

Root Cause Analysis Report

Oakland Warehouse Fire (Ghost Ship)



Problem Statement

Report Number	RCA-08-12-2016-066	RCA Owner	Brian Hughes
Report Date	12/9/2016	RCA Facilitator	Brian Hughes

Focal Point: 36 fatalities, potential for an additional ~66 injuries and/or fatalities

When

Start Date: 12/2/2016

End Date: 12/3/2016

Start Time: 11:30PM

End Time: 4:30AM

Unique Timing

The fatalities occurred after a fire broke out during a live musical performance and after attendees were not able to exit.

Where

Component

Ignition source: Unknown, but electrical suspected

Facility

10,000-square-foot (930 m2) converted warehouse, known as Ghost Ship

Location

2nd Floor of warehouse

Actual Impact

Safety

36 fatalities, no additional serious injuries

Cost

Complete loss of building

Legal

Unknown, but legal impact will be substantial (both criminal and civil) for both the property owner and the City of Oakland

Actual Impact Total: \$0.00

Frequency

Frequency Note

This was the deadliest building fire in the USA since the Station nightclub fire, which occurred on Thursday, February 20, 2003, in West Warwick, Rhode Island. (100 dead, 230 injured, 132 escaped unharmed).

Potential Impact

Safety	Potential additional fatalities and injuries to residents, guests, and to emergency response personnel. 50 attendees 52 firefighters
Legal	Potential criminal and civil action
Cost	Fire could have spread to other buildings

Potential Impact Total: \$0.00

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Report Summaries

Executive Summary

READ THIS FIRST:

We need to disclose that this **EXAMPLE RCA** is based upon publicly available information from a variety of sources (mostly newspaper articles) and **not from any independent investigation conducted by Sologic**. Sologic has not investigated this incident in any official capacity, and we do not want to imply that we were in any way associated with this event. The only purpose of this root cause analysis report is for it to be used as an example for our students and other interested parties.

A root cause analysis has two primary goals: 1) Organize a wide array of information from disparate sources in a way that makes it easier to understand, and 2) Identify a set of evidence-based solutions to present to decision makers. We were able to accomplish the first goal – but this event is still being investigated, and as such we decided to hold off on recommending solutions. Readers may find themselves coming up with their own solutions, to which we say “terrific!” Share them with us if you wish. We would be happy to include them in a future update once we have all the facts.

This example was prompted by a request from the New York Times. The reporters of the series of articles about this event asked for help from the public to gather information, which is unprecedented. In response, we pulled together and shared an initial RCA with them based on the limited available information. Did they use it? There is no way to know – the reporters didn’t contact us, although their subsequent reporting did examine many of the questions our initial RCA raised (so we’re hopeful!). Would an RCA be a useful means of efficiently gathering the information needed to write an investigative article? Without question.

This report is written differently than an actual professional report. We are using this as a learning tool, and as such have chosen a style that communicates directly with the reader as if they were learning how to investigate and compile a root cause analysis.

Cause and Effect Summary

On 2-December, 2016 at approximately 11:30PM, a fire broke out in an Oakland, CA warehouse during a musical performance. 36 people attending the performance died when they were unable to exit the building. However, there was potential for an additional 66 people to have been injured or killed. For reference, this was: 1) The deadliest building fire in the USA since the Station nightclub fire in West Warwick, Rhode Island left 100 dead and 230 injured on 20-February, 2003 and 2) The worst such event in the San Francisco Bay Area since the 1906 earthquake.

With an example like this, it’s hard to know where to stop. Take a minute to scroll to the right-hand side of the chart and you’ll gain an appreciation for how complex this problem is – it has causal pathways as disparate as the high cost of housing in the bay area, gaps in governmental oversight, shoddy building practices, incompetent management, and a willingness to under estimate both the probability and consequence of a major structure fire with limited fire suppression and exit points. But with large catastrophic events like this, that’s what we would expect. The question is - can we learn enough from this event to dramatically reduce the risk of this happening again? And will this new knowledge lead to the required changes?

The focal point (starting point) for this analysis is “36 fatalities, potential for an additional ~66 injuries and/or fatalities.” That’s a longer statement than we normally recommend, but in this case it’s both appropriate and helpful. It’s appropriate because when people die or are injured, we want that to be the focus of the investigation. Yes, a few million dollars in damage also occurred. And yes, there is a potential for legal trouble (both civil and criminal) for many involved parties. But as a rule, we choose to document these in the Impact section of the Problem Statement. This choice of focal point language also sets up the cause and effect chart nicely. It separates nicely into two main branches. One branch is “36 fatalities.” This is obviously important because we want to know, specifically, why people died. The other branch is “Potential for ~66 fatalities/serious injuries.” This branch will allow us to understand why any of these people were at risk and also, why some of them were able to escape.

