent ignition source.
Final Conclusion

After an extensive and labor intensive investigation as summarized above, the area of origin was determined. Other alternate areas were considered and eliminated. It is impossible to ignore the photograph and video although multiple interpretations from several enhancements resulted in different opinions as to what is observed.

After examination and interpretation of each component of data and while some of the possible causes can be eliminated, some cannot, those being an electrical failure or a lightning strike. While additional examination of the evidence might occur in the future, without any information that might be gleamed from those examinations, the cause shall be listed as undetermined as required by NFPA 921.
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Time from Water Flow</th>
<th>Time From FD Arrival</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/29/2012</td>
<td>21:52:00</td>
<td></td>
<td></td>
<td>Small fire at ceiling Building 5, southwest corner</td>
</tr>
<tr>
<td>4/29/2014</td>
<td>4:53:00</td>
<td></td>
<td></td>
<td>Indications of Smoldering Fire, Could not locate. Fire watch established. Odor was in computer room</td>
</tr>
<tr>
<td>4/29/2014</td>
<td>22:14:00</td>
<td></td>
<td></td>
<td>Fire around oven</td>
</tr>
<tr>
<td>1/29/2015</td>
<td>14:32:00</td>
<td></td>
<td></td>
<td>Ambulance Fire</td>
</tr>
<tr>
<td>3/3/2015</td>
<td>0:00:00</td>
<td></td>
<td></td>
<td>Building 6 at B-21: Crate smoldering Cigarette Fire</td>
</tr>
<tr>
<td>3/18/2015</td>
<td>12:22:46</td>
<td></td>
<td></td>
<td>Water flow alarm at 2635 P2</td>
</tr>
<tr>
<td>3/19/2015</td>
<td>0:00:00</td>
<td></td>
<td></td>
<td>Fire involving Dryer at AP 35</td>
</tr>
<tr>
<td>4/3/2015</td>
<td>6:45:00</td>
<td></td>
<td></td>
<td>GE security shift meeting</td>
</tr>
<tr>
<td>4/3/2015</td>
<td>6:50:32</td>
<td>0:01:25</td>
<td></td>
<td>Karen Elbert with Derby calls 911 by telephone after seeing fire</td>
</tr>
<tr>
<td>4/3/2015</td>
<td>6:50:58</td>
<td>0:01:51</td>
<td></td>
<td>Nathan Allen with Derby calls 911 by telephone after seeing the fire</td>
</tr>
<tr>
<td>4/3/2015</td>
<td>6:51:21</td>
<td>0:02:14</td>
<td></td>
<td>Photo taken by Derby Employee Laura Childress</td>
</tr>
<tr>
<td>4/3/2015</td>
<td>6:51:21</td>
<td>0:02:14</td>
<td></td>
<td>Fire Department in time</td>
</tr>
<tr>
<td>4/3/2015</td>
<td>6:51:42</td>
<td>0:02:35</td>
<td></td>
<td>Nathan Allen phone call with 911 ends</td>
</tr>
<tr>
<td>4/3/2015</td>
<td>6:51:43</td>
<td>0:02:36</td>
<td></td>
<td>Nathan Allen calls GE security by telephone and reports fire to them</td>
</tr>
<tr>
<td>4/3/2015</td>
<td>6:52:05</td>
<td>0:02:58</td>
<td></td>
<td>B column Speaker wire running east to west shorts/opens</td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
<td>Event</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>--------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>6:53:19</td>
<td>Pull Station 2621 activated on first floor of office area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>6:53:35</td>
<td>Video taken inside building by Nathan Allen (Derby)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>6:56:40</td>
<td>GE Security dispatched to Building 6 on a structure fire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>6:58:01</td>
<td>GE Security calls 911</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>6:58:12</td>
<td>McMahan command officers on scene</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>6:58:55</td>
<td>Okolona 8006 arrives on scene</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:00:00</td>
<td>Heavy Smoke, south side according to Park Federal Bank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:00:18</td>
<td>GE Security (Fuller) takes photo from west side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:02:52</td>
<td>Heavy Smoke showing west end of building</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:03:46</td>
<td>Heavy Fire showing inside overhead door</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:04:17</td>
<td>Second Alarm Requested</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:05:40</td>
<td>Security officer Brooks tells radio by radio to call the Boiler House</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:06:00</td>
<td>Electric Clock in AP 35 stops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:07:39</td>
