



June 20, 2018

Mr. Tom Jaleski
Code Unlimited
Via Email: tom.jaleski@codeul.com

RE: Fire Code Appeal for Grimm's Fuel (5-29-2018)

Mr. Jaleski,

Tualatin Valley Fire & Rescue received your timely appeal request for Grimm's Fuel as of May 31, 2018.

Per TVF&R policy, the Fire Marshal has conducted a thorough administrative review of your appeal. We have concluded that the appeal does not provide an equivalent to the Oregon Fire Code, and therefore the appeal is **denied**.

If you would like to continue your appeal to a full review by our designated Fire Code Board of Appeals, you must notify our office in writing within 15 days, on or before July 12th, 2018.

If you wish to continue this appeal process, a copy of your appeal will be provided to the Appeals Board, along with a report prepared by the Fire Marshal which will include a copy of this decision and any rebuttal you wish to provide. The Board will set a time to review the appeal where you may be asked to answer questions or provide additional information. The Appeals Board will evaluate information from the appellant and the Fire District, then make a recommendation to the Fire Chief. The Fire Chief makes a final decision on the appeal.

A summary of reasons for the denial is as follows:

- The proposed appeal does not include changes from current site conditions. The current conditions have resulted in a long history of fires, some of which were very significant.
- The appeal does not include any measures to prevent fires from occurring in the compost pile (which is a primary purpose for the height limit in code).
- The appeal assumes that fires will continue to occur and is focused exclusively on measures for on-site staff to attempt to extinguish fires after they start (which there is a long track record of them being ineffective at).
- The appeal relies on the existing water cannons / water tender at the site for suppression. This is insufficient as water is generally not effective for suppressing compost pile fires (as evidenced by the long history of TVF&R responses despite the onsite equipment and efforts).
- The appellant incorrectly claimed 'finished product' piles are not a fire hazard, and therefore would not comply with their 60-foot set back. This is inaccurate. Finished piles can be an even a

greater fire hazard since the moisture content is much lower making it easier to ignite and burn. As an evidence, TVF&R experiences over 400 fires per year in finished mulch / barkdust.

- The appeal relies on “24-hour” staff, however our understanding is that refers to a single employee who happens to live next door to the site. This is not the same as working 24-hour staff since that person is likely asleep at night. Additionally, one person could do very little to suppress an active fire, and on fire incidents in the past we have not been able to get ahold of that person.
- The appellant did not indicate that the piles would be reduced to from the current 350’ (approximate) diameter to meet the 150’ width and 250’ length required by code. Thus, the alternate only addresses 1 of the 3 non-compliance aspects of the pile sizes.
- In conclusion, the administrative review found that the appeal is not equivalent to the level of protection prescribed in code, would likely not prevent or even reduce fires at the site, is ineffective at suppressing fires and would pose an undue hazard to the community.

A detailed analysis is included below.

Site Conditions

Grimm’s fuel is the largest composting facility in the greater Portland metropolitan region. They operate on five separate parcels, with the majority of feedstock and composting occurring on the western most parcel, and bark and other product storage on the eastern parcels. There is a very large static composting pile approximately 45’ in height and 300’+ in length and width, containing over 2,000,000 cubic feet of combustible material. There are multiple other large piles of different materials, yard debris, bark grindings, wood chips, and other combustible materials on site. Nearly all materials on site are combustible and pose spontaneous combustion hazards as well as fire hazards.



Overall site view of all parcels.



Close-up of western (composting) parcel.

Appeal Overview

In the appeal request dated 5-29-2018, the applicant appealed the TVF&R correction notice dated May 2nd, 2018 which required Grimm's to reduce pile sizes to 25' in height, 150' in width and 250' in length by April 30, 2019.

The basis for the appeal was the appellant claimed the following current site conditions provided an equivalent level of protection to the pile size limits found in the Oregon Fire Code:

- Maintain the pile height at a maximum of 45 feet
- Maintain 60-foot separation to property lines
- Provide 24-hour on-site staff trained and equipped to control a fire in the compost pile
- Provide a water cannon on site capable of wetting any portion of the pile

Overview of Violation

TVF&R issued a correction notice due to the pile sizes at the site exceeding the maximum allowed under the currently adopted 2014 Oregon Fire Code Section 2808 which regulates the "Storage and Processing of Wood Chips, Hogged Materials, Fines, Compost and Raw Product Associated with Yard Waste and Recycling Facilities.