36 Fatalities:

The cause “36 fatalities” breaks down easily into two branches: 1) “Massive structure fire,” and 2) “36 people could not escape.” Whenever a fire is involved, it’s a good idea to immediately add placeholder causes for “ignition source,” “combustible material,” and “oxygen.” Now, since we are talking about a building with a public space in which people lived and congregated, it’s also appropriate to examine why the fire could grow so large, so fast. The word “Massive” points to the fact that this fire was large and overwhelming. Why didn’t the fire suppression system kick in to knock it down and/or alert those in the building before it got so big? At the time of this report, there is no information available about any sort of sprinkler system, alarms, or fire extinguishers. However, one former resident reported that he would sleep with a fire extinguisher because of the potential danger.

You will notice that the “Combustible Material” branch offers a rich amount of information. Pictures of this warehouse prior to the fire show combustible material everywhere, from tapestries and textiles to wooden furniture and artwork, as well as the fact that the internal structure was largely wood. There were reportedly several travel-trailers/RVs on the first floor which may have had tires and propane tanks. The bottom line is there was plenty of fuel available.

One missing link is the ignition source, but this is a moot point. Even if investigators determined what exactly started the fire, ignition could have plausibly come from a variety of sources. The fact is that the place burned because it *could* burn. It was just a matter of time before a wire shorted out, a portable heater got too close to a towel, a candle ignited a piece of clothing, or any other array of ignition scenarios.

Okay, so that explains the fire and why it got so big so quickly. But why didn’t people just run out when they saw the smoke and flames? A [graphic from the New York Times](#) clarifies just how much of a maze this place was. A musical performance was taking place on the second floor. But to get to this area, attendees and musicians had to wind around multiple obstacles to then climb a stairway that had been built partially out of used pallets. Previously this part of the building had been occupied by a conveyor belt. The stairway was built after removing the conveyor equipment. The only possible additional exit was a kitchen window on the second floor. The fire started on the first floor and was fully involved before those on the second floor were aware of it. The area immediately filled with thick smoke, making it impossible to see or breathe. The lights went dark. And those who didn’t find their way out were quickly overcome by smoke. Even though firefighters arrived on the scene within minutes, there was no way for them to safely enter. People either got out on their own, or they didn’t get out at all.

Potential for an additional ~66 fatalities/serious injuries:

This branch begins by breaking down the numbers. There were an estimated 50 people in the building at the time of the fire. 52 firefighters arrived on scene. Therefore, an approximate total of 102 people were potentially at risk. Breaking the larger number down into smaller subsets allows us to examine their various experiences along with what brought them together at this place and time.

An estimated 50 people were present in the building prior to the fire. Most of these people were on the second floor attending a musical performance. But some of them were residents or guests in different parts of the building. The musical performance involved a series of artists, all from a single record label – the event sponsor.

But why choose this location? What information was (or was not) considered in making that decision? Apparently, the record label had used this space in the past and found it desirable. While investigating an incident like this, your lines of questioning should include past experiences, whether risks were discussed or assessed, and if so, how did those discussions ultimately lead to the decision to go ahead with this choice?

This is very interesting ground for the RCA investigator because it provides an opportunity to uncover how people address risk. How do our minds work when we desire an outcome, but are required to assume risk to achieve the outcome? How do our past experiences shape our decision to proceed, or not to proceed? This line of questioning can lead to a greater understanding of how we perceive, react to, and manage risks.

It's also fraught with risk for the investigator because these lines of inquiry are often perceived as an attempt to assign blame and lay the groundwork for punishment. Particularly in this case, due to the extreme impact, a great deal of skill (and perhaps immunity from consequences, and/or allowing sources to contribute anonymously) is required to extract honest answers. No one wants to stack wood wide and high around the pole they will ultimately be tied to.

Also, people lived and worked here. Why would they do this, even when at least some of them clearly recognized that the place was at risk of burning? There are the economic realities of life in the Bay Area – it's expensive. The technology boom has brought a lot of new residents to the area and all of them make a substantial amount of money. There is a limited amount of housing available. People who have housing don't want to enter the market, so inventory remains bottled up. This drives up the price of housing, which in turn applies pressure on those who desire to live in the Bay Area, but who do not have a lot of money. Artists like those that rented space in the Ghostship could move to a cheaper town, but why would they?. They had the Ghostship. Prior to the fire, it probably seemed like a perfect solution.

This warehouse was available. The owner found a single person to rent it to, and then either explicitly or implicitly allowed that person to sublet it out to many other people. Because it was not intended to be a residential space, the overall rent was low enough and the space large enough to profitably offer up multiple individual spaces to those who desired such accommodations. The freedom from high rents and restrictive regulations allowed tenants to make the space into whatever they wanted it to be.

