

**INTERNATIONAL**

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# **FIRE PROTECTION**

**THE GLOBAL VOICE FOR PASSIVE AND ACTIVE FIRE PROTECTION**



Special Report  
The Next Generation  
of Flame Detectors

# Is there a fire epidemic facing the waste and recycling industry?

With the risks of inherent fire only increasing, we need to develop and install solutions that can mitigate the fires as early in the process as possible. Especially when the materials we are processing in the waste and recycling industry are unpredictable.



**Ryan Fogelman**

Ryan Fogelman, JD/MBA, is VP of Strategic Partnerships for Fire Rover and Ryan is focused on bringing innovative safety solutions to market. Ryan has been compiling and publishing the "The Reported Waste & Recycling Facility Fire In The US/CAN" since February of 2015, publishing the "Waste & Recycling Facility Fire Annual Report" and speaks regularly on the topic of scope of the problem, detection solutions and onsite proactive suppression solutions. He can be reached at [rfogelman@firerover.com](mailto:rfogelman@firerover.com).

**T**here is certainly no simple answer to that question, but it is an issue that needs addressing. The Merriam-Webster Dictionary defines an epidemic, "as an outbreak or product of sudden rapid spread, growth or development." Although we have been faced with facility fires in the waste and recycling industry for years, we are just now seeing the real extent of the problem.

According to the NFPA (National Fire Protection Association) between 2009 and 2013: "US fire departments responded to an estimated average of 37,000 fires at industrial or manufacturing properties each year, with annual losses from these fires estimated at 18 civilian deaths, 279 civilian injuries, and \$1 billion in direct property damage." In an article penned by Stephen Watkins, "Preventing the Five Major Causes of Industrial Fires and Explosions" that appeared in Occupational Health & Safety in February of 2017, he states that the five main causes of manufacturing and industrial fires are: (1) hot works; (2) dust explosions; (3) flammable liquids and gasses; (4) faulty equipment and machinery, and; (5) electrical hazards. Although these risks certainly need to be accounted for, there is a proliferation of unique risks that we face in our waste and recycling operations whether you are recycling or processing metals, plastics, waste, metals, chemicals, C&D, paper, rubber, organics and hazardous materials.

During the past twelve months from May 2017 to April of 2018, I have consolidated 347 "reported" fires published by a news outlet as waste and recycling operations within the US and Canada. Based on my research and a number of factors including the number of fires at waste and recycling facilities within the UK, an average of 332 documented fires at waste fires occurred

between 2001 and 2014.<sup>1</sup> I believe the number of facility fire incidents in the US is well over 1,700. I based this on EREF's report, Municipal Solid Waste in the US, published in 2016, in 2013 there were 3,913 recycling facilities and 81 in waste-to-energy facilities. This means that more than 40 percent of waste and recycling facilities in the US have experienced a fire incident within the past 12 months (see Figure 1, page 59).

My finding was collaborated by a survey completed by the California Products Stewardship Council (CPSC) of 26 waste facilities from all over California, that stated 83% reported having a fire at their facility in the last two years. (<https://calpsc.org/mobius/cpsc-content/uploads/2018/04/CPSC-Survey-Results-Regarding-Fires-in-the-Waste-Management-Industry-FINAL-4-9-18.pdf>)

## What's causing this trend?

In waste & recycling, we know we have numerous spark-developing dangers, like lithium-ion batteries, loaders scratching concrete, shredder sparks, and hot loads possibly caused by mishandled charcoal, fireworks, fertilizers and more. We have seen a number of trends starting to form which include an increase in fires incidents during the summer's warmer/dryer months as well as holiday spikes due to the increased amount of trash being processed at the end of each calendar year.

## Heat / dryness

We have experienced an increase in fires during the summer and hot months in 2016 and 2017. I go into this further in an article I published last summer that outlined some of the potential causes for the summer spikes. Although only causal, global warming certainly isn't helping the situation. According to

an NOAA report, “Last year was the third hottest on record in the United States, with an average temperature of 54.6 degrees Fahrenheit—2.6°F above average. Only 2012 and 2016 were warmer than 2017[...] The five hottest years on record in the country have been in the last decade, based on 123 years of record-keeping.”

“In 2017, every state in the Lower 48 had an average temperature that was above average, and this is the third consecutive year that has been the case,” said Jake Crouch, a climate scientist at NOAA’s National Centers for Environmental Information. “It’s a continuation of what we saw in 2016, what we saw in 2015, and we also saw a continuation in 2012, so the warmth in 2017 really was observed coast to coast.”

