

# Commercial Investigation #3

Mr. Bill Biloxi  
Subrogation Company #1

Re:            *Insured:*            Medical Facility #1  
                 *Loss Location:*       Columbus, Ohio  
                 *Claim No.:*            <omitted>  
                 *Date of Loss:*         August 2003  
                 *IC1 Project No.:*      <omitted>

Dear Mr. Biloxi,

On August 2003, a lightning from a thunderstorm reportedly caused damage to a fire alarm system installed at the insured's location, Medical Facility #1 located in Columbus, Ohio. A LightningReport survey of the lightning activity within a 5 mile radius of the facility on the day of the loss provided by Medical Facility #1 insurer, Insurance Company #1, showed <a lot of> ground level lightning events.

On October 2003, Mr. Bill Biloxi of Subrogation Company #1 of Ohio, contacted Investigation Company #1 (IC1) and requested IC1's assistance in determining whether lightning caused the continuing reported malfunctions in the fire alarm system. Mr. Biloxi was representing the interests of the insurer, Insurance Company #1. The author of this report, Scott A. Jones, P.E., Mechanical Engineer of IC1, (812) 944-9988, was assigned to conduct the investigation.

By the time of the author's involvement, the fire alarm system had been returned to service. The observations from a site visit, observations from a purportedly damaged circuit board sent to the author by the insured, interview information, and the discussion and conclusions of the investigation are contained in this report.

## ***Background***

On October 2003, the author discussed the events of the loss with Mr. Jim Davenport, Financial Officer for Medical Facility #1, and Mr. Ken Ohms, Owner of Ohms Electric Company, a local electrical contractor. Mr. Ohms was served as the electrical contractor for a new addition that was under construction at the time of the event.

Per Mr. Davenport, the subject facility was built in the <1970's>. The insured purchased the facility in <the 1990's>. The facility comprised approximately 60,000 ft<sup>2</sup> of finished space. The alarm system consisted of approximately 120 smoke detectors and 30 pull stations arranged into a 5-zone, 4-wire system. Alarm Company #1 manufactured the Type 8000 alarm panel.

Up to the time of the reported thunderstorm (i.e., on the reported date of loss), the alarm system had consistently operated with few problems. Following the thunderstorm, Mr. Davenport reported that the nurse call board, which was unrelated to the fire alarm system, needed to be replaced because it no longer functioned correctly. In about the same time, Mr. Davenport noted that the subject alarm panel started having trouble signals on the alarm circuits.

Troubleshooting efforts by the alarm panel service company, BeepCo of Ohio, revealed that parts of the alarm wiring system would occasionally ground. BeepCo reportedly returned the subject panel to service by unknown methods. BeepCo representatives reportedly informed Mr. Davenport that the alarm panel was obsolete and that replacement parts were becoming increasingly hard to locate. *Author's note: BeepCo was unable to send a service representative to discuss their findings on the day of the author's visit.*

Mr. Davenport reported that an inadvertent alarm was received on the panel on October 2003. The inadvertent alarm was attributed to unknown activities related to the construction of a 1300 ft<sup>2</sup> addition to the building. Construction was on going at the time of the author's visit.

Mr. Ohms reported that he had participated in troubleshooting trouble alarms with the subject panel and that the grounds would seem to "move around". He noted that the panel seemed very slow to reset and that it would sometimes require hours to clear an alarm trouble condition. Mr. Ohms also noted that he would not be able to wire the new smoke alarms and pull stations to the existing alarm panel as long as the alarm panel acted erratically.

#### Interview with Mr. Greg Safe, Owner of BeepCo

On October 2003, the author interviewed Mr. Safe by telephone to learn his observations of the alarm system installed at the subject facility. Mr. Safe had learned about the condition of the system from the BeepCo technicians who had performed maintenance on the system.

Mr. Safe related the following:

- The subject system operated erratically due to a lightning strike.
- The system exhibited what he called "ghost grounds".

- He noted that it was becoming more difficult to obtain circuit boards for the unit.
- His attorneys advised him that he should not continue servicing the system.
- He would only be comfortable with continued operation of the system if the entire wiring system to the alarms and pull stations were replaced.
- He felt as though the door holder circuits could be re-used.
- When queried by the author, he did not know of any specific damage from the reported lightning event of August 2003.

