DEPARTMENT OF ENVIRONMENTAL PROTECTION

Isiah Leggett
County Executive

Lisa Feldt
Director

MEMORANDUM

June 2, 2017

TO: Lisa Feldt, Director
Department of Environmental Protection

FROM: William F. Broglie, Acting Chief
Division of Solid Waste Services

SUBJECT: Review of HDR Root Cause Analysis Report and Covanta Response

The County has received the final Root Cause Analysis Report (RCA) conducted by HDR regarding the fire at the Resource Recovery Facility on December 8, 2016. Additionally, we have received Covanta's response to the RCA. After careful review of the RCA and Covanta's response, I have the following observations:

1) The RCA confirmed that exact cause of the fire remains unknown, as there was no evidence to examine since all of the material was by consumed by the fire (or pushed into the pit and subsequently burned in the boiler. In the opinion of HDR, the fire appears to have started on the RRF tipping floor and with the source most likely being discarded material in the waste stream that was pushed into the pile on the tipping floor that either reacted with other waste products or self-ignited.

2) While the cause of the fire is unknown, in the HDR/FRA team's opinion, two directly contributing factors led directly to the increased severity and duration of the fire:

   - The inability to view the tipping floor from the crane cab and to notice the fire until it had escalated to a major blaze, and
   - The inability to churn the pit for an extended period of time.

   Contributing, in turn, to these two factors were:

   - Adequate upkeep of maintenance at the RRF leading to equipment (e.g., South crane) being out of service and reduced boiler capacity (contributing to the high levels of waste in the storage pit) prior to and during the fire event,

- Disruption in normal operating conditions caused by the NRG shutdown just prior to the fire contributing to additional storage of waste in the pit and on the tipping floor,
- Inadequate monitoring of the tipping floor when waste was stored on the floor, and
- Insufficient pre-planning with the MCFRS, and less than optimal fire management practices during the event.

3) The RCA contained several recommendations relating to these findings. The corrective action plan (discussed further below) developed by the County and Authority, in coordination with Covanta should address these findings.

Covanta Response:

Prior to completion of the RCA document, Covanta was provided an opportunity to review the RCA for factual accuracy and separately Covanta was provided the opportunity to respond to the findings in the RCA. After review of Covanta's response, I offer the following observations regarding specific Covanta comments:

1) Waste Pit Level: While Covanta takes issue with HDR findings regarding pit management practices contributing to the severity and duration of the fire, Covanta has committed in their response to MDE on January 19, 2017 to rotate the waste in the pit: "At least six times per year, and in alternating fashion, one-third of the pit, will be dug down to the pit bottom where the tines of the grapple touch the concrete bottom of the pit." This practice was not being followed prior to the fire.

2) Covanta feels that HDR should have focused more on the history of fires at the Transfer Station and the incoming waste stream. Covanta points to their inspection of waste and feels that they do not need more staffing at the RRF, but suggest more staff at the Transfer Station should be provided as well as a more robust public service education program by the County. Neither the County nor HDR dispute the fact that the fire was likely caused by something in the waste stream. In fact, the County has already increased its already robust educational outreach to its citizens to try and reduce the disposal of materials that could cause a fire. In May of this year Covanta brought in an expert fire consultant to assess the practices and conditions at both the Transfer Station and RRF; the County is awaiting the findings and recommendations from this expert to ensure that future investments or changes in procedures at both facilities are aligned with the expert's recommendations.

3) Covanta also stated that the RCA calls into question whether or not Covanta is adhering to NFPA fire codes. Covanta points to the County's insurance provider, FM Global, as conducting inspections of the RRF and even providing a reduction in the premiums based on those inspections. Thus, Covanta states that "This recognition, coupled with the numerous site reports on FM Global's inspections, demonstrates the true conditions to be quite the opposite of those described in the Report." The RCA points out that during the

fire event "it is not clear based on the interviews or plant records if all of the water cannons were fully operable at the time" (Sec 6.4.2). The RCA states that the sprinkler system on the south end of the refuse pit and west side of the tipping floor "were out of service during the fire event and during our visit" (Sec 6.4.2). Additionally, in Section 8 of the RCA, HDR noted "During the survey, many components of the facilities fire suppression and fire alarm systems were noted as being out of service or needing repair." Finally, based on County Department of Permitting Services, Division of Fire Prevention and Code Compliance records, records of an inspection that fire system inspection conducted in August of 2016 showed that not all items were cleared prior to December 19, 2016. As operator of the plant, it is Covanta's responsibility to meet proper inspection, testing and maintenance requirements as required under fire code.

Corrective Action Plan:

It is now 6 months since the RRF fire. Appropriate short-term steps have been taken to ensure that the RRF can safely operate, and to address the most immediate issues surrounding the contributing factors associated with the fire, including the following:

- The County/Authority/Covanta continue to manage the inventory in the pit consistent with the temporary guidance agreed to in December as part of the condition to return to normal operation; i.e., not to exceed 10,000 tons
- Covanta is not using the tipping floor for waste storage
- Expanded and enhanced County outreach and education effort on the "do's and don'ts" of what not to dispose of (embers/ashes, lithium-ion batteries, etc.) in the trash
- Establishment of daily reporting/tracking system on any fire suppression system impairments
- Installation of hose reel stations on the RRF tipping floor to help fight incipient stage fires
- Significant efforts to improve the reliability of the boilers in order to process the incoming waste

In addition, subsequent to the fire, the County and the Authority have worked, in collaboration with Covanta to develop a comprehensive corrective action plan ("Plan") designed to address both the preliminary findings and the subsequent RCA findings. This Plan includes eleven actions for the County/Authority has responsibility and 24 actions for which Covanta has responsibility. Examples of the actions contained in this Plan are:

County/Authority:

- Expanded 3rd party expert oversight at the RRF to include maintenance/planned outage monitoring and ongoing review of preventative maintenance completion
- Improved notification procedure to community
- Purchase mobile particulate monitoring capability

Covanta:

- Repairs to and ongoing maintenance of fire suppression systems, as well as enhancements to fire detection/suppression systems (installation of tipping floor camera, additional hose reels/water cannons to reach pit fires)
- Assessment by 3rd part fire expert of existing systems/processes at both RRF and Transfer Station
- Clean-up and repairs from fire
- Improved planning (including drills and SOPs) with MCFRS for fire response

We (County/Authority) are meeting monthly with Covanta to ensure timely implementation of these actions. As you are aware, Covanta has committed to investing approximately $16 million in maintenance/upgrades over the next 18-months. We will be monitoring completion of these investments.

We believe the combination of Covanta's investment in much-needed plant maintenance, and the completion of the corrective actions identified above will both improve the efficiency of the RRF and reduce the likelihood and magnitude of any future fire event.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Isiah Leggett
County Executive

Lisa Feldt
Director

MEMORANDUM

June 8, 2017

TO: Lisa Feldt, Director
Department of Environmental Protection

FROM: William F. Broglie, Acting Chief
Division of Solid Waste Services

SUBJECT: Environmental Impacts of December 8, 2016, Fire at the Resource Recovery Facility

Several analyses have been conducted over the six months following the fire at the Resource Recovery Facility on December 8, 2016. I thought it would be appropriate, in the context of releasing to the Root Cause Analysis Report (RCA) conducted by HDR to summarize these analyses.

While the more detailed summaries of the monitoring efforts and results follow, the monitoring conducted of air quality and water quality – measured by stream biota and organics/inorganics in streams and groundwater – have found no evidence of adverse impacts from the fire.

Ambient Air. Air monitoring data were collected in the vicinity of the RRF over a two-week period in December 2016 during and immediately following the fire event. Samples were collected, as part of the Division of Solid Waste Services monitoring efforts, at four locations in the vicinity of the RRF and the fire. Target compounds included in the monitoring program were as follows: metals, volatile organics, polynuclear aromatic hydrocarbons (PAHs), polychlorinated dioxins and polychlorinated dibenzo furans (PCDDs/PCDFs), Total Suspended Particulate (TSP), PM10 and PM2.5. The results of this monitoring showed the following:

- No evidence in air downwind of the fire of a violation of National Ambient Air Quality Standards (40 CFR part 50) for pollutants considered harmful to public health and the environment, and
- No exceedance of any Acute Inhalation Exposure Criteria, regardless of wind direction relative to the fire.

Stream Biota. The stream just downstream of the RRF was sampled (by staff from DEP's Division of Watershed Management Operations) for benthic macroinvertebrates (aquatic insects) in December 2016 just prior to the fire, and in January and March 2017 following the fire. Benthic macroinvertebrates were collected, subsampled, identified, and used to calculate Benthic Index of Biological Integrity (BIBI) scores to represent stream conditions. BIBI scores prior to and following the fire were similar – indicating there is no observable impact to stream quality from the RRF fire.

Groundwater and Stream Monitoring. DEP's Division of Solid Waste Services regularly samples groundwater collected from at six monitoring stations, and surface water from two streams, located near the RRF, for both organics and inorganics (including heavy metals). This sampling is normally conducted in the Spring and in the Fall. Since the RRF fire took place in December, DEP carried out an additional sampling mission at all stations on January 17, 2017. All measurements were consistent were prior period results; no impacts from the fire were evident.

Storm Water Management Pond. Under Maryland Department of the Environment (MDE) oversight, firefighting water was initially stored in the RRF's storm water management pond (SMP); periodically sampled, treated, and retested; and finally, with MDE approval, used within the RRF as process water. Since the fire event, the pond discharge was plugged, and pond water was periodically drawn down, to maintain the basin's structural integrity and to prevent an overflow, and was either shipped offsite to the County's Oaks landfill leachate storage pond, or stored on the RRF site in temporary storage tanks. After extensive testing per MDE instructions, water not shipped to Oaks was fed back into the RRF via the facility's clarifier and used internally as process water. While water was fed to the clarifier, and as authorized by MDE, Covanta conducted daily sampling of its plant process water discharge. All sample results were in compliance with the facility's NPDES permit limits. On March 20, 2017, MDE approved that the RRF be returned to normal operations and the SWM pond plug removed. The firefighting water that was stored at the Oaks landfill was tested, approved by WSSC for pretreatment at that site using the leachate pretreatment system there, and disposed with other pretreated leachate into the WSSC system.

Northeast Maryland Waste Disposal Authority

May 15, 2017

Ms. Elizabeth G. Feldt, Director
Department of Environmental Protection
Montgomery County Government
255 Rockville Pike, Suite 120
Rockville, Maryland 20850

Mr. William Broglie, Acting Chief
Division of Solid Waste Services
Montgomery County, Department of Environmental Protection
101 Monroe Street, 6th Floor
Rockville, Maryland 20850-2589

Subject: Revised HDR Root Cause Analysis report

Dear Ms. Feldt and Mr. Broglie:

Attached to this transmittal is the revised final version dated May 12, 2017 of the HDR Root Cause Analysis (RCA) report that relates to the fire incident from December of 2016 at the Resource Recovery Facility. HDR revised the report slightly to correct an inaccurate citation.

Also included in this transmittal is the response letter dated April 21, 2017 that Covanta prepared based on their review of the RCA.

Sincerely,

Chris Skaggs
Executive Director

Attachments

cc: Bill Davidson
Joe LaDana
Joey Neuhoff

MCF11771SLU.DOCX

410.333.2730 / 410.333.2721 fax / authority@nmwda.org
nmwda.org / Business-to-Business Recycling: mdrecycles.org
Tower II - Suite 402, 100 S. Charles Street, Baltimore, MD 21201-2705

Comprehensive Waste Management Through Recycling, Reuse, Resource Recovery and Landfill

Montgomery County Resource Recovery Facility (MCRRF) Root Cause Analysis

Prepared for:

Northeast Maryland Waste Disposal Authority
And
Montgomery County

Prepared by:

HDR Engineering, Inc.

and

Fire & Risk Alliance, LLC
7361 Calhoun Place Suite 690
Rockville, MD 20855

Final

May 12, 2017

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

On December 8th 2016 a fire was reported by Covanta Montgomery, Inc. (Covanta) on the tipping floor at the Montgomery County Resource Recovery Facility (MCRRF or facility herein). Through the course of a ten-day operation, the Montgomery County Fire and Rescue Service (MCFRS) was on scene to lead fire suppression efforts, as well as direct Covanta personnel in support of these efforts. There were several changes in personnel and leadership between both Covanta and MCFRS due to the long duration of this incident. The facility has also had several recent fire incidents in the trash pit and on the tipping floor locations. Figure 1 shows the location of the tipping floor (1) and the refuse pit (3).

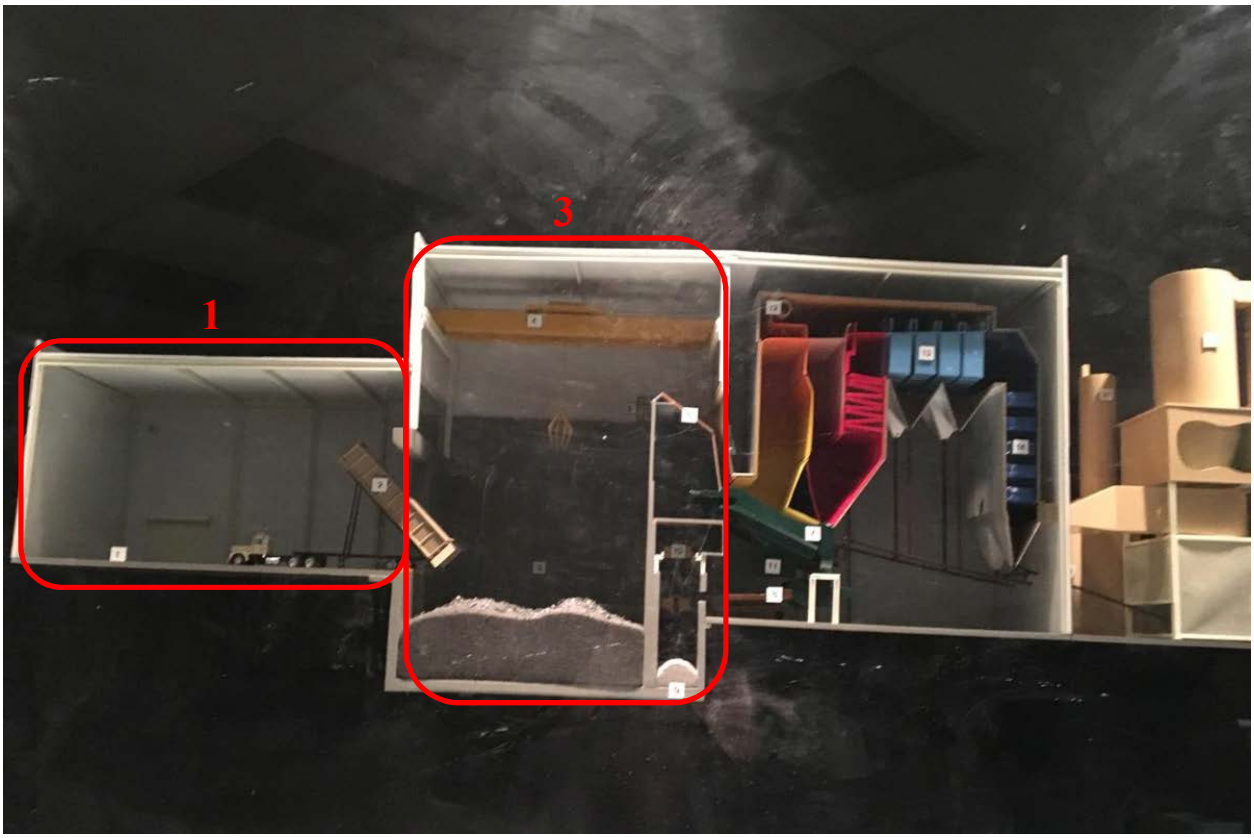


Figure 1 Montgomery County Resource Recovery Facility Model

The MCRRF site plan can be seen in Figure 2. The MCRRF land is owned by Montgomery County and the Northeast Maryland Waste Disposal Authority (NMWDA) owns the facility on behalf of Montgomery County (County). The facility has been operated and maintained by Covanta under a Service Agreement with the NMWDA since the start of commercial operations in 1995 and provides service to the County. Based on waste at the design higher heating value (HHV) of 5500 BTU/lb, the facility is designed to process waste at a rate of 1,800 tons per day (tpd). Historically the HHV of the waste at the MCRRF has been lower than 5500 BTU/lb, resulting in processing at throughput rates closer to 2,000 tpd. A cut-away overview of the pit and tipping floor, with the waste and a depiction of the initially reported fire are shown in Figure 3.

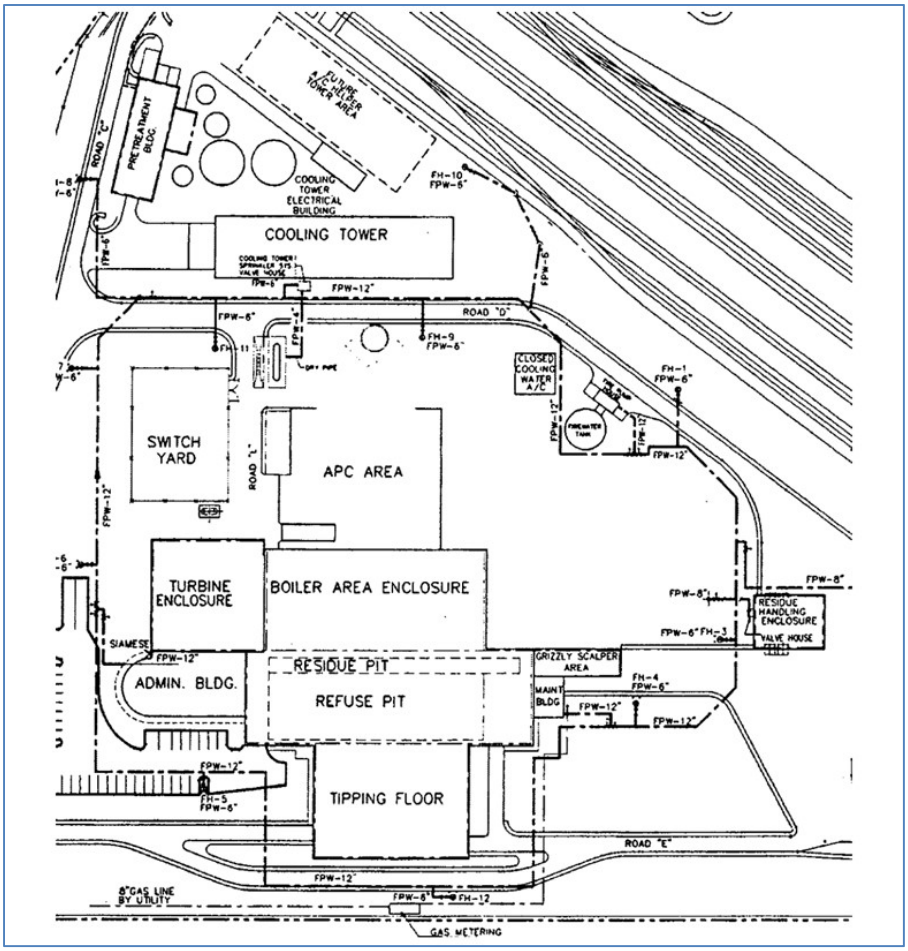


Figure 2 Montgomery County Resource Recovery Facility site plan

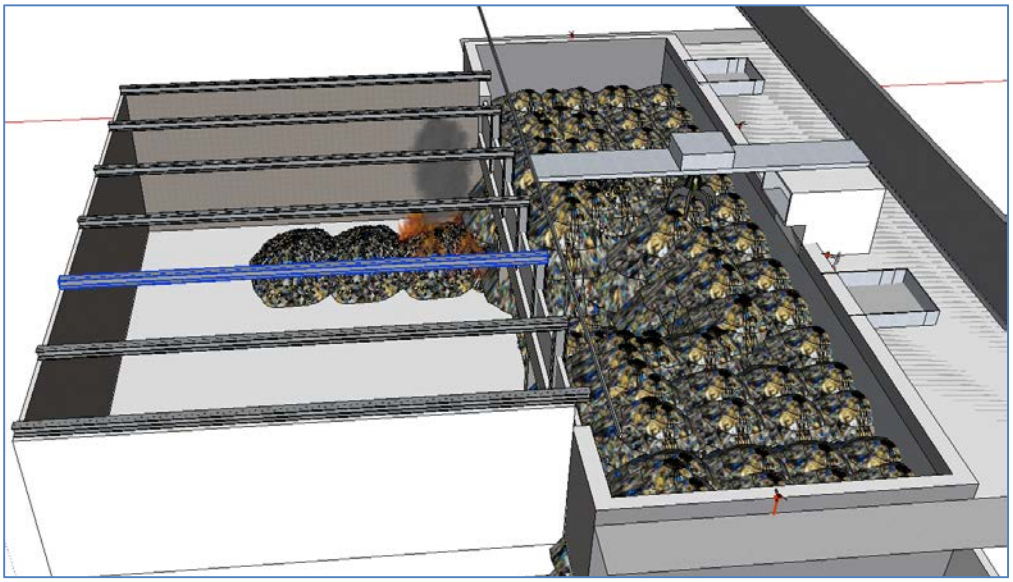


Figure 3 Montgomery County Resource Recovery Facility Tipping Floor and Pit

The County through the NWMDA has retained HDR Engineering, Inc. to help investigate the root cause of this specific fire. In addition, HDR has been asked to assess the operating and maintenance procedures and current condition of critical plant systems at the Facility. HDR is performing this work separately and continues to provide the County and NMWDA with reports relative to outage documentation, work in progress, and the Recovery Plan being undertaken by Covanta. Fire and Risk Alliance (FRA) was contracted to assist HDR with preparing the root cause analysis and fire investigation. This report has been prepared to document the root cause analysis and to provide the County and NMWDA with recommendations for updating the Facility's Emergency Action Plan, Fire and General Emergency Plan, and Standard Operating Procedures (SOPs) related to fire events. Separately, HDR is completing a review and assessment of the SOPs for the balance of the Facility, System Descriptions, and Covanta's Technical Standards for comparison the other WTE Facilities as well as industrial and power industry standards. A report on those finding will be submitted by HDR under separate cover.