2808.3 Size of piles. Piles shall not exceed 25 feet (7620 mm) in height, 150 feet (45 720 mm) in width and 250 feet (76 200) in length.

The pile sizes at Grimm's were observed to be in the range of 40-50' in height and approximately 300' to 400' in length and width. Therefore, a correction notice was issued to reduce pile sizes. Given the magnitude of the reduction required, TVF&R allowed an extended period of time (12 months instead of the normal 30 days) to accomplish the correction in order to help the owner minimize business impact and allow for a safe reduction of pile size without causing odor and other problems.

Hazard of Compost, Mulch and Wood Chip Piles

The reason that the Oregon Fire Code, the International Fire Code and the National Fire Protection Association standards all regulate the pile sizes of wood chips, hog fuel and related organic materials is two-fold:

- Due to the self-heating that occurs as these materials decay, the piles are highly susceptible spontaneous combustion; and
- The materials are combustible and very difficult to extinguish. Inherently smaller piles are easier to suppress and extinguish than larger piles.

The single most important aspect of preventing spontaneous ignition of compost, mulch and wood piles is the height of the pile. This is because heat generation and dissipation is directly related to the volume versus surface area – and height (which creates a pile shape with least surface area) is the single most important measurement. The Ignition Handbook¹ describes this relationship:

“The larger the pile of substance, the less efficient is the cooling from the ambient environment, which can only occur at the edges. The heat generation is proportional to the volume of the substance, while the amount of cooling is proportional to the exposed surface area. Thus, the propensity to self-heat is proportional to the volume/surface ratio V/S.”

As this relates to wood chips and related materials, most published information indicates that spontaneous ignition risks start to increase at 10-12 feet in height, and significantly increase as pile height increases beyond those levels. John Bonhotal, Director of the Cornell Waste Management Institute²:

“Piles over 10-12 feet in height are not recommended, due to the risk of overheating and spontaneous combustion. Piles should be long and narrow, no more than 12-15 feet wide. Piles that are over 20 feet tall have a tendency to overheat and sometimes spontaneously combust”

There is no debate in the scientific and fire protection communities over the influence of pile height on the propensity of spontaneous ignition. This is why all national standards regulate maximum pile heights.

¹ The Ignition Handbook. Vytenis Babrauskas, Ph.D. Published by Fire Science Publishers, Issaquah WA, USA. Co-published by the Society of Fire Protection Engineers.

² <http://www.soilandmulchproducernews.com/index.php/frontpage-articles-hidden/160-a-perfect-storm-mulch-fire-dynamics-and-prevention>

Further, once a pile ignites, it is very difficult to detect and extinguish as smoldering ignition usually occurs deep inside of a pile, as explained by Babrauskas³:

“In general, flaming ignition is not expected to occur—if it occurs at all—until a substantial amount of fuel is consumed and either a large inside cavity is formed or else the smolder front breaks through to the surface.”

This also generally leads to the fire surfacing through multiple “chimneys” in several different locations. This can make finding the origin of the fire very difficult and can lead to flames surfacing in multiple (often remote) locations, creating a very difficult fire to extinguish. Additionally, the sheer volume of fuel in large compost files greatly increases the difficulty to fight such fires.

Of specific importance to this appeal is the fact that water is not particularly effective at fighting wood chip pile fires. Professor Robert Rynk, an expert in mulching and composting fires with State University of New York (SUNY) describes the challenge⁴:

“The tendency of many operators and fire departments is to drown it out with water. However, using water alone has been ineffective at extinguishing these types of fires. One reason is that there is simply too much material, too much heat and not enough water. Another reason is that composting materials tend to shed water. Little moisture penetrates the burning material. In several cases piles have been left to burn themselves out after huge amounts of water failed to put out the fire.”

TVF&R’s experience at Grimm’s and with other mulch fires has been very similar. A review of past fires at Grimm’s has shown that firefighting foam needed to be applied in numerous incidents to effectively extinguish the fire after onsite staff were unable to extinguish it with water alone. Water, as proposed by the appellant is simply not a reliable suppression method.

Once a fire starts in a wood chip or mulch pile, it can easily threaten and spread to other nearby materials or even offsite locations through flame contact, radiating heat or flying embers. This was the case in a significant fire at Grimm’s in 2016 that destroyed a large structure on the property.