We know from the data that drier and hotter weather has a negative effect on the number of fires our facilities face. No matter what part of the country you are in during the first four months of this year, be it wildfires in California or Nor’easters in the East, our weather patterns this spring were definitely chaotic and led to drier and hotter temperatures than normal near the major population centers of the US.

**China’s recycling restrictions**

Another trend I am keeping my eye on is China’s recycling restrictions. The issue is that as the traditional market for recyclable materials is drying up and the supply of recyclables is staying steadfast. Due to lack of a market, we are experiencing an increase in the amount of material inventory across the globe. Time and the data will continue to tell the story in 2018. “In Washington, some communities are diverting recyclables to landfills to prevent public health and fire code issues,” said Brad Lovaas, WRRRA Executive Director. “It’s not safe to store large quantities of recyclables inside for fire code reasons.”

Based on my data, it seems that the paper inventory cause might be a bit overblown. When I compared the first four months of 2018 by type of facility, paper recycling was only up a couple of percentages. compared with other like electronics and metals that can be attributed more to lithium-ion fires. Waste typically incurs at a higher rate as the summer months and holiday season appear. All good data that we need to continue to revisit.



▲ Figure 1: 347 unique incidents were reported. Based on these reasonable assumptions, we can extrapolate that 1,700 fires occurred in the past 12 months.

**Lithium-ion batteries**

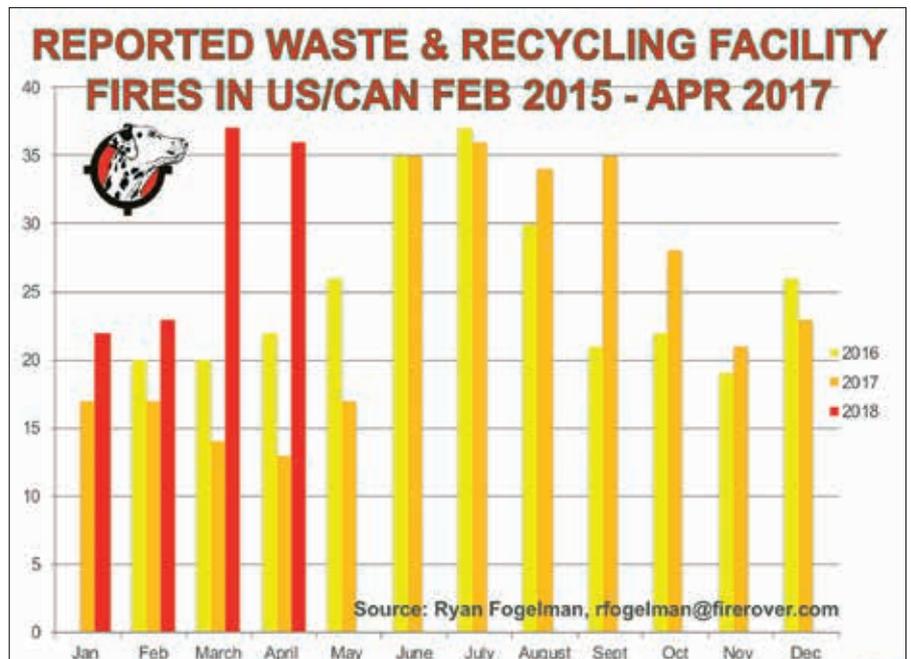
I have been saying for years that there is a wave coming from the increase of lithium ion batteries in our fire stream. It looks like it might be here. When you look at the increase in lithium-ion batteries in our waste stream, it is the perfect storm. According to Cameron Perks, a consultant for Industrial Minerals, “forecast demand for lithium-ion batteries is expected to increase up to seven-fold by 2024.”

The proliferation of lithium-ion batteries is only getting greater. Apple is going to add an estimated three billion mini lithium-ion batteries to the market alone with their AirPods wireless

headphones over the next 10 years.<sup>2</sup> German supplier Robert Bosch GmbH and Japanese battery partner GS Yuasa Corp. aim to sell a lithium ion battery by 2020 that slashes production costs in half and delivers twice the energy density of today’s batteries.<sup>3</sup> The less expensive and more powerful they get, the more issues the waste and recycling industry will face, as the number of lithium-ion batteries explode from today’s baseline.

The study by the California Products Stewardship Council (CPSC) reported in the same survey mentioned above, 65% of the reported fires were due to batteries, the rest are outlined in figure (Figure 2, page 60).

▼ We have seen an alarming trend in the first four months of 2018 of increased fires over 2016 and 2017.