2.0 EXECUTIVE SUMMARY

A fire in the waste storage area of the MCRRF started on December 8, 2016 and was first observed by Covanta's Crane Operator from the Crane pulpit at 18:22. The fire was observed to be on the tipping floor and flames had grown to approximately 50 feet high prior to being spotted as there were no employees on the tipping floor at the time and the line of sight to the area was blocked by a high waste inventory in the refuse pit. Waste was being stored in the tipping area due to high waste inventories at the time. Covanta placed a 911 call at 18:23 and made initial attempts to suppress the fire using hoses and equipment left on site by MCFRS after a refuse pit fire earlier in the year. MCFRS arrived on scene at approximately 18:35 and took over fire suppression efforts. During the next 12 hours the fire spread from the tipping floor into the refuse pit though suppression efforts were under way.

One crane was mechanically available for the full duration of the fire and was used to move smoldering waste from the pit to the boilers. However, crane operation was not continuous throughout the event due to periodic lack of visibility and as a result of safety concerns for the crane operator. Boiler operation fluctuated based on the inability of the crane to move waste during certain low visibility periods. The firefighting led by MCFRS continued through December 12, at which time Williams Fire and Hazard Control, Inc. was brought to the site to assist and direct firefighting efforts. Williams assisted in the efforts by directing equipment and crane operators to move waste, suppress fires, and position the waste to minimize the spread of fire. The fire was declared extinguished on December 16th.

Based on the HDR/FRA team's investigation, the team is in agreement with Covanta that the fire most likely started in the South West corner of the tipping hall and that the exact cause is unknown. The exact cause of the fire is not clear as there was no evidence remaining for examination as all the material was consumed in the fire or pushed into the pit and subsequently burned in the boiler. Based on observations and interviews with key operating and firefighting staff, the most likely source of the fire was discarded material in the waste that was pushed into the pile on the tipping floor that either reacted with other waste products or self-ignited. Some potential sources may have included, thermal breakdown and thermal runaway of batteries (typically Lithium-ion), exothermic chemical reaction from mixing of discarded chemicals, or discarded ash or embers. Determining a specific source or cause is not possible given the lack of evidence.

Based on HDR's experience and surveys, on average, WTE Facilities may have one fire event requiring fire department assistance to successfully suppress the fire every two (2) years. The MCRRF experienced 5 significant fires in 2016 which is a substantially higher rate of occurrence than occurs elsewhere in the industry. Most fires are typically under control within a short period of time and can readily be handled through rapid suppression of the burning waste and the subsequent transfer of burned or smoldering material to the boiler hopper for combustion.

In the opinion of the HDR/FRA team, the frequency of fires at the MCRRF and the duration and severity of the December fire were directly related to the high waste inventory at the MCRRF, a lack of rotating the waste within the pit (churning), and the age/condition of the waste.

In the opinion of the HDR/FRA team:

- The waste inventory in the pit should be limited to an average height in the pit of 53 feet during normal operations with all three boilers in operation (maximum height for 3 days). The Waste inventory should not exceed 70 feet for more than 2 days in a row during boiler

outages, and the waste inventory should never exceed a height of 73 feet in the refuse pit. These heights should be further evaluated for safety considerations.

- The tipping floor should not be used to store waste during anything other than emergency situations, such as crane or loader failures, in which case waste should be moved into the pit within four (4) hours. Waste discharged onto the floor for inspections should be pushed into the pit as soon as practical once the inspections are completed, typically within an hour. Storage of waste on the tipping floor during emergency situations should be monitored by a fire watch.
- The crane operator should be screening and inspecting the waste as it is dumped into the refuse pit. A second crane operator should be operating the spare crane if the waste levels and deliveries impact the ability of the crane operator to inspect the loads.
- Covanta should routinely dig to the bottom of each section of the pit and remove as much waste as practical in each section. Complete removal of all waste is not practical or necessary. The opened crane tines should be able evenly contact the floor to demonstrate sufficient waste removal from each section.
- Covanta should review all Plant Operating Procedures related to firefighting and ensure that all SOPs, Plans, and guidelines are consistent and clear.
- Covanta should return the MCRRF to the "Best in Class" status historically achieved at this facility by completing the Recovery Plan.
- Covanta should improve maintenance of all fire detection and protection equipment and ensure that all fire protection equipment inspection, testing, and maintenance (ITM) is completed in a timely manner and is completed by sufficiently trained and experienced personnel with proper certifications as required by the State of Maryland and Montgomery County Executive Regulations.
- Evaluate fire protection system impairment policies and procedures.
- Covanta should perform a comprehensive fire and life safety analysis at the MCRRF to more fully develop the current status and effectiveness of the systems installed at the facility, and to develop a detailed, site specific prioritized list of recommendations for the MCRRF. This list should be reviewed and approved by the Owners. During this analysis, consideration should be given to the following (but not limited to):
  - Advanced Early Detection Systems (thermal imaging or similar)
  - Improve/add ventilation systems for the tipping room and refuse pit.
  - Evaluate the installation of additional fire protection systems and devices.
  - Evaluate the current fire monitors and consider automatic or remote operations.
  - Consider improved recycling programs for batteries, electronics, and household hazardous waste and improved screening of materials.
- Add systems or update plans for personnel safety including considerations for:

- Installation of permanent air monitoring equipment (oxygen and carbon monoxide at a minimum) in the tipping floor, crane deck of the refuse pit, area and inside the crane pulpit.
- Improve training and provide additional equipment for the protection of personnel during fire operations.
- Review EAP and clarify any directions that may be in potential conflict
- Review the EAP, POP and FGEP to ensure consistency and follow-up with regular training.
- Review the FGEP with the MCFRS and lessons learned from the fire event to update the FGEP as necessary.
- Evaluate locations of the water cannons on the charging deck and determine if there is a better placement or other protective measures that may reduce incidents of damage from the crane operations.

The December fire at the MCRRF had reached a significant severity prior to being noted and prior to firefighting efforts commencing. Considering the high level of waste in the facility, the weather conditions during the event, the related stormwater considerations, and the number of parties involved, limiting the damage to the facility walls and roof, and maintaining facility operations throughout the event is a noteworthy accomplishment.

3.0 CODES AND STANDARDS

The following codes and standards are relevant to the project as they governed the structure during the time of construction.

- Building Officials & Code Administrators International, BOCA National Building Code 1990
- NFPA 10 – Standard for Portable Fire Extinguishers
- NFPA 13 – Standard for the Installation of Sprinkler Systems
- NFPA 20 – Standard for the Installation of Stationary Pumps for Fire Protection
- NFPA 22 – Standard for Water Tanks for Fire Protection
- NFPA 25 – Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
- NFPA 72 – National Fire Alarm and Signaling Code
- NFPA 92 – Standard for Smoke Control Systems

Based on a review of the facility fire protection system drawings, the initial design appears to meet the installation and design requirements for the fire protection standards enforced in 1995; 1990 BOCA, and per the permitting services website for Montgomery County. However, it should be noted that during the HDR/FRA inspection the observed condition of these systems was poor with multiple failures noted over multiple inspections which clearly indicates that the inspection, testing and maintenance requirements of NFPA 25 were not being followed.

4.0 PROJECT SCOPE

HDR was retained by the NMWDA and County to conduct a root cause analysis (RCA) of a fire at the Montgomery County Resource Recovery Facility (MCRRF) under our existing On-Call Engineering Consulting Services Agreement (Contract #13-1(b)) with the NWMDA. Fire and Risk Alliance (FRA), a partner of the Fire & Risk Coalition, was contracted by HDR Engineering Inc. (HDR) to assist in conducting the RCA. The fire was first observed and reported on December 8th, and was reported to be fully extinguished by December 18th. As part of this assessment, representatives from HDR and FRA performed an inspection of the MCRRF located at 21204 Martinsburg Rd, Dickerson, MD 20842 between January 16th and January 19th, 2017. Preparation of the RCA consists of: reviewing available information, including eyewitness and first responder interviews, logbooks, and reports, to help identify potential cause(s) that may have led to the start and scale of this specific pit fire at MCRRF.

4.1 Background

The primary focus of the HDR and FRA Team is to investigate the root cause with an emphasis on comparing the fire that started on December 8th to previous fires in the pit and on the tipping floor to identify any differences and similarities between these events. The facility has had at least five known fires in the 2016 calendar year occurring in: July, August, October, November, and December. Another goal of this project is to assess the operating and working conditions of the MCRRF, including fire protection systems and the operator's emergency response and health and safety procedures at the time of the pit fire with the aim of developing recommendations to minimize or prevent future incidents. Due to the higher occurrence of fires this year compared to previous years, an analysis of the MCRRF fire protection systems and operating procedures (specifically the pit and on the tipping floor) is deemed appropriate to understand the underlying reasons and potential causes for the increase in fire incidents.

4.2 Preparation of a Root Cause Analysis (RCA)

The general items included in this RCA consist of documentation, interviews, visual aids, and any other relevant information. Activities that FRA and HDR conducted included: interviewing Covanta, Montgomery County, NMWDA, MCFRS, and other pertinent personnel, review the emergency response during the fires that occurred in the 2016 calendar year, review all information related to the fires in the facility including but limited to logbooks, video recordings, emergency action plan (EAP), standard operation procedures (SOP), incident reports, and training records, and review facility operating and maintenance records.

5.0 SUMMARY OF PRIOR EVENTS

Small fires in the pit area and the tipping floor area at other waste-to-energy facilities are not uncommon. However, the frequency and severity of fires at the MCRRF are higher than observed by HDR at other similar waste-to-energy facilities. There were four additional fire incidents at the MCRRF during the 2016 calendar year prior to the incident on December 8th. In general, the other fires were of smaller magnitude but give insight as to Covanta's response, observations, personnel involved, and documentation of fire events. The following sections describe in more detail each of the fire events that occurred at the MCRRF during calendar year 2016.

5.1 July 17th, 2016

The fire on July 17th, 2016 started on the north side of the refuse pit. The Covanta Staff initially attempted to suppress the fire internally but ultimately relied on MCFRS to extinguish the fire. Crews from Paramedic Engine 714 (PE714) operated with water operations into the next day before turning operations back over to plant personnel. The fire continued to smolder until July 18th when MCFRS was called again with a request for a stand by engine to help with suppressing hot spots while the crane operated to ensure that flare-ups could be quickly extinguished. See Table 2 through Table 5 in Appendix A for summaries of the logbook entries and incident reports for both Covanta and MCFRS.

5.2 August 19th, 2016

The fire on August 19th, 2016 was located on the tipping floor. The fire was identified and kept under control by Covanta personnel. MCFRS was notified and dispatched to the scene to find that Covanta was using the water cannons and had control of the fire. MCFRS deemed it appropriate for the facility to continue to operate with continuous fire containment measures in place. Covanta was instructed to call MCFRS if additional support was needed. See Table 6 and Table 7 in Appendix A for a summary of the logbook entries and incident reports for both Covanta and MCFRS.

5.3 October 19th, 2016

The fire on October 19th, 2016 was located on the tipping floor and refuse pit. The fire was identified and kept under control by Covanta personnel via a blitz monitor, a master stream water nozzle generally operated by one individual capable of discharging up to 500 gallons of water per minute (gpm). MCFRS was notified and dispatched to the scene to find that Covanta was using the blitz monitor and had control of the fire. MCFRS deemed it appropriate for the facility to continue to operate with continuous fire containment measures in place and left scene after approximately 30 minutes. See Table 8 and Table 9 in Appendix A for summaries of the logbook entries and incident reports for both Covanta and MCFRS.

5.4 November 5th, 2016

A fire broke out in the trash pit on November 5th 2016. The fire was contained by the Covanta personnel on the 5th, but continued to experience flare ups overnight into the 6th. No logbook entry was made for the fire department request, however the fire department report from MCFRS claims that Covanta staff requested the use of a thermal imaging camera to investigate the remaining trash

in the pit. See Table 10 through Table 12 in Appendix A for summaries of the logbook entries and incident reports for both Covanta and MCFRS.

5.5 Similarities Among Previous Incidents

The series of fires listed above have similarities relating to the origin and operation by both Covanta and MCFRS personnel. The fires generally were noted on either the tipping floor area where trash is delivered and stored temporarily, or in the refuse pit where the trash is stacked and stored. The previous fires were generally identified relatively soon after the fires started, typically by the observation of smoke or flame by the crane operator, and firefighting efforts commenced before the fire spread and intensified.

The previous fires were all reported to the control room by Covanta Personnel, and the Control Room Operator placed the call to 911 depending on the initial reports of severity. Each fire was responded to by Covanta personnel. For the previous fires Covanta typically used the facility's permanent fire water cannons on the crane deck to suppress the fire while using the crane to dig out and load the smoldering waste into the boiler hoppers. During the July fire, the MCFRS left the portable blitz monitor for Covanta to use if deemed necessary. This was used by Covanta staff during the October and December fires. Fires on the tipping floor can be either sprayed with the permanent fire cannons if a line of sight from the crane deck is not blocked by waste, or sprayed with fire hoses. There are 2 ½ inch dry standpipe hose connections on both the north and south walls of the tipping floor midway on the wall, but there are no hoses at those stations.

Waste that had been extinguished on the tipping floor was pushed into the pit and picked up with the crane to be loaded into the boiler hoppers. The combustion air source for the boilers is through intake screens located above the crane deck elevation. The air is drawn through the tipping hall and over the pit, drawing the smoke into the boiler's combustion air system. By catching the fires early, the smoke generated by the fire and during the firefighting activities is limited, and this is controlled to a significant degree by this movement of air and smoke. During the December 8th fire, the smoke was significant enough to limit the visibility in the pit and limited the ability of the crane operator to safely operate. As a result, boilers were taken off-line or were kept on-line using only natural gas, which further reduced the visibility as the air flow through the building was reduced under these conditions. Typically fires can be controlled and fought by operators from the crane deck elevation without relying on self-contained breathing apparatus (SCBA). During the December 8th event, SCBA was necessary due to the intensity of the smoke. This is discussed further in Section 6.4.1.

Based on the established EAP when fires are reported to the control room, the Covanta facility is to contact 911 and report the fire even if they believe it is a manageable internal incident. During the November 5th, 2016 fire, the fire department was not notified until after the fire rekindled on November 6th, 2016. This was one incident where Covanta personnel did not follow the EAP by contacting 911 immediately following initial reports of a fire. Facility staff used discretion in determining that the magnitude and severity of this fire was small and deemed manageable internally, even though the EAP specifically states to call 911 when a fire is reported.

MCFRS responded to each fire with a minimum of one fire suppression apparatus. Several incidents were responded to with full "alarm" consisting of 4 engines, 3 trucks, a battalion chief, and an ambulance based off the description given to the dispatcher at the Montgomery County communications center. Each fire was suppressed to MCFRS knowledge or left to the monitoring

of Covanta personnel after relinquishing command and control to facility personnel. The result of each fire was noted as extinguishment either by MCFRS or by Covanta personnel.

5.6 Comparison to Other Similar Facilities.

At the MCRRF and other similar facilities there are occasionally small fires that are treated as incipient and handled by in house staff, such as during hot work or minor upset conditions that result in a small fire. The frequency and severity of fires at the MCRRF are higher than expected and higher than observed at other similar waste to energy facilities. Other waste to energy facilities may experience as many as 1 to 2 fires per year that require outside assistance or a call to the local fire agencies, but typically, that number is even less (1 to 2 events every 2 to three years). At the MCRRF, the number of fires would be anticipated to be less, since waste is handled and prescreened off-site at the transfer station prior to being shipped to the Facility. Two significant fires in a month (July 17th - August 19th) followed by two more fires in an even shorter timeframe (October 19 - November 5th) should have resulted in heightened sensitivity and awareness of fires, and extra efforts should have been made to ensure that all of the remnants of all previous fires were completely dug out of the pit.

Four significant fires in a 4-month period (July 17th through November 5th) is well above industry standard and an indication that there were ongoing problems.

6.0 DECEMBER 8TH EVENT RECONSTRUCTION

During the day shift on December 8th, 2016, there was a very high inventory of waste at the MCRRF, with waste piled up as high as 55 feet above the tipping floor elevation. Considering the 30-foot-deep pit, this equates to material stacked as high as 85 feet above the bottom of the pit. During the day shift waste was pushed into the pit, filling the balance of the pit to tipping floor elevation. Additional waste was delivered to the Facility and was dumped onto the tipping floor and formed into two piles, one on the South side of the floor and one on the North Side of the tipping floor. Deliveries were completed and the tipping floor was unmanned beginning at approximately 17:30 on the day of the incident.