More recently, a large fire at Hillsboro Landfill followed this same scenario. Spontaneous combustion occurred within a wood chip “hog fuel” pile. It eventually surfaced and the exposed flames / embers ignited a large pile of scrap wood. The result was a massive fire with 100-foot flames and embers that ignited nearby fields and burned for days. It is important to note that the nearly identical conditions exist at Grimm’s, where wood debris / contractor recycling piles are in very close proximity to active compost piles.

A clip of the Hillsboro Landfill Fire can be viewed at <https://www.kgw.com/video/news/local/large-fire-breaks-out-in-hillsboro/283-8141257>

³ The Ignition Handbook. Vytenis Babrauskas, Ph.D. Published by Fire Science Publishers, Issaquah WA, USA. Co-published by the Society of Fire Protection Engineers.

⁴ Fire at Composting Facilities; Handling and Extinguishing Fires. Robert Rynk; BioCycle Magazine. February 2014 <http://compostingcouncil.org/wp-content/uploads/2014/02/6-Fires-PartII.pdf>



Hillsboro Landfill / Woodchip Pile Fire May 25, 2018:

The hazard of compost, mulch and related piles is very significant and there is a very valid public safety reason for regulation. They are highly susceptible to spontaneous ignition, are difficult to suppress, and contain a massive amount of fuel that can easily burn for days or weeks. Not only do these fires threaten onsite product and structures, but they also can easily threaten surrounding properties, particularly during dry summer conditions.

Additionally, repeat fires unduly burden emergency resources, and firefighting runoff and foams can contaminate soils, ground water and streams. It is important that composting and related facilities be designed for firefighting efforts, but it is even more important that fires are prevented in the first place by complying with pile size limitations and industry practices to minimize fire occurrence.

A quick review of fires at compost facilities similar to Grimm's illustrates the threat that oversized piles present. Below are a few examples of fires at sites with operations similar in size to Grimm's.

To our knowledge, each of these facilities also had on-site staff with firefighting water supplies similar to Grimm's that were unable to control the fires.



This compost pile fire in Helotes, TX burned for weeks, causing significant problems in neighboring communities and schools. Eventually the state had to hire contractors to extinguish it, at a cost of nearly \$2 million dollars.



This compost fire in Austin, TX burned for over a month and resulted in 9,000 truckloads of burnt debris removed from the site, costing the city more than \$9 million in response efforts.



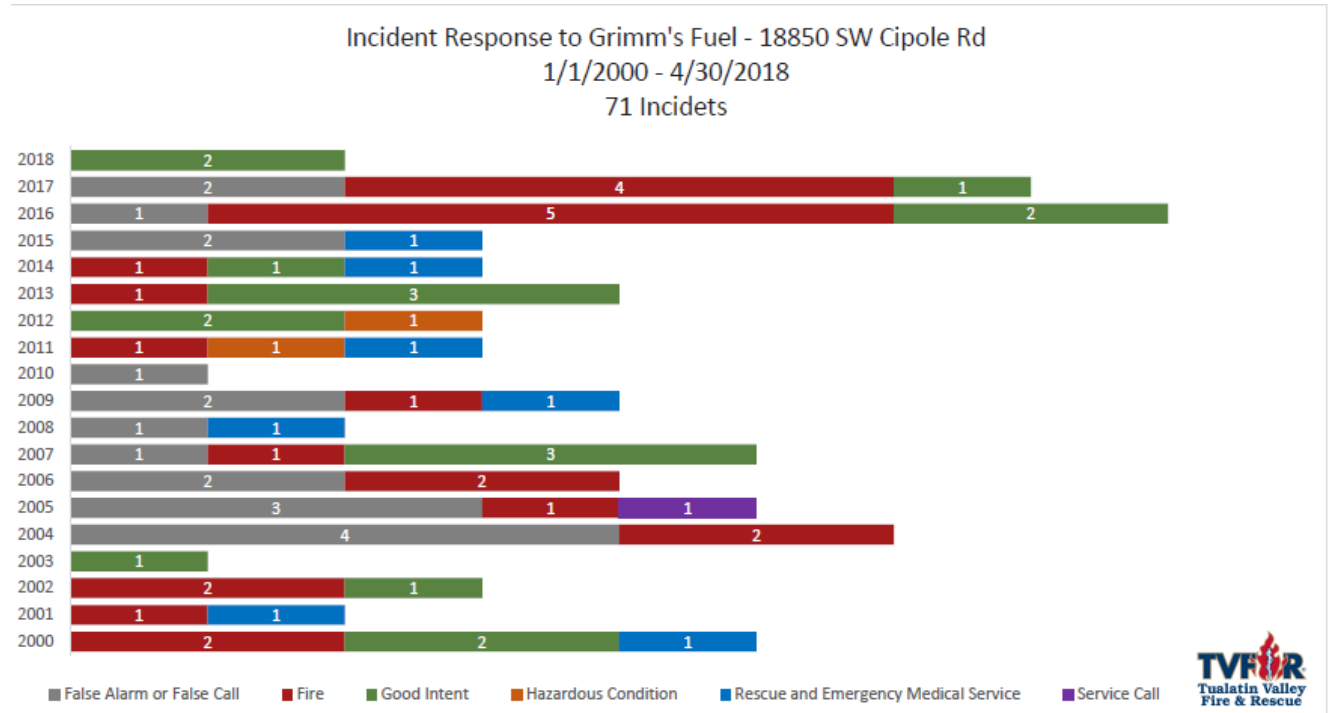
This was one of several massive fires at a similar compost facility in South Salt Lake, Utah.