**Mitigate and avoid risk of fire**

In Watkins' article mentioned above, he suggests the steps that manufacturing and industrial organizations should embark upon to mitigate and avoiding the risk of fire. This includes: (1) Conduct a hazard analysis; (2) Establish fire prevention and emergency procedures; (3) Provide fire safety training; (4) Implement a regular housekeeping routine; (5) Inspect and maintain your equipment and systems. I suggest that we add one more step to mitigating and avoiding fire risks. Add a level of proven thermal technology and proactive detection and manual remote suppression to the safety and operations departments tool belt in order to drastically reduce the risk of a fire incident occurring at waste and recycling facilities.

What happens when a fire occurs at your operation? If it is a fire incident that is caught and contained, we all breathe a collective sigh of relief. "Pats on the back" are passed out for having the safety and procedural processes in place to successfully prevent a fire event from becoming a major incident. In simple terms, the safety and operations teams did their job, and our processes and training worked.

Alternatively, what happens if fire occurred at your operation and the fire got out of control and caused significant damage? The "Active" protection layer typically consists of water sprinklers that are automatically set off when radiant heat passes 180 degrees—more often than not—contain the fire, protecting the lives of your employees and most of the building structure. However, in reality, your operations are offline. The cleanup process is sprung into action to re-start the revenue generating operations of your business with the goal of having the shortest amount of downtime. The subsequent investigation begins as the team starts to search for answers for what went wrong. The backroom discussions and finger-pointing begin, typically pointing to a combination the Operations and EH&S Departments of the organization to develop processes or training to avoid another incident in the future like the one that occurred.

The inherent risk of fire in our waste and recycling industry operations is not secret. As an industry, for us to begin to solve the problem we are facing, we only need to borrow an approach used by the

chemical industry that looks to the "layers of protection" to ensure the highest level of safety.

In an article by Joy LePree published on Chemical Engineering Online<sup>4</sup>, these layers of protection are shown. The lowest two layers show the areas of prevention provided by the control system and operator intervention. The next two layers demonstrate where technology kicks in to prevent significant disaster from occurring.

**What can we do to solve the problem?**

**Education / respect**

There is one thing that I certain of, we could stop almost all waste and recycling fires if the end customer (yes, that is all of us) understood and respectfully disposed of their trash properly. My view is that we need to take two steps back in order to take one step forward. A good colleague of mine said that the only thing that we should be recycling is non-printed paper, #1 and #2 plastics, metals and cardboard. Brent Bell, Vice President of Recycling Operations from Waste Management was recently quoted as saying, "it all boils down to recycling the right items the right way." This can be done by following a few simple rules: 1. Recycle all empty bottles, cans, paper and cardboard 2. Keep food and liquids out of your recycling 3. Keep plastic bags out of your recycling.

This "back to basics" approach might be in contrast to people that believe "If we start telling the public to throw things away instead of recycling, we're never going to get that material collected later," but in the end this approach would leave

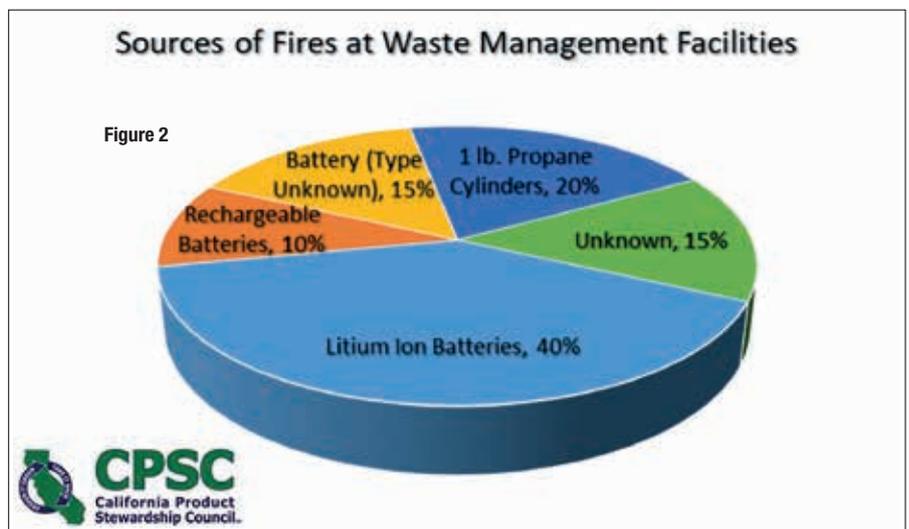
us with a simple, yet effective national recycling program that is profitable and can be the basis for a clean and safe waste and recycling industry that adheres to the regulations that would make our material the cleanest and most marketable in the world.