At approximately 18:22 on December 8th, a fire on the tipping floor was reported to the control room by the on-duty crane operator and the control room operator called 911. Covanta personnel, the shift supervisor and auxiliary operator, started to use a blitz fire water monitor on the tipping floor to attempt to extinguish the fire in its initial stages prior to fire department arrival. The first arriving fire department apparatus arrived 12 minutes after being dispatched to find a significant fire on the tipping room floor and the fire was spreading within a pile of waste on the tipping floor estimated to be 15 to 20-foot tall by 50-foot long. The fire was also spreading into the wall of material extending into the tipping bay on the south end of the refuse pit. The MCFRS took control of the situation and commenced efforts to control and extinguish the fire. During the evening, MCFRS left small crews, one to two units, to observe the fire conditions and primarily worked on suppression operations during the day time when conditions were more favorable. The buildup of smoke and steam in the building during fire suppression operations often hampered the abilities of the plant to continue operations due to limited visibility. Over the course of the operation many different strategies were used to try and improve ventilation and visibility. In addition to MCFRS, Centimark Roofing Company was contacted to assist with vertical ventilation operations by cutting 3 large holes in the roof over the refuse pit. In addition to vertical ventilation, horizontal ventilation was achieved by removing some of the side wall paneling of the tipping floor. This was done by MCFRS. In addition to providing ventilation, removal of the sidewall provided the ability for the MCFRS to fight the fire externally and from above the base of the fire.

It is common practice at similar waste to energy facilities to continue with operation of the boilers during small pit fires. This provides a means to remove smoldering material from the pit, by loading the material in the boiler hopper and processing the waste in the boiler. The operating boilers also pull air from the tipping hall to use as combustion air, which aids in ventilating smoke from the area. The plant attempted to continuously burn trash through the incident, but visibility became a reoccurring issue in that the crane operator could not see the trash to be able to load it. Covanta personnel worked with the fire department in suppression efforts in various ways, such as: loading the hoppers, operating heavy equipment, using hand lines, and providing command and rehab area. The fire department operated continuously for 10 days with the assistance of Covanta staff.

During the initial day of the incident personnel from both Covanta and MCFRS were being relieved and rotated out with new staff, including supervisors and crew chiefs, which on occasion led to miscommunication among involved parties. Scheduled daily meetings were eventually instituted to ensure that all individuals and organizations involved were on the same page. On the 4th day of the operation (December 12th), MCFRS contracted Williams Fire and Hazard Control, Inc. to help MCFRS with the firefighting efforts. MCFRS stated that the operations staff was “out

of ideas" on how to extinguish the fire and that it had reached a point where outside help was determined to be prudent. The Williams representative arrived on scene and made several recommendations. Working with MCFRS and Covanta staff, Williams implemented changes to the firefighting process that improved conditions. Based on various interviews, one key effective procedure that was directed by Williams was to optimize the slope of the piles of burning and smoldering waste within the pit and on the tipping floor. During the process, the use of Class A foam surfactants was discussed on several occasions. Surfactants are added to the firefighting water to lower surface tension and increase the water distribution and wetting characteristics within the burning waste. A Class A surfactant was utilized but it was determined that the surfactant provided only limited benefit. The Williams representative remained on scene to assist command with the incident until the fire was deemed extinguished.

6.1 Timeline Prior to Fire Discovery

Covanta's shift change occurred around 17:30 the day of December 8th. The shift supervisor and chief engineer reported that the rotation of crews was typical and nothing abnormal had occurred. The crane operator claimed that the trash was almost up to his observation pulpit, a level around 85 feet measured from the bottom of the pit. In addition to the large amount of waste in the refuse pit area, there were also two separate piles of waste on the tipping floor. Each pile was approximately 30 feet wide, 50 feet long and 15 to 20 feet high. These piles were in front of tipping bays A and C. A majority of the piles were not visible by the Crane operator due to the line of sight being blocked by the waste, particularly by the waste filling Bays A and C. Figure 4 (taken January 18th, after the fire event) shows the refuse pit and tipping floor facing the north wall while standing on the south observation ledge. The designation A is for the closest loading area (South), B for the center loading area, and C for the furthest loading area (North). Figure 5, taken prior to the fire, on December 5th, shows the A and C bays filled and blocked with waste, a pile on the tipping floor in front of Bay A and an open Bay B. This is similar to the reported conditions on December 8th, with the exception that there was also a pile on the tipping floor in front of Bay C. Reports from Covanta personnel indicated that the amount of trash on the tipping floor and refuse pit was the highest it had been in a while, almost at max capacity. Covanta personnel confirmed that the refuse pit was stacked in a "U" shape around the edge of the pit. The lower portion being bay B and the outer portion was stacked at 85 feet all around completely blocking loading bay A and C.

Figure 6 and Figure 7 give a visual representation of the trash level on the tipping floor and in the pit during the time of the fire incident.

Figure 4 Refuse Pit and Tipping Floor (01/18/2017)

Figure 5 Refuse Pit and Tipping Floor (12/05/16)

Figure 6 Trash on tipping floor back to entrance bay door (12/10/2016)

Figure 7 Trash level up to 85 foot mark in Bay A (12/10/16)

6.1.1 Water Supply

The MCRRF relies on discharge water from the neighboring NRG Facility for its plant water supply. On December 3rd, the NRG Facility was shut down due to an environmental issue and the MCRRF was forced to reduce operations substantially as a result of losing this water supply. Covanta used water tankers and a rental emergency diesel pump to provide water to the MCRRF. By December 6th, the temporary diesel pump and the tankers were providing sufficient water to allow the MCRRF to resume full load operation. Operating in this mode, the rental emergency pump and tanker deliveries provided sufficient water for plant operating systems. However, operating in this mode did not provide sufficient flow to provide the full refill rate of the fire water storage tank while simultaneously operating all plant systems. Based on Section 14.4.2 of NFPA 22, "the means to fill the tank shall be sized to fill the tank in a maximum time of 8 hours." The firewater tank at the MCRRF is equipped with a 6-inch fill line that will allow the firewater tank to be filled in the required 8 hours. Additionally, based on the pump curve provided to HDR for the temporary pump, the pump was capable of providing sufficient flow to refill the firewater tank in 8-hours if it was only serving the fire water tank. Based on the HDR/FRA team's review, the systems in place satisfied the NFPA Code.

Normal water flow to the facility was fully restored on December 9th, one day into the fire. Given that the was first observed at 18:22 on December 8th and that Covanta responded quickly by setting up the blitz monitor on the tipping floor, once the fire department arrived on site and took control of the firefighting, firewater use increased. The volume of the fire water tank was exhausted during the evening of December 8th. Under normal operations, the automatic valve in the 2-inch supply line should be in service and during a fire event the operator assigned to attending the firewater pump would typically open the 6-inch fill line to makeup water to the tank. During HDR/FRA's site visits, the 2-inch automatic fill line valve was observed to be manually isolated and the 6-inch makeup line was also shut. It is not known if the 2-inch line was open during the fire event but based on the records, it does appear that the 6-inch supply line was used as designed.

During the course of the HDR and FRA investigations the water supply issue was never stated to be a cause for the fire severity by those that were interviewed. While it was noted that the firewater tank reached a low level, water tankers were subsequently brought to the site for firefighting and the tank was also refilled. The water demand by the fire department and the facility during this event was significant enough that tankers would have been needed regardless of whether the facility had resolved the NRG water supply prior to the fire.

6.2 Incident Reports

Table 13 in Appendix A lists Covanta log entries relevant to the fire and firefighting operations during the incident. The time frame for the log entries starts at the report of fire on the tipping floor through the duration of fire incident.

Items listed after December 10th decreased in reference to firefighting operations and continued as typical logged operations. Table 14 lists the incident log of MCFRS in addition to the unit narrative of PE714 as they were the first MCFRS suppression unit on scene, and were the company with the longest presence on scene over the 10-day incident duration.

6.3 Fire Discovery

Covanta employee Ron Bricker, the crane operator at the time of the incident, was the first individual to notice the fire. Ron Bricker began his shift at 17:00 on December 8th and was scheduled to work until 05:00 on the 9th. He indicated that he thought the fire was on the tipping floor at the south wall area as he observed a glow from the tipping floor area above the pit wall, Bay A, and a short time later observed flames at the same level and area. He stated that the trash was higher than normal and that the glow was coming from above the concrete horizontal support seen in Figure 4 (approximately 40 feet above the tipping floor elevation). Ron Bricker reported the fire to the control room via the portable radio. Ron Bricker stated that he remained in the Crane cab because he was instructed to do so to spot the fire and to assist in the firefighting. Ron Bricker, stated that he docked the crane in the maintenance position at the end of the bridge, visually confirmed that the emergency escape breathing apparatus (EEBA) was in the storage container, and called the control room to report the fire. The South crane was out of service due to unrelated equipment issues and only the North crane was in operation at the start of the fire.

After the initial report of the fire on the tipping floor, the control room documented the report. After hearing the report on the radio Covanta shift supervisor, Matt Gerlach, rushed out of the basement through the break room corridor, heading towards the tipping floor. After exiting the building, he smelled smoke and observed blistering paint on the South exterior wall of the tipping floor. Matt Gerlach instructed the control room to call 911 to report the fire. The fire department was notified and internal emergency operations began with Covanta personnel.

6.4 Emergency Response

After the fire was identified by Ron Bricker and confirmed by Shift Supervisor Matt Gerlach, the facility made some initial attempts to extinguish the fire. Matt Gerlach (and separately, Jay Luksis Covanta's Safety department) stated that the MCFRS had left some hose and a blitz fire monitor after the July fire, which was located at the fire hydrant near the northeast corner of the tipping building. Matt Gerlach reported that he went to the hydrant with an auxiliary operator (AO) and set up the monitor inside the North bay door of the tipping floor. Matt Gerlach stated he and the AO advanced to the tipping floor open area towards the center and towards the east; however, they ran out of hose. He expressed that he did not have enough hose to stretch to see the fire so he began to bank the water off the tipping room floor south wall in attempt to ricochet/rebound the water onto the fire. Matt Gerlach reported that after about 10 minutes the fire department arrived and he went to debrief them on the situation, including an update on the temporary water supply system, and the portable diesel water pump that was in service. During the evening, the fire department exhausted the fire water tank and supplemented the water needed with tanker trucks.

After the fire department arrived, command of the situation was assumed by the Unit 4 Fire Chief (C914). With command on scene, PE714 informed the responding MCFRS crews of the potential water supply issues. PE714 entered the structure with their apparatus to tactically place the deck gun, atop their rig, for direct line of sight to the fire. After the flaming fire was knocked down, PE714 removed the apparatus from inside the building to the north exterior. Additional master streams and hand-lines were positioned and manned on the tipping room floor by MCFRS personnel. Jay Luksis, Facility Safety Manager/Rail and Transportation Superintendent, and former MCFRS firefighter, stated that attempts to use the north refuse pit water cannon were made but that the trash level was too high and that the water could not reach the fire, nor was there a line

of sight to be able to see the fire. Additional discussion on pit inventory and pit height is included in Section 7.2.1.

John Kinsley, Operations Chief at the MCFRS, stated that Frederick chief 914 was the first fire chief on scene to assume command from PE714. A foam solution and water were both used in the initial stages of the suppression efforts, but ultimately the fire department resorted to water alone as the foam was did not appear to have any observable benefit per John Kinsley. Additional crews arrived and assisted in fire suppression operations.

Over time Ron Bricker, Matt Gerlach, and John Kinsley all indicated that ventilation was becoming a concern. They stated that the visibility on the tipping room floor and in the refuse pit area were minimal and nonexistent at times. Often during this period, the crane operators were limited in their ability to see the crane grapple as they were digging for waste and loading waste into the hopper due to the thick smoke. "Spotters" were used to guide the crane operators to the desired locations in the pit and back to the boiler hoppers. Boilers were ultimately shut down numerous times due to a lack of visibility and inability to load waste. Boilers were also shut down on occasion due to high CO resulting from trying to process the saturated waste. Thus, ventilation became a major concern because the crane needed to operate to remove the trash and keep the boilers operating. Figure 8 shows the visibility on the tipping room floor, which is indicative of the conditions described by both Ron Bricker and Michael Nelson, MCFRS Battalion Chief. Michael Nelson was one of several chief officers on scene the day of the 8th.

After the initial incident was deemed under control at the end of the 8th by MCFRS, command deemed it appropriate to release equipment and hold PE714 as the "primary contact for the remainder of the night" and to monitor the conditions on the tipping floor and refuse pit. Other Units left the site at approximately 23:06 on the 8th. At this time there was limited smoke or visible flame coming from the waste on the floor or in the pit. Typically, no Covanta personnel are on the tipping floor over the night as no deliveries are made during that time. HDR/FRA does note that a control room logbook entry at 21:00 on the 8th indicates "Flames spotted in refuse pit, removing crane from service, unable to feed boilers." It is not clear if this was the first evidence of fire in the refuse pit, and it is not clear how the fire spread from the tipping floor to the pit. There are a number of possibilities for the spread of the fire from the tipping floor into the pit including: spread through the opening in Bay A; spread due to wind or air movement; or spread from material dropping from the crane.

On the morning of the 9th, PE714 stated that the fire had started to spread more rapidly throughout the trash pit and was requesting backup. John Kinsley indicated that the approach for the rekindled fire was to remove the waste with excavators and front end loaders, soak it with water and send it to the hoppers via the crane. A main goal was to separate the piles of trash from one another to prevent the fire from spreading further. The fire created substantial amounts of smoke after the rekindle and during the suppression efforts. According to Jay Luksis, Covanta personnel were sent to the roof to open the smoke hatches after the rekindle occurred on the 9th. The facility EAP does not address the operation of the roof vents and the only methods of operation for the vents are thermal activation or manual operation from the roof. Due to the volume of the refuse pit area and the fact that the combustion air for the boilers is taken from this area makes the automatic thermal operation of the vents highly unlikely. MCFRS brought in their Air Boat unit and positioned it at the north side roll up door in an attempt to positively pressurize the structure to remove the smoke through the vents. John Kinsley stated that the smoke did not dissipate after this attempt and that additional measures were needed. There were some witnesses who felt that the Air Boat actually

increased the intensity of the fire, noting that there was initially smoke but that fires were observed after operating the Air Boat.

The fire department in conjunction with Covanta personnel used large box fans on the roof above the smoke hatches to try to eject the smoke. John Kinsley stated that the ventilation attempts produced minimal results and that the roof and siding needed to be opened further to allow for more air flow (see Figure 9 and Figure 10, below). John Kinsley also stated that the weather was quite windy and cold which was contributing to the minimal ventilation efforts. John Kinsley stated that Centimark Roofing cut large roof openings on December 11, which was confirmed by Mark Freedman, Covanta's Business Manager. Additional roof openings were cut in on Monday December 12. After the building was opened, the conditions improved dramatically with minimum further fluctuation of visibility and smoke conditions.

Figure 8 Tipping room floor visibility, PE714 seen north side rollup door (12/09/2016)

Figure 9 South wall horizontal ventilation openings (12-10-2016)

Figure 10 Ventilation hatches open and roof opening by Centimark (December 12, 2016)

On December 9th, as the incident continued, tankers were requested by both Covanta and MCFRS to help both with firefighting operations and facility operations through this event. Based on HDR/FRA's understanding of the events, the water supply did not have a significant impact on the initial fire department operations as the fire was initially brought under control while the firewater tank was being emptied on the night of the 8th/morning of the 9th. The tank was noted to be at a level of 3 feet at 01:00 on the 9th. Supply water was connected up to the tank and the water level had risen to 5 feet by 02:30. Firewater tankers arrived on site by 03:55 on the 9th and provided for fire ground operations. As discussed earlier, water is normally supplied to the facility from the neighboring NRG power plant, but the plant had been shut down since December 3, 2016 and the facility was only receiving water from a temporary portable pump with a reported maximum capacity of 550 gallons per minute. HDR reviewed the pump curves for the rental pump and estimated that the pump was actually capable of substantially higher flows (close to 900 gpm) and was sufficient to refill the firewater tank in the 8-hours required by code

Covanta's Environmental Coordinator, Kim McIntyre, stated that tankers from Darling & Daughters were on scene and that one 6,000-gallon tanker was located at each side of the tipping floor entrance. MCFRS brought their tankers as well and had an off-site fill site per the incident log. Figure 11 shows the tanker size and location during the fire incident.

Figure 11 Tankers on scene to supply additional water (12/09/2016)

HDR/FRA reviewed the firewater tank sizing and confirmed that the size of the fire water tank is sufficient for the design of the MCRRF and the fire protection systems installed. The tank is designed to provide enough water for two hours of operations with a fire pump operating at 100% flow. The system is designed for the operation of the fire protection systems installed at the facility with some water in reserve for fire department operations as required by code. The refill rate for the fire water tank is designed per code at the time of construction and also meets current code. Refilling requires that the 6-inch manual valve be opened in order to provide the required 625 gpm fill rate. This fill rate is not possible through the 2-inch automatic fill line. As discussed previously, it is not clear if the isolation valve in the 2-inch line upstream of the 2-inch automatic valve was opened or closed during the event. HDR has reviewed the operator logs and MCRRF Fire Response

Procedures and it is not clear if the operator dispatched to the fire pump house operated either the 6-inch or 2-inch manual valves during this event. The Fire Response Procedure should be edited to include operation of the 6-inch line if necessary and to address the required status of the 2-inch make up system.

Full water supply using plant pumps was restored to the facility at some time on December 9th. The Logbook entries are not of sufficient detail to determine the exact time, but by 18:00 the firewater tank level was reported to be at 31 feet, an indication that the normal service was likely restored. With the normal water supply restored, the need for tankers should have been reduced. Tankers remained on site as a contingency to support operations.

After several days of working with Covanta fighting the fire, the MCFRS stated that the operations staff were out of new ideas on how to extinguish the fire and that it had reached a point where outside help was needed. On the 4th day of the operation (December 12th), the MCFRS contracted with Williams Fire and Hazard Control, Inc. who was brought to the scene to help with the industrial firefighting efforts. John Kinsley stated MCFRS and Williams made a list of options:

A. Williams work with Covanta to move trash

B. Use lots of water and foam

C. Turn over entire operation to Williams using MCFRS personnel

The coordination with Williams was done through Alan Butsch, MCFRS Battalion Chief. Option C was chosen and Williams created a plan to make a smoke barrier with trash and to continue to move trash into the hoppers. The smoke barrier used in this application consisted of trash being piled and positioned in a specific manor to redirect and control the flow of air. Williams directed MCFRS personnel in the usage of heavy machinery, along with Covanta's crane operator, to move the trash into specific locations inside of the pit. This provided better control of the combustion process by limiting the amount of air to the burning waste and reduced the areas of the pile that would be impacted by convective air currents. This process limited the spread of the fire and reduced the combustion. Williams, in conjunction with Covanta and MCFRS had daily meetings in the administration offices to coordinate the daily goals and objectives. John Kinsley stated that the daily meetings were beneficial to ensure consistency between shifts and crews. Williams remained on scene assisting with command of the incident until the fire was determined to be extinguished on December 16.

6.4.1 Emergency Action Plans

The Covanta Montgomery facility has an Emergency Action Plan (EAP) and Plant Operating Procedures (POP) which include responsibilities and operations to be undertaken by Covanta staff in the event of an emergency. The EAP states that crane operators are to ensure their EEBA is in the pulpit and ready for service. In the event of an alarm the crane operator is to cease operation if a fire is reported on the tipping room floor or in the refuse pit. In addition, after the fire is reported, the Control Room Operator will identify the location of the fire and will inform the Shift Supervisor and then notify the fire department via 911 if and only if the Shift Supervisor or Facility Manager directs him to do so. If the fire is in the refuse pit, the crane operator shall position the crane in maintenance positions, don their EEBA and escape or respond as needed. There was also a Fire and General Emergencies Plan (FGEP) provided to HDR/FRA that indicates, under section 2.2.3, that the Shift Engineer shall call 911 in case of fire. This appears to be a conflict in policy that needs to be addressed and corrected.