This massive compost pile fire in Michigan took 20 fire agencies several days to contain at significant cost and impact on the community.

Incident History

Grimm’s has had a significant history of fires and related service calls. Since 2000, TVF&R has responded to the site 71 times. Additionally, as the pile size has grown in recent years the number of fires has grown respectively. 2016 and 2017 were record years for responses at the site as show in the below chart:



Additionally, the above chart does not capture the true frequency and threat of fires at Grimm’s. Grimm’s personnel have told us that they have fires on “almost on a daily basis”⁵. Grimm’s staff has had a portable water tender and water cannon for many years, and we are usually called only when they are unable to extinguish a fire on their own.

Analysis of Appeal Claims:

Claim #1: Maintain the pile height at 45 feet

Maintaining the pile height to 45’ height will have no impact on the number of pile fires at the site. This is the approximate pile height for the past several years at which there has been a record number of fires at the site. As discussed earlier in the hazard analysis, a 45’ pile presents an extreme risk, both in terms of frequency for spontaneous combustion and the overall the potential for large scale fire conditions and threat to neighboring properties.

⁵ TVFR incident narrative #37178, August 7, 2016

Claim #2: Maintain 60-foot separation to property lines

From a fire spread standpoint, a 60-foot distance to property lines is of little value in relation to a combustible pile that is 45 feet tall and 300+ feet in diameter. Hot embers from a fire in such a scenario can easily travel hundreds to thousands of feet.

Additionally, the appellant proposed to have finished product within the 60-foot set back, which would further reduce any value the setback might provide. The claim that finished products do not pose a fire hazard is simply untrue. Finished product may be less susceptible to spontaneous combustion, but it is an organic material that is often is more combustible since has less moisture content.

Claim #3: Provide 24-hour on-site staff trained and equipped to control a fire in the compost pile

Since no other information was provided about this claim, we presume this refers to the normal day-time staff and the one employee who lives on an adjacent parcel as the “night-time” staff. This is not a change in conditions, and there have been numerous fires that the staff has not been able to suppress. Additionally, we have been unable to contact the “night-time” person on several fire incidents in the past, so we have serious doubts about the reliability of such staffing. To the best of our knowledge, they live next door, but sleep at night, go out for dinner and otherwise leave their house just like most people do. Regardless, it is inconceivable that on-site staff, let alone a single person, could successfully fight a fire in a massive compost pile by themselves.

Claim #4: Provide a water cannon on site capable of wetting any portion of the pile

This appears to refer to the two water “cannons” that are currently on site. One is a small fixed water gun, and the other a small water tender with a deck mounted gun. As discussed previously, water is an ineffective method for fighting compost pile fires, particularly with small GPM water cannons from a ground level attack. Ineffective manual firefighting equipment in no way is equivalent to preventing fires from occurring in the first place with proper pile size limits.

Conclusion

Based upon the analysis described above, we find that sufficient evidence was not provided to demonstrate an equivalency to the Oregon Fire Code. Furthermore, with a long history of fires at the site, we have documented evidence that the proposed measures are ineffective at preventing or suppressing fires, and this appeal would pose an undue hazard to the site, the community and firefighters if approved. Therefore, the appeal request is denied.

Please feel free to contact me at (503) 259-1429 if you have any questions.

Sincerely,



Stephen A. Forster
Division Chief | Fire Marshal