

Forensic Fire Consultants, Ltd.

December 23, 2021

Mr. Stephen Anderson
Gammage & Burnham on behalf of Republic Services
Via email

Re: Proposed WestWing Transfer Station Site
Hazard Mitigation Analysis & Fire Risk Study

Dear Mr. Anderson,

This report details my findings of the study and analysis pertaining to the current operational impact at the Cave Creek Transfer Station and how the operation would hypothetically apply to the WestWing Transfer Station (WWTS for future reference) and the surrounding area. Specifically, the only adjacent property at the time of this report is the 185^{+/-} Acre WestWing Power Substation site¹ owned by multiple entities. The proposed business park, which is inclusive of the WWTS, will add numerous other operations as the area continues its expansion.

This study and analysis consist of multiple facets of the WWTS facility to include proposed build site, access ways, operations, structure, and combustible waste materials. Evaluation of these areas will include the potential of fire development, fire prevention measures (active/passive/operational), fire suppression, and impact. The scope of this study is not a comprehensive analysis of every possible scenario and outcome, but rather an overview depicting the proactive approach Republic Services has implemented in current operations with existing facilities and personnel which then would be applicable to the proposed facility.

Background research included:

- Inspection of the proposed WWTS site and adjacent Power Substation
- Inspection of the Cave Creek Transfer site
 - Operations/Flow/Methodology of waste management processes
 - Focus on adherence to company processes specific to fire prevention
 - Preventative measures, passive and active fire protection
- Interview of Republic Services operations personnel
- Meeting with Arizona Fire & Medical Authority Fire Marshal Eric Kriwer
- Review documentation publicly available on www.westwingtransfer.com
- Independent research conducted on fire risk management, waste transfer station fires, and the impact of fire to energized overhead electrical conductors

The proposed WWTS is located on the furthest northwest corner of the proposed Future Approved Industrial Park and abuts the southwest corner of the Power Substation. Access to the site would be via a blacktop paved access road from the El Mirage/303 intersection. The proposed structure is to be of non-combustible construction with multiple layers of fire prevention addressed for risk management. The operations training of personnel is an integral part of the fire risk reduction and mitigation of potential events should they occur.

¹ 06.-Citizen-Participation-Plan-Exhibits, Page 183

Municipal Fire Service

The proposed location, within the zoned industrial park, falls within the special taxing district of the Arizona Fire & Medical Authority (AFMA). AFMA provides fire and medical services to all parcels of land which are contiguous to its boundaries. The closest AFMA station is located within eyesight of the WWTS, being separated only by the Power Substation.

AFMA is part of the valley's Regional Automatic Aid System which dispatches any resources based on their respective proximity to the call being generated. Simply put, the closest fire engine is dispatched to the call regardless of jurisdiction. In the event that AFMA Station 104 personnel are on another call, the next closest station (AFMA 103) is just under 4 miles away. The fire suppression response time standard for AFMA is 6 minutes² for first due engine company assignments. AFMA Station 104 is comprised of an engine, brush truck and water tanker. The rapid deployment of these resources is a critical component to mitigation in the event of an uncontrollable fire within a structure or land mass area.

Potential Waste Material Ignition

The determination of the fire risk and hazard mitigation varies immensely due to the ever-changing environment of waste pickup, composition, transport, transfer, and deposit into a landfill. With the evolution of technology, the proclivity for electronics and stored energy devices (batteries) has rapidly increased. The industry works diligently utilizing different delivery methods to educate consumers about what to discard as waste and what is hazardous. There are numerous potential ignition sources which can be identified within the waste collection and management processes. A few of the more commonly identified are that of lithium-ion batteries, hot embers/smoking materials, oily rags, chemicals, and organics. Each of these types of ignition sources within waste material could be averted with proper public education, adherence to waste policies, and disposal awareness.

The impact of technology in the early stages of waste pickup and throughout the movement processes has increased in recent years. The use of cameras on the collection trucks helps the operators to assess potentially hazardous loads immediately upon retrieval. Should an operator become aware of a potential fire within their respective truck, they are highly trained on the proper steps to mitigate the fire. These "hot loads" can occur at any point during the process which necessitates proper training of operational personnel. The key element in any system is the early detection and fast response of trained personnel and equipment to suppress the fire or smoldering debris quickly and efficiently.

Existing Facility Evaluation

The inspected site is larger than the WWTS yet the operational and movement of material and equipment would be similar. The structure, like the WWTS, was constructed of non-combustible material with a high ceiling (passive fire protection). It was equipped with a fire suppression system (active fire protection) as well as required extinguishers. A 1" diameter hose reel was mounted within close proximity to the load out area for use in rapid fire suppression of materials segregated from the pile by the trained equipment operator. The moisture control system was fully operational which is not only primarily for odor control, but also creates a higher Relative Humidity (RH) which aids in keeping the combustibility of waste products low. The interior tipping floor is monitored 24/7 by the Republic Services Operations Center (RSOC) in

² <https://www.afma.az.gov/index.asp?SEC=4E532205-32FA-4D57-8D3D-991A9138BA97>

Scottsdale, Arizona. This monitoring allows the user to interface with the site, see in real time and activate appropriate measures to deploy resources for hazard mitigation.