The EAP states that Covanta shall follow all fire department directions relative to the fire after their arrival. The fire department is in charge of the fire and the Shift Supervisor is in charge of the operation of the plant but is to coordinate with fire department (Appendix C).

According to Ron Bricker, he followed the directions of the Shift Supervisor to stay in the crane pulpit, though he indicated his concerns regarding the worsening conditions around the pulpit. He stated that it was company policy to stay in the crane operators' pulpit, however he had not been in a similar situation previously. He stated that his training consisted of verbal instruction on what to do in a fire emergency and how to use the EEBA. He stated that he wanted to leave but couldn't because he was required to operate the crane. Per the EAP, the Shift Supervisor and the crane operator are to use judgement based on the conditions of the fire, which leaves room for interpretation of severity.

The FGEP, Appendix D, illustrates the requirements with a listing of individual's title and role. The FGEP indicates that the Shift Supervisor is to report to the incident location, which was done by Matt Gerlach. Additionally, the fire department is to be notified by the Control Room Operator after being instructed to do so by the Shift Supervisor, which was also done by Matt Gerlach. No reports of the fire pump being confirmed to be in standby could be provided, however Matt Gerlach did claim that auxiliary operators were assisting him, and would meet with the fire department upon their arrival. Evacuation measures were taken by the facility and all were reported as accounted for per MCFRS incident log and unit report.

Per section 3.1.4 of the FGEP, "smoldering fires are not to be disturbed unless water cannons are manned". However, according to Jay Luksis, the cannon in this case did not have line of sight to the seat of the fire; therefore, hand-lines and ground monitors were used as an alternative.

Section 3.2.2 of the FGEP states that the fire department shall be called every time a fire incident is reported; however, per the MCFRS logs and Covanta Logbook, there are incidents where the fire department was not notified, but rather the fire was handled internally by Covanta staff.

Section 3.4.1 of the FGEP states that the auxiliary engineers are to don SCBA and report to the water cannons. Michael Nelson (MCFRS) stated that hand-lines and monitors were stretched to the south monitor location on the observation level and operated because it was unsure if the permanently installed water cannons were operable. He also stated that it was unknown to him if the water cannons were ever manned by Covanta personnel. Through the interviewing process there were accounts of Covanta personnel on the crane deck without SCBA during the fire. Covanta staff was being used as spotters on the crane deck, with lights to help direct the crane operator to the hopper.

Similarities between the EAP, POP (Plant Operating Procedure) and FGEP exist but the POP (Appendix E) calls out additional responsibilities such as Water Tech. The POP indicates that the responsibility of the Water Tech is to report to the pump house and check the electric fire pump and then meet with the fire department. It is unclear if this step was done during this incident; however, the task is not outlined in the other documents. Discontinuity and differences between the EAP, POP, and FGEP are apparent and these items need to be addressed.

The Plant Operating Procedure for fire events, and the FGEP need to be reviewed and edited to include monitoring the firewater tank level and adjusting valves as directed by the Control room operator.

The FGEP states that continued operation should commence pending severity and visibility. Michael Nelson and John Kinsley concurred that the previous fires and this fire were extinguished when the crane could load the hoppers and burn the smoldering material in the incinerator. Moving trash on the floor (using an excavator to dig material from the pit) could only temporarily lighten the conditions; burning the trash helped solve it.

As part of the EAP and other procedures, Covanta should address ventilation during fire events, as well as set standards for the use of SCBA and limiting access to various areas around the facility. SCBA should be required when the operators are exposed to smoke from the burning waste, and the Crane Operator should use the SCBA when exiting the crane cab and passing into the boiler building or other exit. Reliance on the positive air system (pressurized crane cab) for the crane operator safety needs review, and consideration should be given to the installation of CO monitors in the crane cab.

One main issue that needs to be addressed and resolved is Covanta's practice of fighting fires that are more than incipient in nature. Fighting incipient fires is typically limited to the use of fire extinguishers and small hoses. By assuming the role of fighting larger fires with larger equipment, Covanta is assuming additional responsibility. Significantly more training would be required for any staff assigned to a fire brigade or made responsible for additional firefighting duties. This is discussed later in this report and needs to be fully assessed by Covanta.

6.4.2 Fire Protection Equipment

Covanta has compiled a number of System Descriptions for various plant systems. According to Covanta's Fire Protection System Description No.9, dated April 1995, there are a variety of fire protection systems at the MCRRF. Table 1 shows the listed items throughout the facility along with relevant information.

Based on interviews with both Covanta staff and MCFRS, the fire cannons were not manned throughout the duration of the event, but rather the north cannon was used sporadically and was eventually deemed unusable due to the height and configuration of the waste within the pit. Crane operators Ron Bricker and Richard Early both claimed that the number of operable cannons has varied because they are regularly hit by the cranes when attempting to load the hoppers. It is not clear based on the interviews or plant records if all the cannons were fully operable at the time of the fire as the maintenance and repair records are incomplete. Had the trash levels been low enough for the water cannons to be usable, it is likely that the Covanta personnel could have directed more water onto the fire at an earlier stage as the fire was near the pit area. The direct contact onto the seat of the fire would likely have had a significantly positive impact on the suppression operations.

Table 1 Fire Protection System Description

Item	Description
Fire Water Storage Tank	300,000 gallon, 2" automatic fill valve, 6" manual fill valve, High/Low level alarms
Diesel Driven Fire Water Pump	Peerless Pump 8AEF17N, Clark-Detroit Diesel DDFPL6VT, 2500 gpm flow, 125 psi. 305 HP, 426 in3, 2100 rpm.
Motor Driven Fire Water Pump	Siemens, Peerless pump 8AEF17N, horizontal single stage, 2500 gpm, 125 psi, 250 hp, 460V 3 phase/60 hz ODP motor drive.
Motor Driven Jockey Pump	Siemens, Peerless TMUB-18, centrifugal pump, 30 gpm, 140 psi, 3460 rpm, 7.5 hp, 640 V, 3 phase/60 hz, TEFC motor.
Fire Hydrants	Kennedy Valve, two 2 ½" connections, one 4 ½" connection, 13 total on facility.
Post Indicating Valves	Kennedy, 11 total on facility.
Fire Hose Valves	Class 1 hose valves, wet and dry type, 19 total on facility.
Water Monitors (Cannons)	Powhattan 33-501, 300 gpm, combination nozzle, fixed position.
Wet Pipe Sprinkler System	ASCOA, E&H, covers: Administration Building, Turbine Lower Level, Firewater Pumphouse, Boiler Firing Floor, Elevator Vestibule, Visitor Viewing Area, Maintenance, Stair 1 & 2, North and South Crane MCC, Elevator/Elevator Mach Room. 155 or 286 or 212 F Temperature Rating.
Dry Pipe System	Automatic, Model: 39, 2", 4" and 6" size. Locations: Tipping Floor, Refuse Pit, Standby Diesel Generator Room, Grizzly/Scalper Area, Cooling Tower. 286 or 165 F temperature rating.
Preaction System	Viking, single interlock provided for the turbine generator bearings. Double interlock: Control Room, DCS and Relay Area, Switchgear, Battery, UPS Area.
Control/Alarm Panels	Main Fire Alarm Control Panel, MXLR #1, Control Room, Cerberus Pyrotronics. Branch Control Panel, MXLR #2, Boiler Enclosure, Cerberus Pyrotronics. Remote Control Panel, MXL, Intake/Discharge Structure, Cerberus Pyrotronics. Annunciator, ANN, Control Room, WSA, FAA-250 Remote Command Center, RCC, Admin Corridor, Cerberus Pyrotronics. Smoke Control Panel, SCP, Main Control Panel Control Room.
Portable Fire Extinguishers	Class A, B, and C fire extinguishers throughout facility.
Fire Department Hose Connections	4 point FDC west of administration area, south side T/G Enclosure, and the Cooling Tower Valve House. 2 ½" connections
Smoke Control	Smoke Hatches: Bilco, DFV, 268 F, Locations: Tipping Floor/Refuse Pit, Boiler Enclosure, Grizzly Enclosure. Wall Louvers, Breakout Window Panels, HVAC fan shutdown, Duct Smoke Detection: Cerberus Pyrotronics, 3/X3. Dedicated Smoke Control HAVC Units receive signal from Smoke Control Panel.

The facility operator does not always follow proper red tag procedures for fire protection equipment as indicated in the FM reports and as witnessed by HDR/FRA personnel while on site. Conditions of cannons during site visit indicate that they are not properly maintained and one nozzle was missing entirely. There was no red tag in place for this nozzle being out of service. There were also materials indicating that parts of the water cannon systems were recently replaced, but it is unknown as there were no records of this maintenance being performed.

The fire sprinkler systems did not operate the day of the fire and it is unknown if all the systems in the tipping floor area or the refuse pit were operable. Conflicting reports of the system condition were provided, but it is clear that no water discharged from the dry system over the tipping floor. Based on our reviews of the information provided by the facility operator and the inspecting contractor for the sprinkler systems, and observations at the facility during the site visit, the sprinkler systems on the South end of the refuse pit and the West Side of the tipping floor (fire first reported in the south west corner of the tipping hall) were out of service during the fire event and during our visit, and may have been out of service for a an extended period without proper documentation. From visual inspection during the survey and a review of the fire protection system plans, the sprinkler spacing appears to be a code compliant 10x10 spacing.

The facility drawings call out the tipping area and refuse pit being an F-1, Extra Hazard (Group-1) occupancy classification. Given the sprinkler design and location relative to the fire it is unlikely that the system would have activated in a time frame in which the system would have been effective in controlling or suppressing the fire. Appendix F contains a sprinkler calculation which suggests that the fire would need to be significant in size in order to activate a sprinkler at the tipping floor height. Generally, sprinklers are activated from the thermal layer of smoke, increasing the temperature of a fusible link or bulb. In the case of the tipping floor and refuse pit, the fire was at a significantly lower elevation (less than 50 feet above tipping room floor) allowing the smoke being produced to cool prior to hitting the ceiling (100-foot ceiling in refuse pit, 60-foot ceiling tipping floor). It is likely that the thermal layer hitting the ceiling sprinklers would be significantly delayed in reaching the 286^{o} F activation temperature of the sprinkler heads. Additionally, the design of the wall between the tipping floor and the pit area, with an opening at the transition, allows smoke to travel from the tipping floor to the pit, reducing the likelihood that temperatures will build up to the actuation temperatures. Regardless, had the sprinkler heads activated at the southwest portion of the tipping floor (most remote location), the sprinklers would likely have had a minimal impact on the fire. This is based on the assumption that the fire would have spread and grown significantly by the time the heads activated. In this case, considering the severity of the fire and the sprinkler system design, it is likely that the sprinkler system would have been of limited support in the suppression efforts. The size of the fire necessary to develop the activation temperature of 286^{o} F at the ceiling would likely have overwhelmed the sprinkler system by the time the first sprinkler activated. Had the sprinkler system activated it would have adversely impacted the amount of water remaining in the fire water tank for fire department operations, particularly if multiple heads activated. Operating the sprinklers for the 10 minutes prior to the fire department arrival would have reduced the amount of water available to put directly on the fire. The direct water streams from the fire department hose provide deeper penetration and would have a significantly greater impact than water droplets hitting the surface of the trash from the sprinkler system. There is a possibility that a fire alarm associated with a system release would have provided additional time to respond to the fire and could have led to a reduced severity of the fire. This is not deemed to be a likely scenario.

The hose stations on the tipping room floor are connected to the dry sprinkler systems and were not used. It is unknown if they were operable at the time of the fire but it appears that the south hose station, connected to the west tipping floor sprinklers, would have been out of service as indicated by the impairment tag on the system. Battalion Chief Michael Nelson stated that, during the incident, firefighters used their own equipment because they were confident that their equipment worked and were unsure of the condition and operability of the facilities equipment. The fire department has SOP's that are for general application per scenario. Having a facility specific operation plan in place using the facility fire protection equipment is impractical as fire department personnel rotate and it cannot always be assumed that the facility equipment is maintained and operable. This can be improved with routine inspections, visits and communications between Covanta and the responding departments.

During the incident tankers responded to the facility to supplement the facility water supply with additional water. The 300,000 gallon water tank meets applicable code, but can only supply the facility for a limited duration without being replenished. The 250 gpm auto fill feature, if operable, could not keep up with the demand placed on the fire pump by the fire department through the hydrant system. The fill rate as required by code is calculated to be 625 gpm. This 625 gpm fill rate calculated for this installation is not required to be an automatic fill rate. Supplying this makeup through a manually operated valve does meet code, including the code at the time of installation and also the code in effect today. The fire department was aware of this and started supplementing the water needed with the tankers at 03:55 on December 9th. Fire hydrants are often assumed by fire departments of having the capacity to provide the required amount of water for fire department operations. At the MCRRF the hydrants are supplied only from the fire pumps and fire water tank.

During an after-incident survey of the facility (January 17, 2017), it was noted that the electric fire pump was running. It is not clear why the fire pump would be running at that time considering no fire protection systems were activated. There is a possibility that the fire pump was running due to a leak in the system, a faulty signal, or the use of fire water for plant operations use (cleaning or other). The firewater is occasionally used for cleaning efforts as the pressure is substantial enough to remove dust and grime from facility equipment and structure. The firewater system should be limited to fire protection systems only and should not be used to support facility operations.

Robin (Rob) Ziemke, Covanta Head of Maintenance, stated that the smoke hatches above the tipping room floor and the refuse pit were opened manually. Dennis Thomas, Covanta Shift Supervisor, indicated that the smoke hatches were opened and shut several times though the operation. At some point through the operation the hatches were closed improperly, resulting in the latching mechanism in some hatches being damaged. As a result, the hatches were fastened shut after the operation. Over the weekend of December 10th, large box fans were positioned over the opened hatches to act as smoke ejectors on the roof. The roof hatches are equipped with a 286° F fusible link, however reports indicate that they had to be manually opened. Considering the fire size and height of building, calculations suggest that the fire would have to be magnitudes larger to activate the fusible links.

Jay Luksis claimed all fire hydrants were operational at the time of the fire. MCFRS stated that the initial water supply, pressure and flow, was sufficient.

It is not clear whether the fire alarm panel or smoke control panel were operable at the time of the fire. During the after-incident survey, the fire alarm panel was indicating several supervisory,

trouble, and alarm conditions and it was noted to be in a similar state in prior system inspections. Additionally, the smoke control panel indicated that the smoke control system had activated several different components such as HVAC shutdown and HVAC running.

Fire extinguishers were observed throughout the facility during the after-incident survey. None were confirmed to have been used during this incident, though several were observed to be discharged during the site inspection. Inspection tags varied in year or were missing suggesting that the extinguishers maintenance might not be up-to-date resulting in low pressure or operational issues. These factors point to a potential deficiency in the maintenance and recordkeeping associated with the fire protection system and are systemic of other maintenance issues at the MCRRF.

Had the fire protection suppression and fire alarm system components been fully operational, the facility would have been up to prescriptive code. However, the nature of the fires that can occur on the tipping floor and in the refuse pit will likely not be suppressed with the existing sprinkler system. There are systems that, if installed at the MCRRF, may be able to provide additional mitigation of a fire earlier in its development, such as a deluge system or an Early Suppression Fast Response (ESFR) sprinkler system. However the efficacy of these has not been fully explored to date with regards to the MCRRF as these systems are not required to meet code and thus would be performance-based designed systems.

6.4.3 Incident Command

Included in Covanta's Operating Manuals, is Safety Procedure No. 17A – Emergency Action Plan. In this EAP there is an outlined set of responsibilities for each individual in the case of an emergency. These roles are defined as follows:

- Facility Manager (FM) - Overall responsibility for the EAP, including implementation and review to ensure that it meets necessary objectives. Also, responsible for the state-of-readiness of the plant, emergency equipment and for ensuring required training is conducted.
- Chief Engineer – Assist FM in administrating the EAP. In emergency situations to serve as lead person to coordinate activates and outside support agencies as required.
- Shift Supervisor and Control Room Operator (CRO) – Understand and implement the EAP. In emergency situations, to respond as required, manage plan resources and work with outside support as directed/necessary.
- Facility Safety Coordinator (FSC) – Administer the EAP, ensure that employees, contractors and visitors receive required training and evaluate the effectiveness of the EAP. In emergency situations, to respond as directed/necessary.
- All employees – Understand the requirements of the EAP, be able to identify potential or known threats to personnel, property or equipment and report situations. In emergency situations, to provide support as required/directed within the limits of training.
- Contractors and Visitors – Understand applicable requirements of the EAP and provide required information for each individual to work or visit the facility.

According to the EAP there is an Emergency Control Center that will handle all internal communication needs. This group staffing will include: Facility Manager, Chief Engineer,

Business Manager, Shift Supervisor, Maintenance Supervisor, E & I Tech, Facility Safety Coordinator, Environmental Specialist, Runners (2). The operations of this group are to: determine severity of event, needed resources, estimated duration, First Aid Shelter established, and to continue to monitor emergency inside and outside the facility.

In addition, the EAP specifies the Chain of Command during an Emergency in section E. This section calls out the command structure. *"Once notified of the situation the Shift Supervisor will proceed to the scene and evaluate the situation. He will take charge of the scene as the Man-In-Charge until relieved by a Competent person. The Competent person will be the most senior man responding who is familiar with the surroundings and situation."* The Shift Supervisor will then act as the Emergency Coordinator until relieved by one of the following in this order of preference: Facility Manager, Chief Engineer, Off Duty Shift Supervisor. After being relieved the Shift Supervisor should return to the Control Room to ensure the CRO is capable of handling the situation in the Control Room.

Based on the interview with Matt Gerlach, the Shift Supervisor on duty at the time of the fire, he reported to the tipping floor to see blistering paint on the exterior walls and active fire on the tipping floor. He reported that he started to operate a blitz fire monitor in attempts to suppress the fire. He stated that he continued to operate while talking with the control room via radio. He met with the first arriving MCFRS personnel to give them a debrief of the situation at hand.

Matt Gerlach did not claim that any formal Emergency Control Center was initially established. From his interview, he claimed that personnel were at the facility from both Covanta and MCFRS but no formal Command center or single point of contact was created until later in the incident. According to the EAP, a formal exchange of command was to happen between the Shift Supervisor and the Facility Manager or Chief Engineer, though it is unclear if that was attempted or ever happened. In the Covanta post-incident report, there is no reference to any exchange with command other than MCFRS taking over fire suppression efforts. However, over the duration of the event a command center was made in the Administration Building to coordinate with all involved parties including Covanta, MCFRS, and Williams.

A Fire Response Team is only mentioned in the FGEP, and suggests that all personnel intimate with the fire or have firefighting experience are to help respond to the fire and follow instruction from the in-charge staff member. From the interview with Jay Luksis there is no formal training for a fire brigade or fire team. The "team" consists of whoever is on shift and is available to assist. It is unknown to HDR/FRA if MCFRS is agreeable to having Covanta create a fire brigade or if formation of a fire brigade is within the standards practiced by Covanta at any of the other plants it operates.