#### Interview with Doug, Service Technician at BeepCo

On October 2003, the author interviewed Doug (no last name given), the BeepCo service technician who had most recently performed maintenance on the alarm system at the facility. He had also performed corrective maintenance to the alarm system following the reported lightning event.

His observations were as follows:

- The system suffered from internal ground faults.
- He reported that he replaced a system zone card. He could not locate the reported damaged card by the time the author left the facility.

*Author's note: the zone card that was reportedly removed from the panel was later sent to the author for inspection. See the Observations section for details regarding the author's inspection of the card.*

#### **OBSERVATIONS**

On October 2003, the author performed a site inspection at the subject facility. Mr. Davenport and Mr. Ohms were in attendance for a majority of the inspection.

The subject facility received electrical service from overhead conductors situated to the north side of the facility (*Photograph 1*). The conductors traveled below grade to a transformer vault situated adjacent to the facility (*Photographs 2 and 3*). The subject alarm panel was powered from an emergency power panel, which reportedly could be powered from an emergency diesel-generator as well as commercial power.

*Photograph 4* shows the floor plan and zone assignments for the alarm system. The smoke detectors in each of the resident rooms and common spaces consisted of a fixed base (*Photograph 5*) electrically connected in series using a 4-wire system. The photoelectric smoke detector heads were provided with a bayonet mount to the detector bases.

The author toured a portion of the attic region to examine the layout and support of the alarm system conductors. The conductors were routed in an ad hoc manner as shown in *Photographs 7 and 8* (red conductors). The conductors were supported in an ad hoc manner (*Photograph 9*) including regions where the conductors were exposed to sharp edges (*Photograph 10*).

The nurse's call box, which was not examined as part of this investigation, appeared as shown in *Photograph 11*.

The Alarm Company #1 alarm panel appeared as shown in *Photograph 12*. The panel was served by a remote communicator (*Photograph 13*) that linked to the central station service.

### Alarm Panel Inspection



**Figure 1 - Zone Card Layout**

As shown in *Figure 1*, which was created from *Photograph 14*, the zone cards for Zones 1 through 4 were laid out with each card sharing alarm function for the smoke detectors

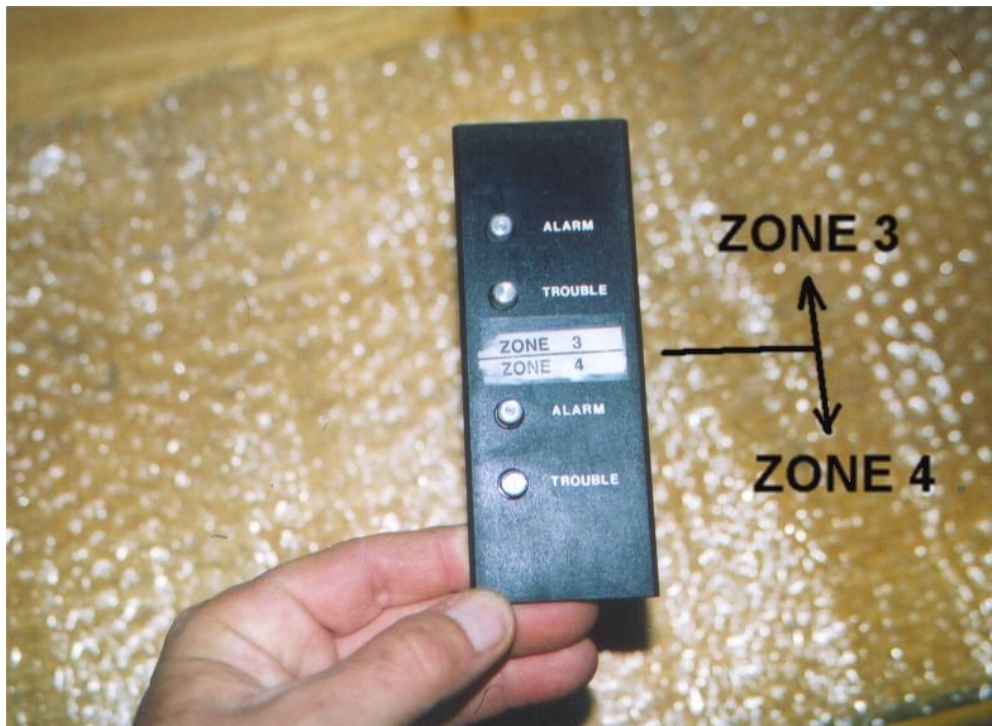
as well as the pull stations. Expansion alarm slots with blank cover plates were situated to the right of the Zone 1 through 4 cards (*Photograph 15*).