**Investing in the proper technology**

The fact is that fire incidents that continue to plague the waste and recycling industry do not discriminate against poorly run operations. Some of the best operators in the industry are still victims of fire incidents. Why? The answer lies in the fact that most organizations focus the bulk of their operational and safety resources around the "Prevent" and "Mitigate" stages. They create processes and training programs that teach their employees how to use equipment and run their operations safely. Also, they train how to effectively deal with an emergency by finely balancing containment and response with the employee and environmental protection.

The issue is our lack of investment and reliable technology available to protect our operations from the "Incident" stage. When it comes to using technology, most organizations use the options that come on the equipment, such as automatic sensors and shut offs. However, when it comes to the tools we use during the "Incident" stage, including standards such as fire alarms, strobe lights and even water sprinklers, the current technology available simply does not cut it.

The issue lies in the fact that developing operation and safety processes and procedures, while important, can only take you so far in lessening the risk of fires. An effective fire technology solution works





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DETECT | EXTINGUISH | PROTECT

# NO MORE FIRES. EVER.

## 24/7 FIRE PROTECTION SOLUTION

### What is Fire Rover?

A portable, self-contained unit, equipped with a 24/7 heat detection and fire suppression system.

### How it works:

Fire Rover's US military-grade thermal cameras, award-winning video surveillance system, and powerful foam dispensing unit, extinguish fires using the Industry's only dual UL listed fire suppressing agent FireAde 2000.

- Thermal cameras detect a rise in temperature
- Fire Rover personnel monitor and analyze the threat
- The team remotely aims and dispenses foam to cool the hotspot, or suffocate the fire.

### Detect:

Fire Rover utilizes the FLIR A310F Thermal Camera – able to pinpoint and detect hotspots within 2 degrees, before a fire flare-up. The FLIR A310F detects temperature variances 24/7, including in complete darkness.

### Extinguish:

The Fire Rover live-monitoring team is instantly alerted of a heat increase, and engages Fire Rover's automated foam delivery system – extinguishing fires of all calibers, including metal, petroleum, plastic, agriculture, and waste fires.

### Protect:

Fire Rover extinguishes all fires immediately, creating a noncorrosive biodegradable shield, prohibiting fires from reigniting.



Scrapyards | Shredder Facilities | Waste MRF's | Recycling Centers | Transfer Stations  
Automotive | Refineries | Utilities | Agriculture