Technology evolution is likely to be encompassed on new facilities being erected. Fire prevention, early detection, and suppression means have all improved and Republic Services, along with other waste companies, are constantly striving to implement these measures. Implementation of these measures is beneficial to the environment, the public, first responders, operations personnel, and the facility production.

Proposed WWTS Site

The WWTS proposed site reflects much of the same construction materials, processes, and fire safety features as the Cave Creek site. At this time, there has not been a formal construction plan to review; however, the renderings and the preliminary submittals reflect similarities in facilities. The processes, which include the movement of vehicles, equipment operations, waste material movement and personnel, are common for the transfer site. The following addresses the specific risks and hazard mitigation plan. This analysis does not consider every potential scenario. It offers a perspective of fire prevention, fire detection, fire suppression and the risk assessment of potential fire development. Each scenario below considers a standard ratio of residential/commercial waste according to industry-related studies³.

1. Transport to/from the WWTS with materials in-transit

- a. Fire prevention
 - i. Public awareness of hazardous waste product introduction to loads
 - ii. Employee training programs
 - iii. Operator to recognize when suspect materials are introduced to load
 - iv. Regular maintenance of vehicles and equipment
- b. Fire detection
 - i. Trained operations personnel remain vigilant throughout processes
 - ii. Early detection equipment such as alarms and thermal detection devices
- c. Fire suppression
 - i. Activate emergency response as necessary
 - ii. Compact load; extinguish fire; dump load from truck at safe location
 - iii. Mitigate fuels
- d. Risk assessment
 - i. Vehicular damages
 - ii. Personal injury
 - iii. Property damages

2. WWTS Site specific

- a. Fire prevention
 - i. Paved roadways with well-maintained shoulders free of combustible vegetation and/or rubbish
 - ii. Well-maintained landscape with separation from structure and workspaces
 - iii. Routine rubbish and debris removal from site landscape
 - iv. Posted "No Smoking" signage

³ 2016 Waste Composition and Analysis ... - Larimer County. <https://www.larimer.org/sites/default/files/uploads/2017/wastesort.pdf>.

- v. Non-spark producing equipment, such as rubber tires and rubber “squeegee” on the bucket of tractor
 - b. Fire detection
 - i. On-site personnel
 - ii. Audio and video communications with on-site *and* off-site personnel
 - iii. Early detection devices with local and off-site alarm/notifications
 - c. Fire suppression
 - i. Notify appropriate authorities i.e., supervisor, alarm company, 911
 - ii. Segregate area of fire
 - iii. Extinguish fire utilizing multiple means
 - d. Risk assessment
 - i. On-site fire outside of transfer structure
 - 1. Light vegetation fuels sparsely located on property
 - 2. Vehicular operations on-site (generally falls under transit)
 - 3. Property damage
- 3. WWTS building**
- a. Fire prevention
 - i. Non-combustible construction
 - ii. Regular maintenance building systems
 - b. Fire detection
 - i. On-site audio and video with 24/7 monitoring
 - ii. Early detection devices with local and off-site alarm/notifications
 - c. Fire suppression
 - i. Active fire sprinkler system such as ESFR, Deluge, Foam application
 - ii. Fire extinguishers on-site with trained personnel
 - iii. 1” water hose with reel for rapid deployment
 - iv. Bolstered by fire department response
 - d. Risk assessment
 - i. The building in and of itself is non-combustible
- 4. Waste materials inside or in transit within a vehicle inside the transfer station**
- a. Fire prevention
 - i. Trained personnel on/off-site with continuous monitoring 24/7
 - ii. Recognition of potentially hazardous loads and segregating from others
 - iii. Moisture control
 - iv. Removal of waste accumulation from tipping floor
 - b. Fire detection
 - i. Trained personnel on/off-site with continuous monitoring 24/7
 - ii. Early detection devices with local and off-site alarm/notifications
 - c. Fire suppression
 - i. Active fire sprinkler system such as ESFR, Deluge, Foam application
 - ii. Fire extinguishers on-site with trained personnel
 - iii. 1” water hose with reel for rapid deployment
 - iv. Operator to segregate debris on fire from remaining combustibles
 - v. Bolstered by fire department response
 - d. Risk assessment
 - i. The degree of waste material involvement is more dependent upon several factors, none of which can be expressly calculated due to the *ongoing transfer of materials into and out of the facility, proximal locations within the facility, make-up of the waste pile, and the potential size of the waste pile at any moment.* Generalizations therefore are the only means of conveying the potential risks associated with a small, controllable fire