The alarm panel transformer and power card were situated below the alarm cards (*Photograph 16*) and showed no indications of arc flash marks, conductor insulation charring, or any other indications of exposure to lightning-induced over-voltage.

#### Inspection of Reported Damaged Zone Card

During the first week of November 2003, Mr. Davenport contacted the author and reported that BeepCo recovered the zone card that was replaced to restore operability of the alarm panel following the reported August event. Mr. Davenport reportedly took possession of the card and sent the card via common carrier to the author soon thereafter.

*Figure 2*, which was developed from *Photograph 17*, shows a front view of the alarm card that was represented to have been taken from the subject alarm panel following the August 27<sup>th</sup> event.



**Figure 2 - Zone Card Reportedly Removed from Alarm Panel Following August 27th Event**

As can be seen in *Figure 2*, the zone card was laid out in a completely different manner than the existing cards in the alarm panel (reference *Figure 1*). The zone card that was sent to the author *shared two different zones on the same card*, whereas the existing cards installed at the facility *shared pull stations and smoke detectors on the same card*.

*Photograph 18* shows the manufacturer's identification for the zone card sent by Mr. Davenport. *Photograph 19* shows a top view of the reportedly damaged card circuit board. *Photograph 20* shows a bottom view of the circuit board with indications that the integrated circuit at the center of the card had been altered by hand soldering.

The reportedly damaged circuit board had one broken etched copper trace at the edge of the board (*Photograph 21*). Each end of the damaged copper trace is shown in *Photographs 22 and 23*.

### System Trouble Test

With the author stationed at the alarm panel, the author had Mr. Ohms remove smoke detectors from their respective mounts in the patient rooms. During two trials, an authentic trouble signal, as appropriate, was received at the alarm panel. The smoke detectors were returned to their respective ceiling mounts, and the trouble signals appropriately cleared from the alarm panel.

### *Discussion/Conclusions*

The subject Alarm Company #1 alarm board installed at the insured's facility appeared to be operational in all respects on the day of the author's inspection. There were no trouble signals present at the time of the inspection. Operational test of the trouble circuits showed satisfactory operation of the same.

There were no indications of arc flash marks on any of the inspected components within the panel including the panel power supply. There were no indications of a lightning strike on the roof or gutters as ascertained by the author's inspection of the same.

Inspection of the alarm wiring in the attic portion of the building showed that the alarm conductors were not routed in a cable tray or any other systematic way to ensure that the conductors would not come into contact with adjacent components. As shown in *Photograph 10*, the alarm conductors came into the contact with sharp-edged pipe brackets at least two locations near the alarm panel.

*With regard to the zone card that was sent to the author by Mr. Davenport and represented to have been the zone card installed prior to the August 27<sup>th</sup> event, it is not believed the zone card was ever installed in the subject alarm panel. The zone card was marked in a manner that was completely inconsistent with the markings of the existing cards. The reportedly damaged zone card had indications of hand-soldering and a broken copper trace that was damaged by unknown means.*

The LightningReport printout of lightning activity that was provided by Insurance Company #1 showed <a lot of> ground-level lightning events during the calendar day of August in a 5 mile radius surrounding the facility. *From the author's inspection of the*

*facility and the alarm panel, it is not believed that lightning caused direct damage to the subject alarm panel.*

The author could not discern whether the “phantom grounds” that were being reported at the facility were caused by the poor alarm conductor routing methods, agitation of the conductors from the construction activity for the building expansion, wetting of the overhead conductors, or other means that promoted grounding of the conductors. *Regardless, it is not believed that a lightning event at the facility would cause a “moving ground” condition in the respective conductors.*

The conclusions drawn in this investigation are based on an analysis of the information collected during the site visit, researched data and engineering knowledge, and information provided by the insured and the client. Information or data that becomes available at a later date may justify the modification of the results or conclusions at that time. IC1 maintains additional information regarding the subject claim on file and the preparation of a more detailed report can be undertaken if warranted in the future.

We appreciate the opportunity to work with you on this claim. Pending further direction this file will now be placed in a closed status. Please let us know if we can be of further assistance on this claim or any future claims.

Sincerely,

Investigation Company #1

Scott A. Jones, P.E., C.F.E.I.  
Mechanical Engineer