7.0 ROOT CAUSE ANALYSIS

7.1 Fire Cause and Origin

From initial reports from Ron Bricker the fire was first observed as a glow and subsequently flames above the wall separating the pit from the tipping floor area, in the loading area of Bay A of the refuse pit. Based on all first-hand accounts, the fire was on the tipping floor and the waste in the pit was not actively burning at the time of the discovery of the fire. Considering the height of the opening through which the operator observed the flames (approximately 45-feet from grade), the distance the crane operator was from the fire, and the amount of trash in the refuse pit and tipping floor, the fire was past the incipient stages of fire growth and was already well developed.

The exact cause of the fire is not clear as there was no evidence to examine since all of the material was consumed in the fire or pushed into the pit and subsequently burned in the boiler. The only information available to HDR/FRA at the time of our inspection was from eye witness statements. There are a number of potential causes of tipping floor and pit fires and each of these was evaluated. Several potential causes were examined that were deemed implausible and thus were ruled out:

- Methane (from decomposing waste) ignited from equipment or mechanical spark;
- Hot work (i.e. welding) recently performed in the area;
- Smoking on the tipping floor; and,
- Fire or sparks from the feedchute hopper as a result of boiler upsets, feedchute plugs, or feedchute damage.

The causes that were considered and deemed plausible during this event are as follows:

- Self-heating of refuse, spontaneous combustion;
- Unquenched fires from earlier events;
- Thermal breakdown and thermal runaway of batteries (typically Lithium-ion);
- Discarded ash which retained smoldering embers; or,
- Exothermic chemical reaction from mixing of discarded chemicals.

Each of these possible scenarios are deemed plausible based on the waste stream delivered to MCRRF; however, determining a specific cause is not possible given the lack of evidence. HDR/FRA was not able to obtain video recordings captured during the event, as the recordings of video of the refuse pit cameras had reportedly been copied over through the normal course of the DVR system operation, and there are no cameras on the tipping floor that would have captured the initial fire. The refuse pit cameras may have provided some limited insight and would further confirm the observations made by the crane operator (Ron Bricker).

There were no reports of personnel on the tipping floor at the time of Ron Bricker's report, however the first individual on scene of the tipping floor was Matt Gerlach. He responded to the reported location from the basement to find blistering paint at the corner of the south wall building at the connection point to the refuse pit. Figure 12 shows the potential conditions of the wall Matt Gerlach observed responding to the tipping floor. Blistering paint confirms that the fire was past the incipient stage. Matt Gerlach stated that as soon as he got to the tipping floor there was a significant amount fire and smoke along the south wall of the tipping floor area at the corner of the refuse pit. Figure 13 indicates the origin is at the south corner as represented with the star. MCFRS incident report suggests that the origin of the fire was on the south portion of the tipping floor as well.

Figure 12 Blistering paint on the tipping floor south wall (12/08/2016)

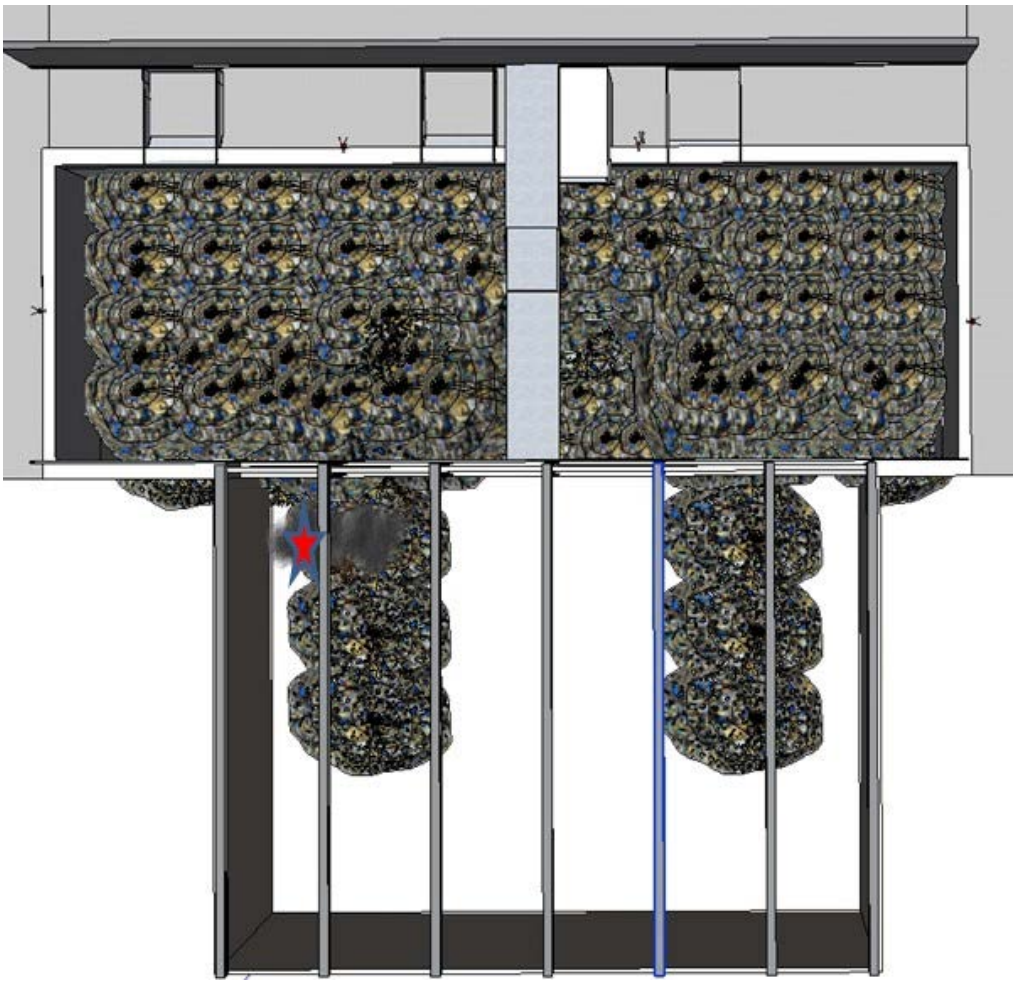


Figure 13 Layout drawing with star indication of fire origin

7.1.1 Unquenched Fires from Previous Fire Events

While HDR/FRA team did consider the possibility that the Root Cause of the fire was the result of unquenched fires from previous fire events, in this teams opinion, based on the location of the fire and the first-hand accounts, the fire started on the tipping floor and not on the face of the waste that was in Bay A of the pit. In our opinion, a fire in the pit in Bay A would have spread rapidly up the face of the Bay and the fire would have been centered on the wall of the waste in that Bay. This was not the account of the first to arrive on the tipping floor (Matt Gerlach) and was not an observation made by the MCFRS. However, based on conversations with Covanta, reviews of the earlier fires, and the frequency of the fires, the HDR/FRA team is of the opinion that portions of the earlier fires may not have been completely extinguished or dug out of the pit. In the HDR/FRA team's opinion, it is likely that there was a connection between some or all of the earlier fires and that the earlier fires did contribute to the December 8th fire intensity and spread of the fire in the pit by the preheating of the waste.

7.1.2 Spontaneous Combustion

An additional potential origin of the fire involves a deep-seated fire in the pit as a result of self-heating of the refuse in the pit, resulting in spontaneous combustion at the face of the Bay A, which

then spread to the tipping floor. The additional trash on the tipping floor being pushed up against the refuse pit trash wall could potentially allow a connection to the new trash. Supporting this theory is that with the high level of trash there is increased pressure on the trash at lower elevations. The increased pressure can accelerate the decomposing process. In addition, the trash in the pit had not been rotated regularly due to the high volume and system outages, thus the trash had been sitting for an extended period (as much as 9 months). The decomposition not being disturbed for this duration could present the opportunity for spontaneous combustion to occur. The heat, chemical composition, and interaction with air could allow the trash to ignite and spread. Considering most of the trash is likely in the warm decomposing and dry state it would be easier for the fire to spread throughout the MSW in the pit. Similar to the scenario in Section7.1.2, this scenario is not supported as the Root Cause of the December 8th fire by the first-hand accounts of the Crane Operator and Matt Gerlach. Fire dynamics and visual evidence also lead to the conclusion that the fire originated on the tipping room floor. Spontaneous combustion of waste in the pit cannot be conclusively ruled out with the present information. In the HDR/FRA team's opinion the lack of pit churning and the resulting characteristics of the old decomposing and drying waste in the pit did contribute to the spread and intensity of the December 8th fire but were not the Root Cause of the December 8th fire.

7.1.3 Waste Composition

The more likely Root Cause of the December 8th fire was the trash composition of the daily trash delivery. The facility typically receives over 2,000 tons of trash daily from the Solid Waste Transfer Station in Gaithersburg, Maryland. The transfer station separates trash and recycling items based on the nature and material construction. The trash composition can change hourly and daily and may contain components that are capable of self-heating or exothermic reactions, such as batteries. The waste may also include various household chemicals that may be harmless alone, but may create reactions when combined. The waste may also include inadvertently discarded hot materials such as ashes from a fireplace. Covanta is responsible for receiving and inspecting the waste as it is delivered to the MCRRF to ensure that is not deemed to be Unacceptable waste.

At the MCRRF and other similar facilities, the crane operator(s) has a good view of the trucks and trailers as they dump into the pit. Waste is typically dumped directly into a trench made by the crane operator and there is a good opportunity to view the waste as it is discharged into the trench in the pit. Additionally, the crane operator maintains the trench by digging out the new load and dumping it into another area of the pit with the crane, further exposing the waste for observation. A small flame or smoking load would typically be noticed by the crane operator. The MCRRF and other similar facilities often use two crane operators during the receiving hours of the day shift to ensure waste is properly mixed and fed into the boilers, and to maintain an open trench for delivery vehicles, minimizing the waiting times. This second crane operator also provides a second set of eyes to observe the incoming loads. On December 8th one crane was out of service and only one crane was available. Some of the waste deliveries were being dumped onto the tipping floor and pushed into a pile on the floor. Pushing waste into a pile on the tipping floor does not typically result in the level of inspection that is achieved by the crane operator. Waste on the floor is also not visible by the crane operator and a small fire can spread before being observed, as appears to have been the case on December 8th.

Waste inspections are performed on the tipping floor and consist of dumping an incoming load of waste on the floor and an inspection of the load by the front end loader operator. The front end

loader operator can spread the waste on the floor to provide a better view of the full load of waste. After inspecting the load, the load should be pushed into the pit.

For the reasons described in this Section, the HDR/FRA team recommends that the tipping floor not be used to store waste during anything other than emergency situations. Waste discharged onto the floor for inspections should be pushed into the pit as soon as practical once the inspections are completed. Storage of waste on the tipping floor during emergency situations should be monitored by a fire watch.

HDR/FRA have not attempted to perform a detailed analysis of the delivery patterns of the waste between the transfer station, rail yard and MCRRF. It may be possible that the loads dumped on the south side of the tipping hall could be traced back to a time window at the transfer station when they may have been loaded. It could then be possible to narrow down the potential incoming loads at the transfer station associated with that time window. Waste inventories at the transfer station, statements by Covanta staff that the waste on the South side of the tipping floor had not been fully cleared out on December 7th, and the timing of deliveries and loading of containers, would contribute to uncertainty associated with this exercise. It is our understanding that Covanta has attempted to trace the loads back through the delivery process. The HDR/FRA team has not been provided with any additional information.

7.2 Incident Duration- Severity of Fire

Based on discussions with MCFRS, Covanta personnel, and a comparison to the waste to energy industry, the severity of this fire was substantially greater than other fires at the MCRRF and at other waste to energy facilities. While there have been some significant fires at other facilities within the last 10 years that resulted in greater damage, including the 2007 SEMASS Facility fire, the 2012 Bay County Florida fire, and most recently the Fairfax County Virginia fire in February 2017, fires are typically caught early, in the incipient stage, and extinguished by plant personnel. In this instance, there were a number of factors that contributed to an extended duration of the fire.

7.2.1 Waste Inventory

The MCRRF facility incorporates a pit and crane system to provide for receiving, storage, mixing and loading waste into the boilers. Typically, waste is received at the facility Monday through Saturday. A pit and crane system is a typical configuration for waste to energy facilities. The pit is typically sized to provide four to seven days of waste storage, which is sufficient to allow continued receipt of waste during boiler outages and to build inventory to allow full load operation during periods following outages, long weekends, and periods of low waste delivery. A pit provides storage to reduce the need to bypass waste to alternative sites during high delivery periods or low boiler loads. The pit and crane also provide the ability to mix waste and to manage the waste being fed into the boilers. Directly loading the boilers with waste from incoming loads, or feeding waste exclusively from an old section of the pit may result in erratic control of the boilers and spikes in emissions. Mixing old and new waste and “fluffing” the waste in the pit prior to loading the boilers optimizes the boiler operation.

At the time of this event the height of the waste totaled 85 feet in much of the pit area, and there were also two piles on the tipping floor estimated to be 15 to 20-foot-tall by 50-foot-long piles of trash on the tipping floor, which added to the fuel load and duration of the incident. Plant operational data was reviewed including Covanta’s midnight Pit Tonnage Inventory Reports for the 1st and 15th of each month. Based on the tonnage reports, the pit inventory was at an average

height of approximately 15 feet on February 15, 2106, which represents an MSW inventory of approximately 2700 tons. This low level is a good starting level when entering the Scheduled boiler outages in February and March. After the outages, which were extended outages, the pit level was high, at approximately 12,200 tons on March 15. For a majority of the time, waste inventory levels remained above approximately 10,000 tons up until the December fire.

HDR has reviewed the plant data and has made estimates for the boiler steaming rates throughout the year based on the waste deliveries, reported inventories, and assumed densities, and developed the following Figure 14 to provide an estimate of the inventory throughout the year. This inventory is based on the total inventory on site, including any waste on the tipping floor and in containers. Figure 15 provides an estimate of the midnight pit level projected as if all waste had been emptied from containers and the tipping floor and was pushed into the pit. While this overstates the pit inventory for periods when the inventory was stored in containers, this methodology was used based on the limited data HDR could find for the number of full containers on site. Waste inventory, including the midnight tonnage reports should be better documented and maintained by Covanta. A daily and weekly update and running spreadsheet should be maintained as is typical at other facilities. Monthly calculations that rely on tons processed, such as the HHV calculation and the kWh/ton are suspect based on major discrepancies in inventory values.

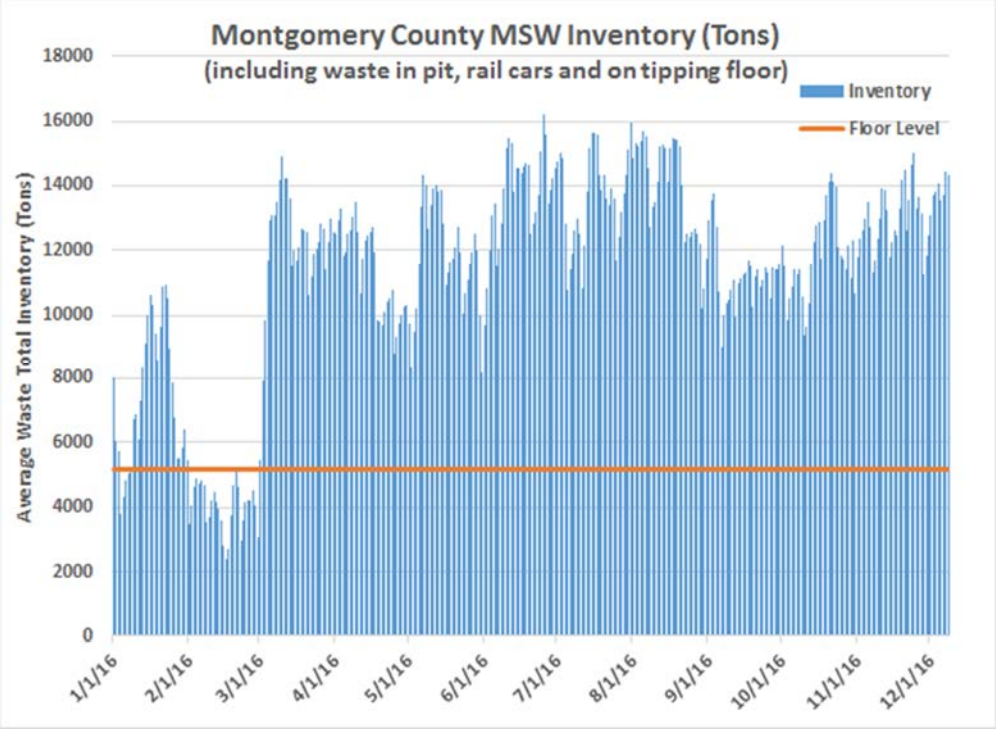


Figure 14 Graph of Estimated Waste Inventory for 2016

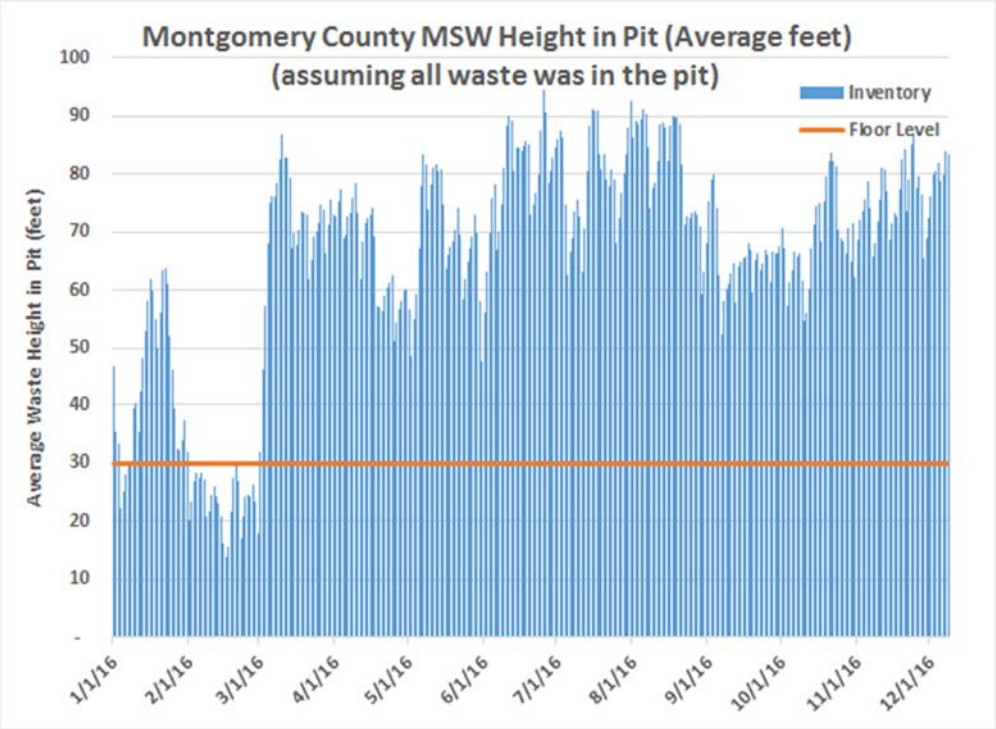


Figure 15 Graph of Estimated Pit Height for 2016

Prior to the December 8th fire, there was a high inventory of waste in the pit and the tipping bays at the North and South ends of the pit were completely filled with waste. The fire started in a location on the tipping floor that was blocked from the view of the crane operator, by the filled South bay door, and was located in an area where there was opportunity for the flames to spread upwards along the face of the waste pile. By the time the Crane operator observed the fire, the flames had reached a height of 40 to 50 feet above floor level, leading to a significantly harder fire to combat than the previous fires. Additionally, since the fire was on the tipping floor it was not accessible to the crane and could not be gathered up by the crane and deposited in the boiler feed hoppers, further allowing the opportunity of the fire to spread. Once the December 8th fire spread from the floor into the pit, the ability to use the crane to dispose of the smoldering trash was frequently not possible due to heavy smoke in the building which resulted in insufficient visibility for safe crane operations.