- and a large fire needing resources outside the transfer station such as AFMA.
- ii. Materials fire of less than one residential truckload (approximately 8Tons)
 1. By segregating the load, it can be extinguished or burn itself out based on numerous factors
 2. The degree of damage is likely minimal to the facility
 3. The fire is unbeknownst to the passersby
 4. A minimal smoke plume would be visible dependent upon the size, material make-up, complexity, and location of the fire. Wind direction and speed is an additional factor which cannot be conclusively determined.
 - iii. Materials fire of seven residential truckloads (approximately 60Tons)
 1. Segregate the loads within the structure and/or remove from the structure to extinguish
 2. Sprinkler system may actuate dependent upon several factors
 3. The degree of damage to the structure is moderate
 4. Fire department response required
 5. Smoke plume highly visible
 - iv. Worst case scenario of maximum 131Tons waste material on-site
 1. No ability to segregate loads
 2. Sprinkler system fully operational
 3. Degree of damage to the structure is moderate
 4. Fire department response required
 5. Smoke plume highly visible

Of note, the north facing opening of the structure would have five bays. In the unlikely event a large-scale fire ensued, the closest overhead electric utility lines are located over 175' due north along an APS easement. The second closest overhead electric utility lines are over 250' due west. These dimensions are from the proposed facility and not the property line.

Numerous power poles, energized electrical lines, towers and other electrical sub-station components are within a visible area from the site. The sub-station and the grounds surrounding the energized lines is generally well-kept and free of weeds and vegetation.

In extremely rare instances involving wildland fires, the dense vegetation below or adjacent energized electric lines can generate thick smoke with a high carbon content causing the electricity to find a path to earth or the metal tower/pole. This rare phenomenon can also be achieved with the burning of tires or heavy plastics, commonly observed in dense commercial processing facilities. The comparison of heavy fuels such as dense vegetation, rubber tires, and plastic to the lighter fuels of household waste accumulation would infer the carbon content could not be sufficient to facilitate the transfer of electrical current or failure of the energized lines. Additionally, the smoke and heat dissipation over the span of 175'/250' would further erode the potential for thermal decay of the electrical lines.

There are many factors when considering the end risk assessment of the overhead electrical lines. To summarize, an event such as the improper disposal of a lithium-ion battery, would have to be discarded into the waste process. It would then have to go undetected until such time it ruptured causing thermal runaway and eventually igniting adjacent combustibles. Then, all of the prevention, detection, and suppression efforts in place would have to fail. Further, the failure of those efforts would have to be supplanted by the inability of AFMA to contain the fire. Lastly, the natural effects of wind direction, ambient temperature, humidity, smoke plume

composition, and fluid dynamics would all have to be in perfect alignment to extend far enough to *potentially affect* the energized power lines. This event is an extremely unlikely scenario.

Virtually all public electric utility companies have the ability to reroute electricity through a variety of substations to deploy power in times of need. The redundancy of the electrical grid allows for the redistribution as necessary.

The Western Area Power Administration (WAPA) email⁴ from Dennis Patane stated the WAPA “has no objection to the rezoning case”. WAPA goes on to state the only concern they have is “that any vegetation planned within our easement area would have a 10’ height restriction, at full maturity”. It is clear the primary concern is vegetation under the energized electrical lines for the reasons stated above.

The proposed WWTS would be a state-of-the-art facility with the most up to date and effective fire prevention measures in place to mitigate hazards. The overall design of the structure, enclosed on all but one side, decreases the exposure of the waste to the environment. The five bay openings facilitate the ease of operations and the excellent egress for risk management. The implementation of an additional fire access road above and beyond the required access suggests the willingness of Republic Services to consider reasonable requests.

In reviewing the existing site, I determined the operational processes of the waste handling to be effective and in alignment with Republic Services policies and procedures. I also determined the personnel were highly trained and adhered to the company standards for safety and operations. They were well-informed on procedures related to fire prevention, fire detection, and fire suppression. The application of these operational procedures, principles, and work ethic at the proposed WWTS would very likely continue the rising trend of technology application into waste collection and management.

Conclusions

Republic Services meets or exceeds current industry standards pertaining to the collection, transport, transfer, and disposal of waste products. The data gathered and reviewed fails to reveal any concern for the operational processes. The general description of the structure is similar to other sites; however, plans are not available at this time for the proposed facility. The fire risk for the site (land use area) and structure are minimal based on current data reviewed. The waste accumulation and transfer procedures conform to the company operations.

Fires in household waste are inevitable and the processes Republic Services have in place provide rapid mitigation efforts for prevention, early detection, segregation, and suppression⁵.

Please feel free to reach out if I can be of further assistance.



Keith Paffrath
IAAI-CFI®, ICC-CFI-II, NFPA-CFI

This report is based on data derived from Republic Services, interviews with employees, observations, and research conducted on transfer site operations. This report is not intended to consider every possible facet of the proposed facility or process. This is merely an overview of the site analysis, operational and structural observations related to fire risk management. WWTS structure plans were not considered in this report; a site visit to a comparable facility was used as a baseline. Prevention, detection, and suppression systems are likely to be more technologically advanced on a newly constructed building and site.

⁴ 06.-Citizen-Participation-Plan-Exhibits, Page 205

⁵ Using a combinational approach to prevent facility fires - Waste Today July 2, 2019



Cave Creek site with five of the seven bays, misting system on-1" fire hose circled in red



Front end loader with rubber tires and rubber "squeegee" on blade-circled in red



View looking west from proposed site with electric lines on north property line-in red



Closer detail of pole approximately 175' north of proposed structure