A variation of the risk discussion we had earlier is applicable here as well. Residents liked the space and wanted it to be home to them. They could afford it. There were limited rules. The owners were on board – as long as the rent came in on time, they were happy. Most importantly to everyone, no fire had yet occurred. In fact, no fires had occurred in any of the other multiple similar warehouse dwellings around Oakland (or anywhere else, for that matter). This likely played into the perception that the risk of residing in the Ghostship (and using it as a music venue) was worth taking.

The City of Oakland plays a significant role here as well. The City building and fire departments could have identified these risks and shut the place down. But they didn't. Why not? Apparently, building inspectors had recently attempted to inspect the place, but were unable to gain access, so they left. The fire department has a reported 62 vacancies of positions that have been funded, but not yet filled. This building hadn't been inspected in more than 30 years, if ever, despite a requirement to inspect every 2 years. Clearly, there are massive systemic issues with how the City of Oakland is being managed. A cause like this is often a launching point into a different investigation. Hopefully the City of Oakland will recognize this event as a wake-up call that city residents are at risk and that the gaps uncovered by this, and subsequent investigations, need to be closed.

- End of Report -

Solutions

SO-0008	Solution	Solutions to come at a later date, but feel free to identify your own and send them to us.	
	Cause(s)		
	Note	No additional notes	
	Assigned	Criteria	Not Checked
	Due	Status	Validated
	Term	Cost	

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Team

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Owner

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Evidence

EV-0001	Evidence	When 36 Died in Oakland: Delving Into What Happened, and Why By THE NEW YORK TIMES UPDATED 6:56 AM
	Cause(s)	36 fatalities 36 people could not escape ~50 people present in the building at time of fire 52 firefighters present fighting the fire A broader "warehouse community" of artists exists Artists and others do not generally make a lot of money Attending a musical performance Bay Area is one of the most expensive places in USA to live Combustible art supplies Combustible building materials (such as a stairway made of pallets) Combustible material added by people Combustible material piled outside the structure Combustible material present Demand for this particular space exists Egress points were not adequate Few/no marked exits Fire Department manages safety inspections Fire spread rapidly Ignition source(s): Large amount of combustible material, inside and outside Large demand for housing in the Bay Area Limited supply of housing in the Bay Area Many people have substantial disposable income Many tech workers have substantial incomes Massive structure fire No (or limited) fire protection systems 62 funded, yet vacant Fire Department positions Nothing as bad as this event has happened in the past Oxygen present: Atmosphere Performance took place on 2nd floor Popular lineup - people desired to see the artists on the bill Rent in this warehouse was considered "affordable" Potential for an additional ~66 fatalities/serious injuries Rental rates were cheaper than most on the market Renting this kind of space is common, considered acceptable Responsible officials did not enforce code policies Smoke/fire was overwhelming Stairway to 2nd floor was built out of pallets Structure constructed from wood Tech boom cash infusion - many tech workers

Tenants desired this particular community
 These tenants desired to live in the Bay Area specifically
 This warehouse space was available
 Those controlling the warehouse chose to offer space to renters
 Venue choice: Record label chose this location
 Warehouse used as a residence
 ~14 people escaped
 Got low to ground
 Were able to find exit
 Attending a musical performance
 This space wasn't intended as residential

Location(s)

<http://www.nytimes.com/2016/12/08/us/the-oakland-fire-delving-into-what-happened-and-why.html?hp&action=click&pgtype=Homepage&clickSource=story-heading&module=photo-spot-region®ion=top-news&WT.nav=top-news>

Attachment(s)

Contributor

Brian Hughes

Type

URL

Quality

★★★★★

EV-0002

Evidence

Oakland's 'Ghost Ship,' Site of Fire, Was a Motley Warehouse With a History By JULIE TURKEWITZ, THOMAS FULLER, RICHARD PÉREZ-PEÑA and CONOR DOUGHERTY DEC. 5, 2016

Cause(s)

Location(s)

<http://www.nytimes.com/2016/12/05/us/oakland-fire-ghost-ship-warehouse.html>

Attachment(s)

Contributor

Brian Hughes

Type

URL

Quality

★★★★★

EV-0003

Evidence

Oakland fire chief can't say if Ghost Ship warehouse was ever in department's database

Cause(s)

Fire spread rapidly

Location(s)

<http://www.latimes.com/local/lanow/la-me-ln-ghostship-oakland-warehouse-fire-20161209-story.html>

Attachment(s)