<td>Third Alarm Requested</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:08:00</td>
<td>Electric Clock in AP 35 stops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:09:00</td>
<td>Tony French calls Bibbs cell phone.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:09:01</td>
<td>Security advises no one answers the phone at Boiler House</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
<td>Duration</td>
<td>Details</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------</td>
<td>----------</td>
<td>-------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:09:01</td>
<td>0:19:54</td>
<td>1105 evacuates firefighters from the building</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:10:00</td>
<td>0:20:53</td>
<td>Bibb calls Jeff Pendleton, his supervisor, call last 40 seconds</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:12:00</td>
<td>0:22:53</td>
<td>Bibb calls Tony French, Call last 25 seconds</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:13:10</td>
<td>0:24:03</td>
<td>Michelle Salles meets Bibb, he is doing what he can</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:16:48</td>
<td>0:27:41</td>
<td>Request to command to have Millwater pressure raised</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:18:51</td>
<td>0:29:44</td>
<td>Building Collapse</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:19:40</td>
<td>0:30:33</td>
<td>Not enough water, have to go outside property</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:24:00</td>
<td>0:34:53</td>
<td>Tony French calls Bibb. Call last 26 seconds</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:24:08</td>
<td>0:35:01</td>
<td>Fuller is sent to the Boiler House</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:26:00</td>
<td>0:36:53</td>
<td>Tony French takes photo at Shepardsville and Fern Valley</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:26:00</td>
<td>0:36:53</td>
<td>Bibb calls Jeff Pendleton. Call last 1:21</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:27:41</td>
<td>0:38:34</td>
<td>Fuller leaving Boiler House on way to Mill Water</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:31:00</td>
<td>0:41:53</td>
<td>Bibb calls Jeff Pendleton. Call last 1:30</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:34:00</td>
<td>0:44:53</td>
<td>Bill calls Jeff Pendleton. Call last 27 seconds</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:36:00</td>
<td>0:46:53</td>
<td>Fuller reports mill water done all they can do.</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:40:00</td>
<td>0:50:53</td>
<td>Rick Urschel calls Bibb. Call last 2:31</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:44:00</td>
<td>0:54:53</td>
<td>Rick Urschel calls Bibb. Call last 23 seconds</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:46:00</td>
<td>0:56:53</td>
<td>Bibb calls Rick Urschel. Call last zero seconds</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:46:00</td>
<td>0:56:53</td>
<td>Bibb calls Rick Urschel. Calls last four seconds</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:47:00</td>
<td>0:57:53</td>
<td>Bibb calls Rick Urschel. Call last zero seconds</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:47:00</td>
<td>0:57:53</td>
<td>Bibb calls Rick Urschel. Call last four seconds</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
<td>Duration</td>
<td>Event Description</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>--------</td>
<td>----------</td>
<td>---------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:47:00</td>
<td>0:57:53</td>
<td>Bibb calls Rick Urschel. Call last three seconds.</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>7:48:36</td>
<td>0:59:29</td>
<td>No 5th alarm companies, dispatched PRP</td>
<td></td>
</tr>
<tr>
<td><strong>4/3/2015</strong></td>
<td><strong>7:53:23</strong></td>
<td><strong>1:04:16</strong></td>
<td>Director of GE Safety wants Building 5 evacuated</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>8:20:14</td>
<td>1:31:07</td>
<td>Order given to evacuate Building 10</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>8:31:02</td>
<td>1:41:55</td>
<td>LFD request additional equipment eventually totaling 13 apparatus and 8 command officers</td>
<td></td>
</tr>
<tr>
<td>4/3/2015</td>
<td>8:45:10</td>
<td>1:56:03</td>
<td>Manhole cover blown</td>
<td></td>
</tr>
</tbody>
</table>

Updated 07/19/15 at 1500 Hours