In the HDR/FRA team's opinion, the pit should never be filled to a level that impedes the operation of the fire cannons, or such that waste blocks the line of sight of the fire cannons to areas of the pit. One or more of the fire cannons should be capable of directing water to any area of the pit or waste storage areas. In HDR's opinion, waste should not be stored on the tipping floor with the exception of emergency situations. In the event waste is stored on the tipping floor, a line of sight by the crane operator and for the cannons should be maintained under all operating conditions. These criteria may require the implementation of additional pit management procedures and may require additional bypassing of waste away from the MCRRF. With the boilers operating properly and reliably, the need to bypass waste should be minimal. HDR has previously recommended that the operating level of the pit should be capped at 53 feet (up to 3 days) during normal operations with three boilers in service and that the waste level in the pit should only be allowed to exceed 70 feet for short durations (up to 2 days) during outages and should never be projected to exceed an

average height of 73 feet. HDR's recommendation of a maximum level of 73 feet was based on zero waste being stored on the tipping floor at any time other than for waste inspection or emergency equipment outage events (short term crane or loader outages). Given these limits, it should be possible to achieve coverage of all waste storage areas with the multiple fire cannons at all times.

As discussed, HDR has recommended that the operating level of the pit be capped at 53 feet during normal operations. This pit level represents approximately 9,000 tons of waste inventory, which is sufficient for four (4) days of normal plant operations with all three boilers running at full load. Four days of inventory assures that there is sufficient waste for long weekends or disrupted deliveries, and will result in lower pit inventories on Monday mornings. Operating at this lower inventory level will provide Covanta the ability to rotate waste within the pit ("churn" the pit) on a regular basis, particularly prior to scheduled outages. Churning the pit removes the oldest waste at the bottom of the pit improves the quality of the MSW "fuel", reduces any possibility of producing methane, and helps prevent the possibility of spontaneous combustion. With the pit at consistently high operating levels, it is not practical to churn the pit and waste is therefore allowed to sit for prolonged periods.

At other similar waste to energy facilities, it is common practice, and required in some operating agreements and permits, to routinely dig to the bottom of a section of the pit to ensure all the waste in that section is "turned-over" or processed within a set period of time (churned). The pit is typically divided into 3 to 10 sections and the operator sets a rotation whereby each section of the pit is cleared to the bottom on a routine basis. It was reported by multiple individuals that the trash on the bottom of the pit had not been rotated regularly at the MCRRF. As part of a revised plan presented to the Maryland Department of the Environment (MDE) in response to the incident, Covanta has proposed digging one third of the pit to the bottom of the pit two times per year. Covanta should be prepared to document in a log or with photos that the pit was cleaned out in each third of the pit two times per year. While it will not be practical or possible to completely clean out the waste at the bottom of the pit due to the grapple configuration, Covanta should demonstrate that the waste has been substantially removed by lowering the crane grapple to the floor of the pit with the tines opened. All of the tines should contact the floor and the grapple should sit flat. Churning the pit in sections is similar to practices at other facilities and should be suitable for the MCRRF. The frequency of getting to the bottom of any one section should be no more than every 7 months. In addition to ensuring a better mixture of waste and a reduced potential for any spontaneous combustion or gas generation, churning the pit in this manner ensures that the level of water at the bottom of the pit is controlled. If water has accumulated in the pit, digging out one section will result in dropping the water level across the entire pit.

In the HDR/FRA team's opinion, the high level of trash in the pit resulted in; (i) the inability to view the tipping floor from the crane cab and to notice the fire until it had escalated to a major blaze, and (ii) the inability to churn the pit for an extended period of time. These two factors were direct contributing factors that led to increased fire severity and duration of the December 8th fire. While HDR has provided the opinion that 73 feet average waste level in the pit may be acceptable, this was for short term during scheduled outage periods only. Normal operating levels should be the 53 foot average pit level recommended by HDR. If waste is to be stored on the tipping floor, the maximum recommended level in the pit would be reduced to a level necessary to allow a clear line of sight by the fire cannons and the crane operator to all of stored waste on the tipping floor.

7.2.2 Additional Inventory Resulting From NRG Shutdown.

The NRG shut down on December 3rd resulted in the need to secure (shut down) and reduce load on the boilers. The boilers were all returned to normal service by December 6th. Between December 3rd and December 6th, HDR calculates that approximately 3,000 tons that would have otherwise been processed was not processed, increasing the already high waste inventory level. However, during that period, 1,575 tons of waste was proactively bypassed away from the MCRRF, reducing the impact to 1,400 tons of additional inventory. The inventory report dated December 7, 2016 at 23:59 pm indicated that the total tonnage in the pit was 11,761 Tons and this report is identical to the report on December 8th, 9th, and 10th, 2016. HDR suspects that no surveys were actually performed during this period, as plant focus was on the fire. Instead, the last recorded value was simply carried forward in the reports.

7.2.3 Fire Protection Systems

Additional factors contributing to the severity may have included the out of service and unused fire protection systems. Had all the systems been in service there is a potential that the systems could have helped suppress the fire earlier, reduced the spread of the fire, provided an earlier notification of the fire, reduced requirements to set up temporary hoses, and improved safety.

7.2.4 Crane out of Service

During the event, the South crane was out of service. With the fire and resulting smoke, it was not possible to make repairs to the crane until after a majority of the fire and smoke was under control. A hoist motor, eddy current brake and trolley coupling were ultimately replaced and the crane was returned to service on December 16th.

Typically, at waste to energy facilities, the cranes can be used to help fight and control fires by pulling out smoldering waste and feeding the waste into the hopper. Operators will also wet down areas of the pit and the crane can be used to move wet waste onto a smoldering pile to control the fire. Without the second crane in service, the firefighting assistance offered by the cranes was reduced.

7.2.5 Reduced Boiler Availability and Capacity

Boiler availability and boiler capacity at the MCRRF is below industry standard and has resulted in reduced boiler throughput. The lower throughput results in high waste inventories. This reduced availability and capacity is a result of a lack of maintenance and repair on the boiler and air pollution control systems. By way of example, boiler feed table and feed chute repairs that were made to Boiler #1 during the November 2016 scheduled outage were not reasonable and below industry standard. As a result, the boiler was not capable of operating reliably or at full load after the boiler outage. During the December fire, Boiler #1 was secured and not available to process the smoldering waste for a majority of the time. Boiler #1 operated for 28 days prior to the fire and during that period, based on HDR's calculation the lack of maintenance resulted in an additional 6,660 tons of waste inventory in the pit at the start of the fire. The reduction in capacity also resulted in less ventilation air being pulled from the pit area during the fire. The following Figure 16 shows the impact of reduced boiler #1 capacity on the Pit inventory.

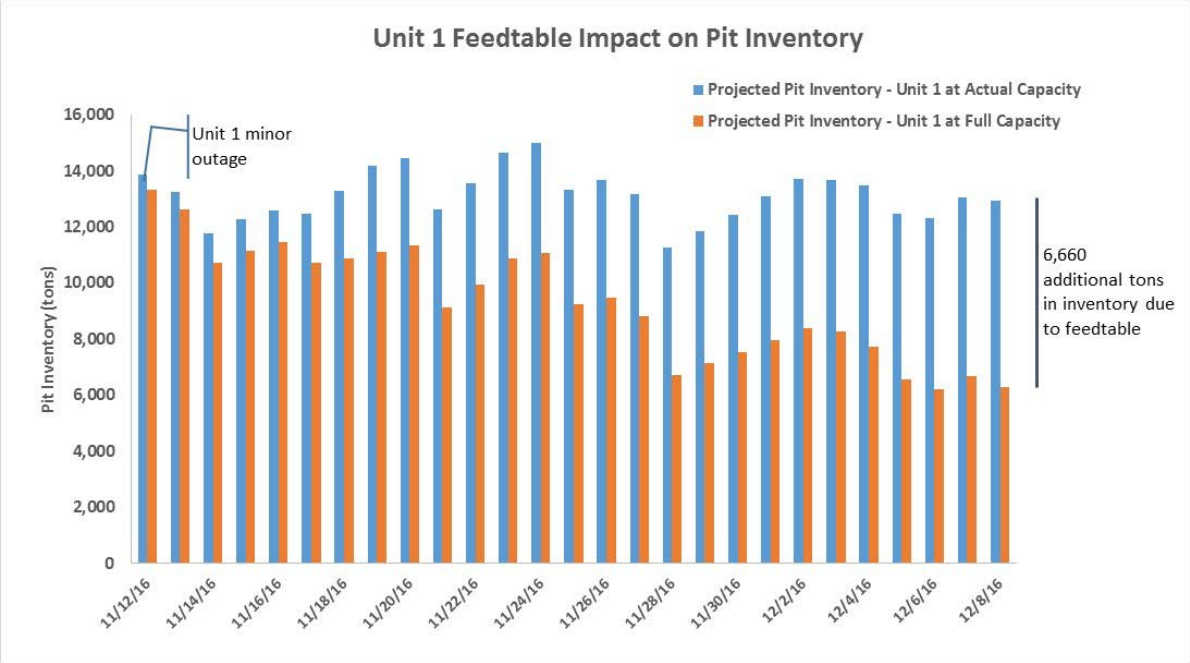


Figure 16 Impact of Boiler #1 Feed Table Damage on Waste Inventory

7.2.6 Other Factors

Other factors that may have contributed to the severity and extended duration of the fire include:

- The NRG water supply issue that could have limited the amount of water available at the facility. Based on the HDR/FRA team's interviews, this did not have an impact on firefighting. However, there have been subsequent discussions where this was mentioned as a limiting factor. Based on our continued understanding, this did not hamper or restrain firefighting activities.
- The ventilation system for the pit and tipping floor relies on the boilers to draw combustion air from the pit area and roof hatches actuated by a fusible link during emergency situations. The large amount of smoke being generated by the fire resulted in reducing boiler loads and shutting down boilers due to safety and visibility issues. With the boilers shut down or reduced in load, the ventilation was reduced, making the situation worse. Covanta did attempt to maximize air flow through the boilers, keeping the fans in service, but burner operation, emissions, and other factors resulted in less ventilation during this period. Figure 17 shows the total air being pulled from the pit compared to the full load design flow. Less than half the typical ventilation rate was available for a majority of this period.
- Fire Watch - Had a fire watch been put in place when there is waste left of the tipping floor, especially when the floor is not visible from the crane pulpit, the fire may have been avoided or discovered prior to reaching the magnitude it did.

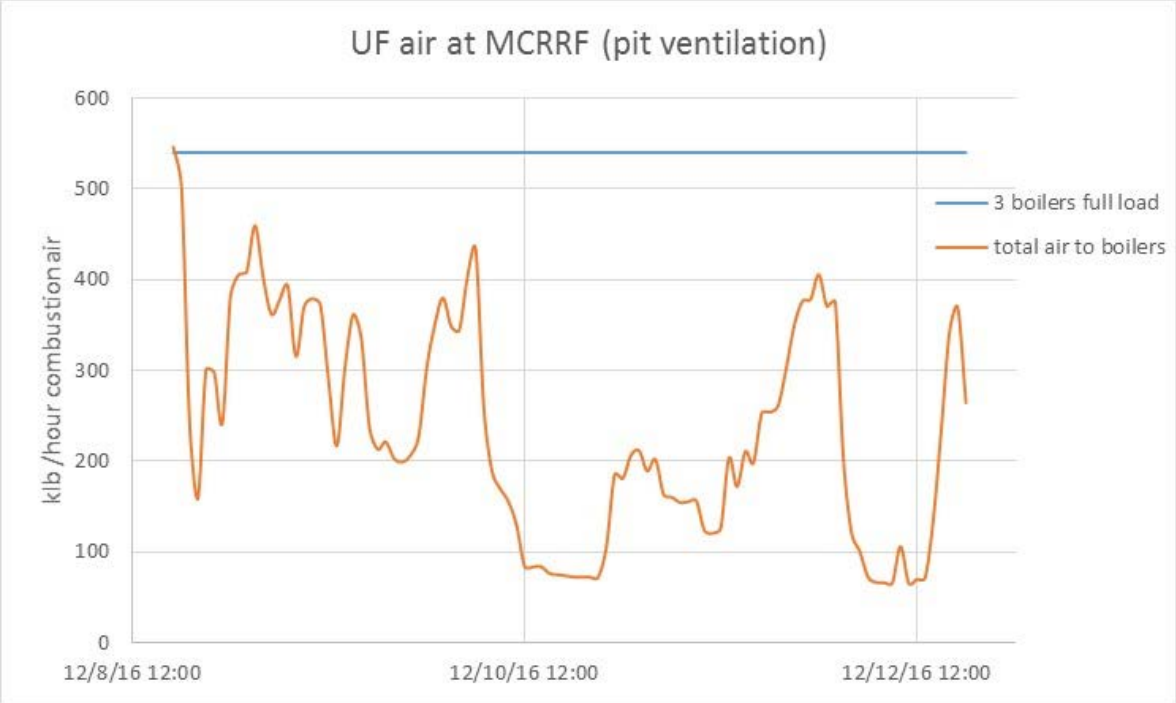


Figure 17 Pit Air

7.2.7 Coordination between MCFRS and Covanta

MCFRS stated that there is no official pre-action plan for the facility but that they perform training runs several times per year. The MCFRS visits the site and performs exercises at the MCRRF to familiarize some members with the facility operations, facility layout, personnel, and fire protection systems. The fire department has changing personnel and different apparatus in and out of service each day, and no realistic assumption can be made that the MCFRS firefighters arriving for any given fire know details about the facility.

When the fire department arrived they approached the fire as a typical trash floor fire, trying to soak everything in water. Additionally, based on the interviews, the fire department and Covanta management personnel did not initially work closely together to achieve fire suppression. Each party had independent goals, with the primary goal of the MCFRS to completely extinguish the fire with water, while Covanta had a separate goal to extinguish the fire with minimal water to allow the material to be fed through the boiler. There may have been a lack of coordination and communication between the parties. After a representative from Williams arrived on scene, a formalized management structure was established to keep all parties informed. Had a pre-incident plan been established, a command system could have been implemented, in which more information could have been exchanged earlier, with the potential for smoother transitions in leadership each day, as well as the establishment of a mutually acceptable goal for all parties. The unclear objectives of the stakeholders and lack of communication may have contributed to a protracted back and forth between the stakeholders, adding time to the incident duration.

8.0 RECOMMENDATIONS

Based on this review and analysis, there are a number of recommendations that should be considered by Covanta, the County and NMWDA to reduce the possibility of fires and reduce the severity of fires. These include Covanta policy and procedure considerations, plant improvements, and procedural changes for the Covanta/County/NMWDA.

In addition to some specific recommendations, the HDR/FRA team is recommending that a comprehensive fire and life safety analysis be conducted at the MCRRF to more fully develop the current status and effectiveness of the systems installed at the facility, and to develop a detailed, site specific prioritized list of recommendations for the MCRRF. This will entail working with Covanta, the County and the NMWDA, and researching and evaluating a number of potential options.

8.1 Pit Level and Waste Management

One item that was a recurring comment among the Covanta staff and the MCFRS was the pit level and pit management. Several comments were made in interviews suggesting that the pit level was higher than it should have been and that routine churning of the pit has not been performed and is not part of the standard practice at the MCRRF. Our recommendation is to set up a management system with goals and estimated consumption and delivery models to better prioritize and manage deliveries to the facility. It is also recommended that the trash level be maintained at a level that is more manageable by the crane operators and facility staff. HDR has recommended a pit level target of 53 feet for normal operations (three boilers operating at design loads), with allowance to increase to 70 feet during outage periods and 73 feet for emergency situations. Waste should be bypassed if the projections indicate that pit level will be higher than 53 feet for more than 3 days during normal operations and higher than 70 feet for more than 2 days during a scheduled outage. These levels should be evaluated based on real time observations to verify that these are reasonable limits.

Storage of waste on the tipping floor should be avoided at all times, with the exception of emergency situations due to loader or crane outages. Dumping waste on the tipping floor should be limited to waste load inspections and the inspected waste should be pushed into the pit promptly. The pit survey at 0000 daily should also be documented in an electronic filing system, rather than saving over the previous day and printing out the report. The daily report should clearly show tons delivered by rail, tons dumped in pit, and tons remaining in containers. Print outs should be used as a backup and not as the primary data file.

8.2 Advanced Detection and Early Response Systems

Thermal imaging systems are available that can monitor the pit surface temperature. Control and alarm systems can be incorporated to provide alarms when hot spots are identified. This is not a new technology but is currently not a common practice at waste to energy facilities in the US. FLIR and potentially Fluke have infrared thermal imaging systems available for waste bunkers. Other systems using heat or smoke may be available and should be considered and investigated.

8.3 Improved Facility Maintenance Practices

Covanta should improve maintenance practices and complete all work necessary to bring the facility and all systems to Industry Standard levels and to improve preventative and routine

maintenance practices. There are documents of preventative maintenance (PM) for components throughout the facility, however there are incomplete and missing reports suggesting that the PM may not actually be getting done completely.

During the survey, many components of the facilities fire suppression and fire alarm systems were noted as being out of service or needing repair. If not already in place, we would recommend creating weekly, monthly, semi-annually, and annual check list items for the maintenance group to repair and maintain. In addition, it is recommended that all fire protection equipment, in regards to inspection, testing, and maintenance (ITM), be completed by, or contracted to, a fire protection professional. An electronic filing structure should also be created to have an organized compilation of all ITM items. ITM records were reviewed but severely incomplete. The fire protection systems ITM should be conducted by an individual and/or company with appropriate training, experience, and licensing as required by NFPA, the State of Maryland, and Montgomery County

Many of the facility systems and components have not been maintained to industry standards. Covanta has committed to a Recovery Plan aimed at bringing various boiler and facility systems back up to higher standards and to improve the reliability and performance of the equipment and Facility in general. There are many operational issues at the plant that are a result of poor maintenance history that are taking focus away from safe and efficient operation of the facility. During 2016, the boilers operated at approximately 77% overall steaming capacity. Industry standard is typically in the 85 to 88% range with some plants exceeding 90%. For the MCRRF, each percentage point represents approximately 7,500 tons of waste processed. Increasing from 77% to 85% would have resulted in the processing of an additional 55,000-60,000 tons and may have eliminated the need to bypass waste in 2016. It would have resulted in more controlled pit inventory and reduced the need to store waste on the tipping floor.

8.4 Improved Coordination with MCFRS

It is recommended that the facility work with MCFRS to create a pre-action plan. The plan should encompass the operational tasks for both the Covanta staff and the fire department. Within this pre-action plan it should be specifically outlined who the points of contact are for each organization including backup contacts and phone numbers. The pre-action plan should contain a facility site plan and highlight all fire protection components. The fire department should be invited to at least annual trainings and surveys of the facility to maintain familiarization with the current state of the facility.