Contributor

Brian Hughes

Type

URL

Quality

★★★★★

EV-0004

Evidence

Why the 'Ghost Ship' Was Invisible in Oakland, Until 36 Died By THOMAS FULLER, JULIE TURKEWITZ, YAMICHE ALCINDOR, CONOR DOUGHERTY and SERGE F. KOVALESKI DEC. 22, 2016

Cause(s)	Inspectors attempted to inspect, but were unable to gain access City of Oakland did not inspect 62 funded, yet vacant Fire Department positions Fire Department manages safety inspections Fire department did not inspect Officials unaware of code violations Responsible officials did not enforce code policies
Location(s)	https://www.nytimes.com/2016/12/22/us/why-the-ghost-ship-was-invisible-in-oakland-until-36-died.html
Attachment(s)	
Contributor	Brian Hughes
Type	URL
Quality	★★★★★

EV-0005	Evidence	The Oakland Fire: What Happened Inside the Ghost Ship By FORD FESSENDEN and ANJALI SINGHVI DEC. 12, 2016
	Cause(s)	Property owner decided to rent Property managers decided to rent
	Location(s)	http://www.nytimes.com/interactive/2016/12/12/us/oakland-warehouse-ghost-ship-fire.html
	Attachment(s)	
	Contributor	Brian Hughes
	Type	URL
	Quality	★★★★★

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Actions

AC-0001	Action	Was the refrigerator the ignition source? If so, what specifically happened? Was it the refrigerator itself, or the power source to the refrigerator?
	Cause(s)	Refrigerator suspected to be the ignition source?
	Assigned	
	Date	12/11/2016
AC-0002	Action	What is it about the Bay Area that is so appealing to artists?
	Cause(s)	These tenants desired to live in the Bay Area specifically
	Assigned	
	Date	12/11/2016
AC-0003	Action	How is the housing crisis in the Bay Area driving demand for this kind of space?
	Cause(s)	Limited supply of housing in the Bay Area
	Assigned	
	Date	12/11/2016
AC-0007	Action	See AC-0019
	Cause(s)	
	Assigned	
	Date	12/11/2016
AC-0011	Action	Were there fire extinguishers available? If not, why not?
	Cause(s)	No fire extinguishers?
	Assigned	
	Date	12/11/2016
AC-0012	Action	Why were there no sprinklers?
	Cause(s)	No fire suppression system?
	Assigned	
	Date	12/11/2016
AC-0013	Action	Why were there no alarms?
	Cause(s)	No alarms?

Assigned**Date** 12/11/2016

AC-0014	Action	Why was there so much combustible material around?
	Cause(s)	Combustible building materials (such as a stairway made of pallets)
	Assigned	
	Date	12/11/2016
AC-0015	Action	Why was there so much combustible material around?
	Cause(s)	Combustible material piled outside the structure
	Assigned	
	Date	12/11/2016
AC-0016	Action	Why was there so much combustible material around?
	Cause(s)	Combustible art supplies
	Assigned	
	Date	12/11/2016
AC-0017	Action	Why did they decide to rent this space out?
	Cause(s)	Property managers decided to rent
	Assigned	
	Date	12/11/2016
AC-0018	Action	Why did they decide to rent this space out?
	Cause(s)	Property owner decided to rent
	Assigned	
	Date	12/11/2016
AC-0020	Action	Causes Unknown
	Cause(s)	Performance took place on 2nd floor
	Assigned	
	Date	12/11/2016
AC-0019	Action	What is going on with the City of Oakland and the Fire Department? Why no (or few) inspections?
	Cause(s)	
	Assigned	
	Date	12/11/2016
AC-0021	Action	Causes Unknown

	Cause(s)	Stairway to 2nd floor was built out of pallets
	Assigned	
	Date	12/11/2016
AC-0022	Action	Causes Unknown
	Cause(s)	Few/no marked exits
	Assigned	
	Date	12/11/2016
AC-0023	Action	Causes Unknown
	Cause(s)	Debris and clutter prevented exit?
	Assigned	
	Date	12/11/2016
AC-0024	Action	Causes Unknown
	Cause(s)	Other???
	Assigned	
	Date	12/12/2016
AC-0027	Action	Causes Unknown
	Cause(s)	Officials aware of code violations, yet did not enforce?
	Assigned	
	Date	1/19/2017
AC-0025	Action	Causes Unknown
	Cause(s)	Wiring/electrical system ignition source (suspected)?
	Assigned	
	Date	1/16/2017
AC-0026	Action	Causes Unknown
	Cause(s)	Venue choice: Record label chose this location
	Assigned	
	Date	1/16/2017

Root Cause Analysis Report

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Notes

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Chart Key

- Transitory
- Non-Transitory
- Transitory Omission
- Non-Transitory Omission
- Unidentified
- Chief Quality Agent
- Final Point
- Evidence
- Solutions
- Notes
- Actions