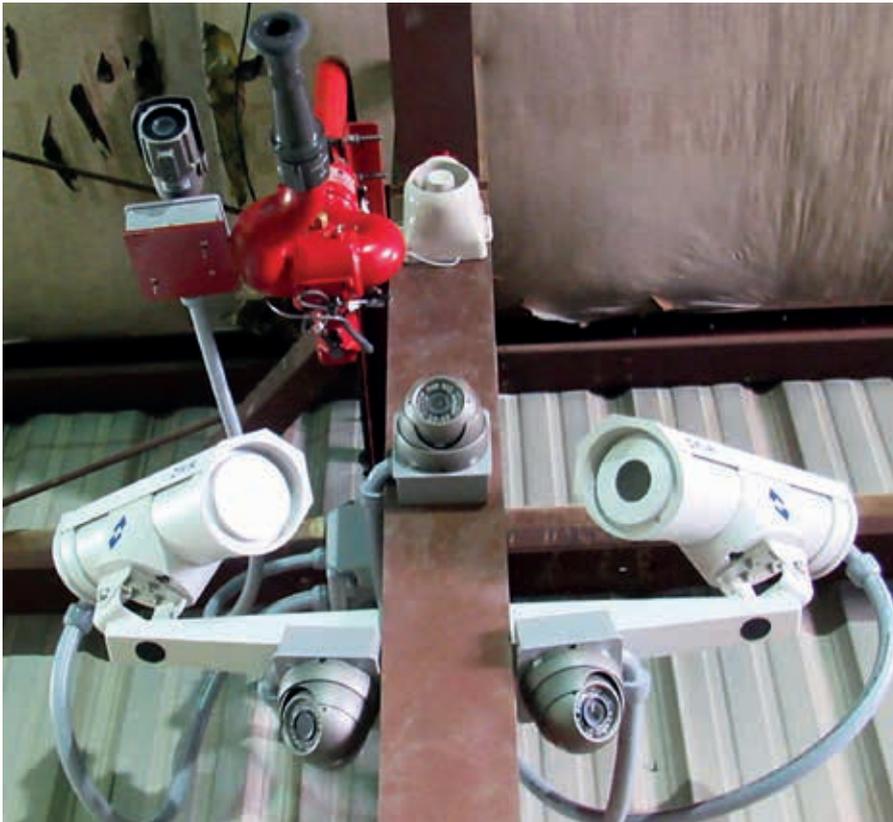


**FireAde2000** – The newest generation in US Military specification foams. Produces a stable, heat resistant and self-sealing blanket, superior to all other MIL-SPEC 6 foams. FireAde 2000 blocks oxygen from the fuel source reduces heat to stop the burning, and converts the fuel to prevent further ignition. Class A & B Foam; Vapor Suppressant; Industry's ONLY Dual UL listed agent; Cooling Agent; Biodegradable and Non-Corrosive; Exposure protection/fire break; Zero Hazardous chemicals; Resists extreme temperatures.



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◀ Custom Fire Rover protection of industrial equipment and hazards.

“saves” have little to no cleanup required and our Clients were able to continue their operations after the event. Additionally, our technology includes built-in fire watch so there is no need to worry about resetting the unit or risk of a reoccurrence.

This type of solution is a living, breathing layer of protection meant to complement and work within all of the diligence and hard work that safety and operations teams have developed, maintained and continuously improve upon. Imagine if a surgeon only had humans (without the help of technology) available to keep us alive during a surgical procedure. Surely, the percentage of incidents during surgery would increase. Fire detection technology works to compound the level of safety within organizations and can give EH&S and Operations staff the right tools to meet their goal of “No fire incidents”. It fills the void between the operations manual processes and proactive fire protection, with the right combination of human knowledge and technology working together for the greater goal of fewer fire incidents.

With the risks of inherent fire only increasing, we need to develop and install solutions that can mitigate the fires as early in the process as possible. Especially when the materials we are processing in the waste and recycling industry are unpredictable. Using a combinational approach to protection converts the fire situation from playing defense late in the game and deep in your own territory to winning the coin toss, going on offense, crossing the 50 and taking the game downfield. Two vastly different outcomes.

➔ For more information, go to [www.firerover.com](http://www.firerover.com)

**References**

- 1 The CFOA (Chief Fire Officers Association) reported from the Environmental Association.
- 2 <http://fortune.com/2016/12/20/apple-airpod-recycle/>
- 3 Autobody News, <http://www.autonews.com/article/20131202/OEM06/312029964/bosch-sees-big-opportunity-for-lithium-ion-batteries>
- 4 <http://www.chemengonline.com/dont-let-your-disaster-plan-collect-dust/?printmode=1>

diligently to provide a safety system that has the primary function of preventing incidents that may cause unplanned business interruption, property damages, pollution and/or injuries. This solution should be designed to detect an out-of-control process and take automatic action to ensure that the process and the plant are returned to a safe state. Unlike the options available in the past, the solution should encompass a combination of:

- Proactive automated detection of excessive heat and its location
- Manual verification of the source of the abnormality, and
- Onsite remotely operated coolant options to eliminate/contain the threat.

This Combinational solution rapidly identifies fire in its incipient phase, alerts all forms of emergency response and initiates containment with coolant/pre-wetting options before the growth stage is realized. This leads to multiple benefits including:

1. Employee and fire fighting personnel safety automatically improved.
2. Fire is detected in its earliest stage, something that is not standardized in this occupancy.
3. Fire is pre-wetted and cooled, allowing time to set up hoses, nozzles and

- connections to water supply.
4. Heat buildup beneath structural elements is reduced along with smoke development. This allows the fire service to locate the seat of the fire swiftly and surely.
5. Fire footprint is exponentially reduced, preventing unplanned downtime, physical damages and safety hazards.

With our Fire Rover technology, we have moved the focus from containment of a major fire incident to early detection and cooling of a fire incident. Our solution is the only one on the market today that seamlessly integrates military grade thermal detection (not IR, flame or smoke detection), remote human verification and onsite remote targeted application of our cooling wetting agent. Our Fire Rover solution is currently installed in almost 100 waste and recycling facilities across the US. We have extinguished over 78 fires in the past 12 months at the Clients sites we protect. We are protecting hazards that include tipping floors, in-feeds, equipment, rubber feedstock, scrap metal, hazard materials and more. We typically catch most fires during the incipient, pre-incipient and smoldering stages, and we have not had one fire incident within a protected area that has grown to a Major Fire Incipient stage. In fact, most of our