Covanta should decide on the level of responsibility they will assume during fire events and should modify the EAP and FGEP to reflect that responsibility. Covanta staff should then adhere to the policies. This decision by Covanta will either reduce or increase the role Covanta plays in future fire events.

If the decision is made that Covanta will take a lead role in fire incidents, then a formal fire response team or fire brigade must be created. A fire response team is mentioned in the FGEP but it doesn't state who is involved or their responsibilities. A fire brigade is trained in firefighting in accordance with NFPA standards and should be provided with appropriate PPE for structural firefighting operations. Along with this initial training, there should be continual training for all personnel as required by NFPA standards. Additionally, Covanta would need to work with and cooperate with the FRS, and a fire brigade would need full acceptance by the FRS. Prior to any

recommendation, the HDR/FRA team would need to assess Covanta's approach and plans, and there would need to be acceptance by the Owner, the MCFRS and Insurance provider.

The EAP and FGEP should be updated with outlines of specific incidents that the emergency response team may encounter and should outline when responding individuals should retreat and wait for the fire department to arrive. An EAP and FGEP overhaul, and potentially a consolidation of the two, should be completed. The plans should be more specific and consistent as to the response requirements of personnel at the facility. With the update, the facility should create appropriate documentation of the changes and provide training on the new procedures and policies as appropriate. There are currently several documents that have varying and potentially conflicting procedures. One EAP should be created, formally issued, followed, and enforced. The EAP should also be reviewed on an annual basis to determine if modifications to the plan are required based on lessons learned from incidents. The EAP should be shared and approved by all involved parties including the MCFRS.

8.5 Comprehensive Facility Analysis

It is recommended that the facility undergo a comprehensive fire and life safety analysis to determine the status and effectiveness of the current systems installed at the facility. The building and its systems should be evaluated against current codes and standards along with industry practices to determine where improvements could be made to improve the safety and operations of the facility. An operational analysis should also be performed in conjunction with this study to look at other areas of improvement. Based on this analysis, a detailed list can be developed that will provide a listing and prioritization of the most effective recommendations. While the MCRRF currently satisfies the minimum code requirements, the reduction of risk associated with each of the potential options should be evaluated along with cost and effectiveness.

The following is a list of some items and recommendations that should be considered as part of this comprehensive analysis;

- Improve/add ventilation systems for the tipping room and refuse pit.
- Improve inspection, testing and maintenance of fire suppression systems.
- Evaluate current sprinkler design and consider alternative systems for enhanced fire suppression intended to meet specific performance objectives based on acceptable loss criteria developed in conjunction with Covanta and the County.
- Evaluate the installation of additional fire protection systems and devices.
- Evaluate the size of the fire water tank, including capacity and refill capabilities to determine if modifications should be incorporated to meet specific performance requirements. Rectify issue(s) with 2-inch automatic refill line that require manual isolation of this system during normal operations.
- Evaluate fire protection system impairment policies and procedures.
- Evaluate the current fire monitors and consider automatic or remote operations.
- Consider improved recycling programs for batteries, electronics, and household hazardous waste and improved screening of materials.

- Consider installing permanent air monitoring equipment (oxygen and carbon monoxide at a minimum) in the tipping floor, crane deck of the refuse pit, area and inside the crane pulpit.
- Improve training and provide additional equipment for the protection of personnel during fire operations.
- Controlling the amount, height, and orientation of the refuse pile to control ventilation and fire spread possibilities.
- Until a full program is engineered and put in place, at the time of midnight pit volume measurement, Covanta should use an infrared camera to scan the pit area for hotspots and report results found to facility management.
- Eliminate the storage of waste on the tipping floor.
- Based on interviews with plant staff, the auto load feature of the crane is not properly functioning and manual intervention is required. Evaluate and improve the "auto load" feature of the crane to allow loading the hopper when visibility is impaired.
- Create and maintain records of containers as they are emptied to track refuse.
- Evaluate installation of additional video cameras for monitoring of critical areas (tipping floor) and establish a data storage plan to allow for review of video after any incidents.
- Improve video storage capabilities and/or implement policies and establish a data storage plan to allow for review of video after any incidents.
- Evaluate the use of permanent thermal Imaging, Infra-Red (IR) or video fire detection systems for tipping room and storage pit areas.
- Implement Fire watch policies and procedures for periods when fire protection systems are impaired in accordance with NFPA standards.
- Improve incident reporting documentation and implement an after action review process.
- Evaluate the current water supply system to the facility.
- Evaluate installing a permanent backup water supply on the Potomac River to reduce dependence on NRG operations. The need for such a backup system may be more driven by plant operations than fire protection requirements.
- Evaluate containing and/or processing water runoff from fire operations.
- Evaluate the installation of area wide air monitoring system around the facility.
- Review EAP and clarify any directions that may be in potential conflict (see page 21).
- Review the EAP, POP and FGEP to ensure consistency and follow-up with regular training.
- Review the Fire Response Procedures within the POP and revise as necessary to incorporate items such as firewater tank level considerations. Additional updates may be required to reflect any systems modifications since the last revision date (2010).
- Review the FGEP with the MCFRS and lessons learned from the fire event to update the FGEP as necessary.

- Evaluate locations of the water cannons on the charging deck and determine if there is a better placement or other protective measures that may reduce incidents of damage from the crane operations.
- Modify Refuse Pit Fire Procedures to include fully excavating and removing the waste from the section of the refuse pit where any fire is observed or suppressed.

9.0 SUMMARY

The fire on December 8th, 2016 was a ten-day incident involving the Covanta Montgomery County Resource Recovery Facility and the Montgomery County Fire and Rescue Service. The fire root cause is unknown but theorized to be either: spontaneous combustion, hot material in a delivery during the day, thermal runaway of battery(s), or an exothermic reaction from discarded chemicals. It is possible, that the fire was worsened by a rekindling of a fire in November during the firefighting efforts. The origin is suspected to be on the south side tipping floor at the intersection of the refuse pit. The incident was reported by the on-duty crane operator who reported to see flames and glowing red at the top of the trash pile at approximately 18:22 hours. The first attempt to extinguish the fire was done by the Shift Supervisor. He stretched fire hose from the North bay hydrant to the center of the tipping floor, banking water off the wall onto the fire. Direct attack was not done due to the limited reach of the hose and line of sight issues. The fire department arrived on scene and got an initial knock down of the fire with PE714. Over the evening the fire was controlled and MCFRS released all units other than one engine crew. The crew reported a rekindle in the morning of the 9th with fire spreading throughout the refuse pit. The attempted suppression was met with the need for additional tanker water, drainage issues, poor ventilation and visibility inside the building, and communication/coordination challenges. A contracted fire company, Williams, was brought on scene from Texas to be the industrial fire expert. The Williams representative directed modifications to the pit pile configuration and slopes, using the crane to manage the waste piles and feed the hoppers, which improved the visibility in the room and allowed improved progress. The fire was extinguished on the 18th after continual operation by the Covanta staff and MCFRS.

The MCRRF is designed to be a continually operating facility, with the dual functions of processing waste and generating power for the local communities. Covanta has a responsibility to maintain the structure and systems within the facility. There are recommendations that the facility improve inspection, testing and maintenance practices and maintain an electronic documentation filing system of all maintenance, repairs, inspections, and daily reports completed, both internally and contracted. Additionally, a revised Emergency Action Plan is suggested to include revisions to the command structure, fire response team, and training. The fire department should also be involved in creating a pre-action plan for the facility including points of contact, facility summary, and fire protection systems. A comprehensive survey of the facility and all its systems should be completed to identify other areas of concern. With these recommendations, the facility will be better prepared for future fires in the refuse pit and tipping floor.

APPENDICES TABLE OF CONTENTS

APPENDIX A – INCIDENT SUMMARY LOGS

July 17th, 2016 Event

Table 2 Covanta Logbook July 17th, 2016

Time	Event Description
July 17, 2016	
1840	Fire on North Side of Pit/Freedman notified
1840	Montgomery Co. Fire Department called.
1848	Fire Department on Site
1859	u-2 coded on-line
1900	All 3 units burners lit/ 90k load
1955	All 3 F/C logged closed on OIS
2030	u-2 coded offline/pit fire
2033	u-2 burners secured/feed water isolated
2048	Tyler Witt/D. Sanchez called in for double time to help with pit fire

Table 3 Covanta Logbook July 18th, 2016

Time	Event Description
July 18, 2016	
1044	Called 911 to provide one fire truck –smoldering spots
1707	Called 911 – asked dispatch for one fire truck to help with smoldering fire

Table 4 MCFRS Incident Log on July 17th, 2016 at Montgomery Covanta

Time	Event Description
July 17, 2016	
18:44:18	"Fire to the right near the trash pit"
18:45:06	Fire in trash pit, smoke visible, no one trapped, no hazmat, commercial building
18:45:56	PE735 and associated alarm units dispatched
18:46:03	"Caller said that the trash pit is on fire. Guys are attempting to put fire out. Informed caller not to try and put the fire out and to exit the building."
6:52 PM	BE714 on scene with command have a large refuse fire. Hydrant PE714
7:02 PM	BE414 has hit most of the fire at this time, will not need the tankers and does not need W714 replaced
7:05 PM	FRED 14 have 2nd water supply, most of fire is completely knocked, suggests hold with co 14 units, BC703 request command meet face to face
7:10 PM	Pile of rubbish on 2nd floor, fire contained, hold with E914, AT735, AT923, PE714, BE714, A734, BC703.
00:29:33	Command requesting air boat, command terminated, holding PE714 for an extended period.
08:59:37	Units clear from scene
Narrative	"AOS to find large pile of rubbish on fire on tipping floor, fire threatening and even larger compacted pile of rubbish. Held with 4 engines, 2 towers, ambo, and BC. Worked with a loader operator from FS31 to pull pile apart, then once smoke cleared, plant provided and operator for the loader. Rubbish was placed in the pit and transferred to incinerator. After several hours of this operation, held with 1 engine and rotated crews through the night @ 3 hour intervals. No injuries, no loss."

Table 5 MCFRS Incident Log on July 18th, 2016 at Montgomery Covanta

Time	Event Description
July 18, 2016	
10:43:44	"Flares up from last night's fire on tipping floor /// request single engine for standby"
10:44:10	PE714 dispatched
10:45:05	PE714 enroute
10:45:29	"Caller said someone will be at the gate to meet the engine"
10:55:16	PE714 on scene
13:51:30	PE714 clear scene, available
Narrative	"Returned to the incinerator fire because the Head engineer wanted us to standby while they dig into pockets of trash. They started that when they dug into pockets of trash, where the seat of the fire is suspected to be, that flames would come out. We established a water supply and positioned the engine to use the deck gun to hit hot spots. Had a hand line set up to also hit the hot spots. DOC Chief arrived a short time later and spoke with the Head engineer. All parties agreed that we would leave them with the blitz nozzle and hose."

August 19th, 2016 Event

Table 6 Covanta Logbook August 19th, 2016

Time	Event Description
August 19, 2016	
1148	Called 911 report of fire on tipping floor. Fire put out/contained by plant personnel.
1247	Notified Bill Davidson Fire Marshal and fire department off site

Table 7 MCFRS Incident Log on August 19th, 2016 Montgomery Covanta

Time	Event Description
August 19, 2016	
11:54:52	Reported building/structure fire, full assignment, commercial/industrial, no hazmat
11:56:11	Assignment dispatched to facility
12:05:00	PE714 on scene with hydrant, reports fire is out
12:08:00	Command to Montgomery – Incinerator have deluge gun on fire, fire knocked and smoldering, PE714 investigating, holding all units
12:11:00	Command to Montgomery – fire about 30 feet down into trash, smoldering, holding 2 engines, 1 truck, battalion chief (PE714, E714, Q714, BC705)
12:14:00	BC705 on scene
12:21	BC705 to Montgomery – fire is deep seated, incinerator will continue to monitor and will call if additional F/R needed, no current need for F/R, command terminated, all units may go in service

October 19th, 2016 Event

Table 8 Covanta Logbook October 19th, 2016

Time	Event Description
October 19, 2016	
16:25	Smoke in refuse pit on North Side, A.O's and Crane Operator Investigating
16:27	Visible Flame in refuse North East corner, A.O's lined up fire cannons and fire hose on tipping floor
16:27	Fire Dept called (on-site at 16:32)
16:35	Notified FSC, Plant Manager, and Acting Chief Engineer was with A.Os when fire started.

Table 9 MCFRS Incident Log on October 19th, 2016 Montgomery Covanta

Time	Event Description
October 19, 2016	
16:29:16	Trash pit fire, full assignment, structure fire, commercial/industrial building, no hazmat
16:36	PE714 is making PE709 2nd due, will advise layout upon arrival
16:37	PE735 asking about fill site, PE714 reports maybe be hydrant in area
16:39	PE714 AOS with water supply and blitz fire in operation from power plant, has command
16:41	Command reports hold 2 engines and 2 special services
17:02	Command terminated, release talk group 7 C
17:06	Units clear fire ground

November 5th, 2016 Event

Table 10 Covanta Logbook November 5th, 2016

Time	Event Description
November 5, 2016	
1202	Fire in pit at 30' mark in trash
1208	Fire put out + fed into U2
1321	Fire in same location of pit
1324	Fire put out + fed into U3
1954	Fire tank lolo level – fill valve open

Table 11 Covanta Logbook November 6th, 2016

Time	Event Description
November 6, 2016	
0044	Fire in refuse pit, center bay in trench
0050	Fire out, sprayed with fire water
0121	Fire in refuse pit center bay trench, keeps flaring up, firewater set to put out
0525	Burning wet fuel from refuse pit fire

Table 12 MCFRS Incident Log on November 6th, 2016 Montgomery Covanta

Time	Event Description
November 6, 2016	
12:49:23	Needs thermal imager, smoke investigation,
12:49:48	Dispatch PE714
12:59:55	PE714 on scene
13:42:46	PE714 clear

December 8th, 2016 Event

Table 13 Covanta Logbook December 8th, 2016 Through December 18th, 2016

Time	Event Description
December 8, 2016	
1822	Fire on tipping floor reported by crane operator
1823	Called fire department / 911
1825	Reducing BLR loads / lighting burners
1835	Fire department on site
1900	2 north burners lit
1930	F.C. logged closed all units
1933	All OFA air fans off
2019	Coded U1 off-line @ 20k steam flow
2022	Burners out
2039	Able to feed U2/U3 small amounts of fuel due to limited visibility and the refuse building
2045	Maximizing ID fan/ FD fan flow U1 to help clear tipping building
2110	Flames spotted in refuse pit, removing crane from service, unable to feed boilers
2115	Notified Kim of firewater running from refuse pit to parking lot, placed booms around storm drains
2200	Able to feed small amounts of fuel in U2/U3
2236	Unable to feed U2/U3 due to worsening smoke in tipping building, set up boilers w/ minimum air and draft S.P.
December 9, 2016	
0000	Able to feed U2/U3
0100	Running low on firewater tank level, tank down to 3', no lolo tank level alarm,
0230	Firewater tank lolo level in, tank level around 5'
0355	Received fire water tanker delivery
0600	U2/U3 burners lit, crane operator can't see feed chute,
1800	Firewater tank level 31'
2150	Able to feed U2 hopper but visibility limited
2210	Unable to feed U2 continuously due to limited visibility

Time	Event Description
December 10, 2016	
0035	Attempted to feed U2 feed chute again
2235	Started U2 FD fan
December 11, 2016	
0008	Started U2 off fan
0224	Blew soot U2
0930	Firewater fill valve opened
1932	Blew soot U2
December 12, 2016	
0004	Started U3 rev air fan
0205	Lit U2 burners, CO north burner failed to light
0256	Lit U2 burners, CO unable to feed units, visibility
0258	Lit U3 burners, CO unable to feed units, visibility
December 13, 2016	
0630	SYL running wet O2 calcs
0700	Triple grapple swap, unable to feed boilers,
0810	High CO U2, set boiler draft to 40 and put out campfires at clinker roll
1520	Burners lit due to elevated CO
1937	Lost raw water, call next door to start more pumps
December 14, 2016	
0003	Blew soot U3
0005	North refuse crane down, the pin came out
1350	Burners lit U3 due to wet fuel
1807	Lit U3 burners, CO, feeder 5 not pushing trash
2037	Blew soot U3
2057	Blew soot U2
December 15, 2016	
2055	Blew soot U2
2215	Blew soot U1
2311	U3 rev air fan
December 16, 2016	
0018	Blew soot U3
0950	Pre-act false alarm, placed impairment w. FM Global
December 17, 2016	
0555	Burners lit U2 due to wet fuel
1036	Burners lit U2 due to wet fuel
2020	U2/U3 reduced load to 150k due to visibility issues in reuse pit
December 18, 2016	
0145	U3 burners lit, high CO and wet fuel
0232	U2 burners lit, high CO and wet fuel
0705	Putting out any campfires U2

Table 14 MCFRS Incident Log December 8th, 2016 Through December 18th, 2016
Montgomery Covanta

Time	Event Description
December 8, 2016	
Incident Number: 16-0152736	
18:28:37	Fire on ground level, full assignment, structure fire, commercial/industrial building, no hazmat, flames and smoke visible
18:30:19	Full assignment dispatched
18:36	PE714 on scene with command, fire in trash it
18:43	C914 on scene with command
18:43	PE714 fire knocked
18:46	PE714 requesting a RID and a 2nd alarm
19:05	Command putting the 2nd alarm in service
19:09	Command putting the FM in service
19:55:55	Command requesting air unit and CT
21:41:24	Command holding PE714, PRE709, PE722, AT735, T731, W714, M714, CT714, AR904, all other units may go in service
23:06:23	Per command, holding PE714 releasing TG7C, PE714 will be primary contact for the remainder of the night, will come up on bravo if anything is needed
December 9, 2016	
06:42:32	PE714 requested alternate channel, no operator,
10:39:23	Command update, active fire on the south side wall and north side division Charlie. Working on a plan to use north cannon to assist with extinguishment. Zero visibility to crane to remove trash. Safety concerns for floor crews will not be affected by use of the north cannon. Rehab is now in the admin offices, food and shelter is provided. Water supply to site is good. 2 6000 gallon tankers will continue to supply the operational needs, they will fill up at the Dickerson 6+12 WSSC hydrant. All units par and updates given to command.
PE714 Unit Narrative	PE714 dispatched as first due engine on fire at incinerator plant. PE714 had previous knowledge of possible water supply issues at facilities hydrant system and relayed this info to responding units. PE714 AOS to find workers directing us to are of building where trash is dumped and stored. PE714 reported large volume of fire extending up the outside of 4 story building along with large trash fire inside the building extending up the 50 foot walls inside. PE714 assumed command in attack mode. PE714 planned to pull through building and access hydrant on other side but noticed employees had a hose line stretched across route of travel. PE714 stopped inside building and used deck gun to knock down fire extending up walls. PE714 crew along with M714 crew hand jacked line to hydrant and made connection. TW714 directed to supply PE714. PE714 stated water flow from hydrant was sufficient and info relayed to responding

Time	Event Description
	battalion chiefs that hydrants were working. Second blitz fire placed in service along with hand line to control flare ups. Frederick chief arrived on scene and command was transferred to him along with an update. PE714 officer became fire attack group. Supervisor at facility stated all personnel were accounted for and info relayed to command. PE714 broke down operations after initial knock down and repositioned PE714 outside of building. PE714 crew continued to assist in controlling hot spots and flare ups as loader operated in building. PE714 relieved by PE731 crew later into incident.

APPENDIX B SUMMARY OF INTERVIEWS

Covanta

Jay Luksis – Safety, September moved to Transfer Station, last load on the 8th was at 1730, fire started around 1830, all fire hydrants were working, 3 of 4 cannons working, crane hit the cannon next to pulpit, Friday morning fire was in trench, allowed to store trash on tipping floor for 72 hours, fire department (FD) packed up and left on the evening of 8th, FD never really took charge of situation, flames shot up south wall of tipping floor, since March south and north bay have been blocked and backed up, other fires started in center of trench and on south side, when the FD used monitors the smoke and fire started to push out of the top of the trash pile, Williams was called in by FD to help, FD worried about PPE contamination, fire team consists of people with prior training, foam and airboat both ineffective,

Joe Beecroft – Chief Engineer, left at 1800 on the 8th and told at 1900 that the fire was under control and nothing to worry about, visibility was a huge problem, 3 days before the raw water issue had arisen, water restored the 9th, claimed a meeting with FD at the beginning and end of each day was happening, difficult to get everyone on the same page, Williams was in charge after he arrived, incident reports are not done for fires only when there is damage or injury,

Ron Bricker – Crane Operator, saw flickering near south wall on tipping floor side of concrete support, docked crane, got really smoky, stayed in the pulpit because "required to", helped to visualize the fire from above, used radio for communication, first fire working the crane, did not get hot in pulpit however the area around the pulpit had zero visibility, was warm walking to the pulpit each day, "scary", wanted to leave the pulpit but was company policy to say and help, verbal training on EEBA.

Mike Roelkey – Operations Supervisor, went home at 1830, but came back, 31ft of water in firewater tank, 3ft at 0200 hours the 9th, needed more water could not maintain demand, tankers were called in, pond level was increasing due to the firewater runoff, fans were placed on the roof, previous fire events had minimal smoke compared to this fire, would like more cameras on the tipping floor, lots of personnel changes from both Covanta and FD.

Matt Gerlach – Shift Supervisor, was in basement when fire was reported, walked outside to see blistering paint on outside wall paint, called control room to call 911, set up the blitz fire with AO to start putting water on the fire, debriefed FD once on scene, at the end of the shift the fire was under control (0500 9th), Chris Dezmen got excavator the 9th, did not deal with Williams, Nov/Aug fires set up a fire watch on the tipping floor, Dennis Thomas was relief, fire training from the Navy, does tailgates and what if scenarios with staff each shift.

Dennis Thomas – On shift before fire and Friday 9th evening, FD on charging deck, crane operator felt abandoned, flames were hitting the pulpit at some point, water concerns, visibility issues, kept trying to dig out the trash, fire cannons and dry pipe had problems, cannon operator was given a SCBA from FD to use, IDLH in refuse pit and tipping floor, told crane operator to leave before Chief Engineer did because conditions were too bad, roof vents were opened and closed periodically throughout the incident, south crane had problems during the incident, communication issues with FD, limited management presence over nights and weekends.

Richard Early – Crane Operator, left just before fire, 0500 December 9th, operated the crane, lots of smoke and periodic flame, FD had equipment on the floor, CO was "off the charts", was on scene for several fires, 14 year employee, fire cannons were not working, no cannon training but has used fire hose before to wash down facility items, thinks November fire was still smoldering, trash at the bottom of the pit has probably been there for 2 years, incident was due to the snowball effect.

Joe LaDana – County Solid Waste Division, saw fire blistering siding, relayed information to County higher ups, help structural engineer from county by providing a walk through, employee since 2002, not designated a role in the fire, Feb the trash pile was high too and never came down, different FD chief every day, would have been better had the 2nd crane been operational, drains inn the crane maintenance/rest area were plugged.

Robin (Rob) Ziemke – Head of Maintenance, was not there during fire initially, helped open roof smoke hatches, got 2nd crane running, claimed the FD is responsible for the fire suppression, maintenance was not a contributor to the fire, roofing company and FD cut the roof, will do minor maintenance on fire protection systems, big jobs are left to the professionals.

Jonathan Fuller – Crane Operator, trash was really high, very smoky conditions, started in April, actively picked trash with spotters, nothing unusual from other fires initially, has verbal fire and EEBA training, never felt uncomfortable in pulpit.

Jim and Jake – Control Room Operators, raw water outage was a huge problem, FD was in control room, FD had control, boiler room fans set in reverse to help with ventilation efforts.

Kim McIntyre– Environmental, concerned about firewater drainage, Darling & Daughters tankers bought in, called MDE and told about fire event, have expired water permit and were under orders not to discharge from pond due to contaminants, ERG water issues, firefighting was higher priority over environment, storm water drain was boomed.

Tim Gregan – Covanta Regional VP of Operations, 1830 fire alarm went off, annunciator near conference room going off, RNG facility supplies water to MCRRF, rented a pump to pump water from the river, waste did not stop coming via rail, Covanta used water cannons and fire hose, tried to keep the boilers running, FD filled SCBA cylinders, FD changed management a lot, ran out of water fast, water running out of pit, airboat was unsuccessful, triangle of trash made on east wall of tipping floor Williams idea, fire moved from south to north, FD had few personnel on scene first night, 27 year Region VP, transfer station has had approx. 5 fires in 2016 as well, looking at getting fire watch company or flame detector, trash bypass has to happen more, when digging in trash the water seemed to bubble up, trash height varies based on season and have reserves.

Mark Freedman – Covanta Business Manager 2014, facility manager since 2001, RCA is only log of incident, FD drained tank, smoke damage on exterior walls, 500 gpm pump from river, first few days little FD coordination, each day the goals and approach changed, 13th Williams and FD got command set up, crane operate has to move the burning trash no other way, their SOP is the EAP, Jay Luksis was main point of contact he thought, July and Aug fires were on south side as well, thinks the cause is related to the other fires.

Fire Department

John Kinsley – Operations Chief MCFRS, several fires over the previous months, typically used the claw to feed the fire to the boilers, FD was using the loaders and excavators with SCBA and trained personnel, tried to spate piles of trash to keep the fire from spreading, operations ceased at 0000 the 9th because the fire was knocked down, one unit remained on scene, lighting and smoke were the main issues, Ventilation was a high priority so the Airboat was used to pressurize the space, boat did not work, Structural stability and trash stability was a concern, Marie Labau was specialized as a structural engineer to evaluate the building integrity, removed wall panels, contractor cut the roof, Co. 714 has maps of facility, water cannons we talked about being used but MCFRS equipment was used instead, daily meetings were needed for the communication to work better, Emergency operations Center (EOC) was established by Williams, Alan Butsch was main contact for Williams, plans were made to use Williams after all options were exhausted, Always at least one OIC and suppression crew on site until the 18th except the night of the 16th due to the weather.

Michael Nelson – Duty Operations Shift Chief, on scene the 8th, 20 min response on scene, vents made on side A, quick knock of the flames, deep seated fire, chief 914 was first unit on scene, life safety is always 1st priority, ran out of water sometime over the evening of the 8th, used foam and water, foam wasn't very affective, gigantic amount of trash was the issue, nowhere to move the trash to.

Alan Butsch – Battalion Chief EMS, arrived the 11th, focused on moving trash because ventilation and soaking the trash were not making progress, was primary contact of Williams, had reached out the 11th and William arrived on scene the 12th, Class A foam used, ~20 gallons of concentrate used at 1%, after noon of the 13th FD in standby mode, not much to do, Had contact with Tim Gregan from Covanta, Covanta personnel used the heavy machinery, hard to tell what caused the fire but speculated that the fire has been there for a while, possibly from a previous incident, Williams claimed that trash fires are common in decomposing matter, was concerned about the piles falling over, Marie the structural engineer was a great asset. Alan had not gone to previous fires, pile of trash around 15-20 feet by 50 feet long, smoke barriers help the most, the smoke barriers allowed smoke to cease and allow the cranes to operate,

APPENDIX C – EMERGENCY ACTION PLAN

EAP COVANTA MONTGOMERY MB Rev. 1

Crane Boarding Fire Emergencies (S.P. 15B)

Before boarding a crane, all employees shall remove an emergency escape breathing apparatus (EEBA) from the crane pulpit and they must take to the job site.

In the event of a fire or sounding the fire alarm, all employees working on the cranes will terminate any on-going activity and respond to the alarm as follows:

If the event is not an emergency or plant evacuation or has no effect on the charging floor/tipping floor/refuse pit, the crane activity can resume.

If the event does effect the charging floor/tipping floor/refuse pit or an emergency plant evacuation, the crane activity must terminate and respond.

The Control Room Operator will identify the location of the fire from the fire control panel. He will announce the location to the Shift Supervisor. The Control Room Operator will call the fire department if and only if he is directed by the Shift Supervisor or Facility Manager. The Crane Operator will take orders from the Shift Supervisor and or Chief Engineer.

If the emergency is a refuse pit fire, the Crane Operator will notify the Control Room to sound the fire alarm. All personnel that are performing work on the refuse crane shall don the escape breathing apparatus units if necessary and proceed to the nearest stairwell and exit to the Emergency Evacuation point. The Crane Operator shall position the operating crane(s) to the maintenance positions. The Crane Operator will don an EEBA for the purpose of escape if needed.

Follow all direction of the fire department upon their arrival that is relative to the fire. The fire department is in charge of fighting the fire until the fire is out. The Shift Supervisor will remain in charge of the operation of the plant, but will cooperate with the fire department in fighting the fire.

In the case of an injured or unconscious worker on the crane, contact the control room. Report the location, the name of the injured, and a brief explanation of the situation. If medical or rescue assistance is needed contact 911.

Rescue will be performed by Emergency Medical Service personnel (EMS) only.

APPENDIX D – FIRE AND GENERAL EMERGENCY PLAN

FIRE AND GENERAL EMERGENCIES

1.0 Introduction

This Plan outlines the procedures to be followed by Covanta Montgomery, Inc. Personnel in the case of fire and general emergencies. During any such emergency, personnel must react quickly and decisively to the situation while remaining calm thus minimizing potential damage and/or injury and enabling the resumption of normal plant operations.

1.1 All personnel other than the fire fighting team (Operations shift on duty) must evacuate the building to the south administrative parking lot when a fire alarm is sounded.

2.0 General Emergency Procedure

2.1 All Plant Personnel

IMMEDIATELY report all emergencies to the control room. If the emergency is a fire, the first action is to pull the nearest fire alarm station and then call the control room. Remain calm and report as follows:

2.1.1 Give your name and location

2.1.2 State the type of emergency (chemical spill, oil spill, heart attack, refuse pit fire, electrical fire, etc.

2.1.3 State the magnitude of the fire or seriousness of the emergency

2.1.4 Verify that the Shift Engineer has copied and understood your communication.

2.1.5 ALL PLANT PERSONNEL MUST MONITOR CHANNEL 1 ON THEIR RADIO WHEN A FIRE ALARM IS SOUNDED.

2.1.6 Water Plant Operator must alert all personnel on all channels to report to the south administrative parking lot and to monitor channel 1.

2.2 Shift Engineer Actions

2.2.1 Sound the fire alarm (if fire and the alarm has not already sounded). Leave the alarm on until directed to secure it.

2.2.2 Announce the emergency over the PA and over radio communication on channel 1. Make three announcements approximately 20 seconds apart.

NOTE: IN THE EVENT OF A FIRE DO NOT USE THE ELEVATOR.

2.2.3 Call the Fire Department, at 911.

2.2.4 When the emergency is a fire in the refuse area, immediately stop all trucks from entering the tipping floor.

2.2.5 Notify the Chief Engineer or Facility Manager. Corporate notification will be made at the discretion of the Facility Manager.

2.2.6 Remain in the control room to coordinate the emergency actions and operate the units.

2.3 Shift Supervisor, Auxiliary Engineers Actions (2)

2.3.1 Immediately proceed to the location of the emergency.

2.3.2 Render assistance as required. Call 911 if assistance is required.

2.3.3 Should the emergency be a fire, one Auxiliary Engineer shall report to fire pumphouse.

2.3.4 Verify that the electric fire pump is running and that the diesel fire pump is on stand-by.

2.3.5 Report the fire pump running and fire system pressure to the Shift Engineer.

2.3.6 Proceed to the front gate to direct fire department to fire location, then proceed back to the fire pumphouse until the fire is out, and the Shift Engineer directs the pump shutdown.

2.3.7 Keep the Shift Engineer informed as to the conditions and additional assistance required.

2.3.8 When the emergency is a fire in the refuse area, immediately stop all trucks from entering the tipping floor.

2.4 Crane Operator Actions

2.4.1 Remain at duty station.

2.4.2 Carry out emergency instructions.

2.5 Equipment Operators, Shuttle System Personnel, Maintenance and Administrative Personnel Actions

2.5.1 Should the emergency be a fire, evacuate the building and report to the administration parking lot south of the administration building. Before leaving the building check the bathrooms and take the facility visitors book to account for facility guests.

2.5.2 Remain in the parking lot. Do not re-enter the building unless directed, by the Shift Supervisor, Chief Engineer or Facility Manager.

2.6 Maintenance Supervisor Actions

2.6.1 Report to the administration parking lot with a radio and stand by for instructions.

2.6.2 Conduct a head count of all personnel. Report personnel accounted for or missing to the Shift Supervisor.

2.6.3 Carry out emergency instructions as directed by the Shift Supervisor or Shift Engineer.

NOTE: The Fire Department is to be called for ALL reported fires. If we are successful in getting the fire out before the Fire Department arrives, call and cancel the original call. In any case, one truck will arrive.

3.0 Pit Fires

3.1 Crane Operator Actions

3.1.1 Notify the Shift Engineer of the situation. Sound fire alarm (if not already sounded) leave alarm on until directed to secure it.

3.1.2 Move the cranes to the end maintenance zones, or clear of the fire hazards and park them. Then stand-by for directions.

3.1.3 Do not move or disturb refuse in the area of the fire until directed to do so by the Shift Supervisor.

3.1.4 A smoldering fire is not to be disturbed unless the water cannons are manned.

3.1.5 Escape air supply systems are available in crane pulpit if needed.

3.2 Shift Engineer Actions

3.2.1 Sound fire alarm If not already sounded). Sound the fire alarm over the PA system and over radio channel 1. Make three announcements approximately 20 seconds apart.

3.2.2 Call the Fire Department when ANY fire is reported. Telephone no. is 911.

3.2.3 IF AFTER REGULAR TIPPING HOURS, the Shift Engineer is to immediately open the entrance/exit gate.

3.2.4 Reduce boiler loads to a minimum, then close the feed chute dampers when the feed chute low level alarm is tripped.

3.2.5 Notify the Chief Engineer and Facility Manager. Corporate notification will be made at the discretion of the Facility Manager.

3.3 Shift Supervisor Actions

3.3.1 Instruct the Rail Yard to stop all container trucks from entering the tipping floor. Have the tipping floor doors closed, but have a person standing by to open the south door for the fire trucks.

3.3.2 Keep the Shift Engineer informed as to conditions, and additional assistance required.

3.3.3 Follow all instructions of the Fire Department relative to fighting the fire. The Fire Department Commander is in charge of fire fighting. The Shift Supervisor will remain in charge of operation of the plant but will cooperate with the Fire Department Commander in fighting the fire.

3.4 Auxiliary Engineers Actions (3)

3.4.1 Put on self-contained breathing apparatus and proceed to man the water cannons.

3.4.2 Keep the Shift Engineer informed as to conditions, and additional assistance required.

3.4.3 Follow all instructions of the Fire Department relative to fighting the fire. The Fire Department Commander is in charge of fire fighting. The Shift Supervisor will remain in charge of operation of the plant but will cooperate with the Fire Department Commander in fighting the fire.

4.0 Returning the Plant to Normal

4.1 Shift Supervisor Actions

4.1.1 Instruct the crane operator to resume feeding the feed chutes. THE BURN AREA IS TO BE PICKED FIRST.

4.1.2 Man a water cannon as necessary to prevent fire from erupting.

4.1.3 When the feed chute level is sufficient to seal the boiler, instruct the Shift Engineer to begin restoring the boiler loads to normal.

4.1.4 When all traces of burned material have been fed out, direct the Rail Yard to resume container truck operation.

4.1.5 Order the fire pumps shutdown and the jockey pump started.

4.1.6 Survey the equipment used during fire fighting, and order fire extinguishers and breathing air bottles to be replaced and fire hoses dried and properly stowed, etc.

4.1.7 Maintain a fire watch as directed by the Fire Chief, but in no event less than 2 hours.

4.2 Shift Engineer and Auxiliary Engineers Actions (3)

4.2.1 Restore the boiler loads to normal.

4.2.2 Notify the Rail Yard that the plant is open for deliveries.

5.0 Chemical Fires

Should a chemical fire exist, general emergency procedures will be followed by appropriate personnel and the local Fire Department called for assistance. All chemical tanks in the Facility have been marked with the NFPA triangle to show appropriate fire and reactivity conditions and the local Fire Department has been walked through the Facility so that they are aware of all chemical storage areas. Should a fire condition exist near a chemical storage location the Fire Department will be called and appropriate advise given to the Fire Department for proper fire fighting coverage.

If there is a fire near the Anhydrous Ammonia tank, it may be necessary to activate the deluge system to cool the tank. An over pressure releases to the stack.

APPENDIX E – PLANT OPERATING PROCEDURE

FIRE RESPONSE PROCEDURE (DAY SHIFT)

1. Pull the nearest fire alarm station.
2. Call the control room.
3. Give your name, location and type of fire (class A, B, C) to the Control Room Operator.
4. State the magnitude or seriousness of the fire.
5. The Control Room Operator will announce the emergency over the ComTrol system. Make 3 announcements approximately 20 seconds apart.
6. All personnel should switch their radios to channel 1.
7. The Control Room Operator calls 911.
8. The Water Tech should report to the fire pump house and check that the electric fire pump is running and the diesel fire pump is in stand-by. Report status to the Control Room Operator.
9. The Shift Supervisor and one Auxiliary Operator should report to the scene.
10. The Water Tech should proceed to the front gate and await the fire department.
11. The second Auxiliary Operator should report to the control room and await instruction.
12. The Crane Operator should remain on station unless advised to evacuate by the Shift Supervisor or Control Room Operator.
13. All other personnel should report to the administration building parking lot. The Operations Supervisor should inform the transportation department to evacuate and turn all radios to channel 1.
14. The Maintenance Manager should perform a muster of all on-site personnel in the parking lot.
15. The Facility Manager should assume the duties of scene leader from the administration building parking lot.
16. The fire department will be in charge of fire response at the scene.
17. The Shift Supervisor should report conditions at the scene to the Facility Manager.
18. The Facility Manager will determine the casualty is over and personnel may leave the muster area.

NOTE: THE ELEVATOR SHOULD NOT BE USED IN THE EVENT OF A FIRE.

Revision Date: October 2010

FIRE RESPONSE PROCEDURE (NIGHT SHIFT)

1. Pull the nearest fire alarm station.
2. Call the control room.
3. Give your name, location and type of fire (class A, B, C) to the Control Room Operator.
4. State the magnitude or seriousness of the fire.
5. The Control Room Operator will announce the emergency over the ComTrol system. Make 3 announcements approximately 20 seconds apart.
6. All personnel should switch their radios to channel 1.
7. The Control Room Operator calls 911.
8. One Auxiliary Operator should report to the fire pump house and check that the electric fire pump is running and the diesel fire pump is in stand-by. Report status to the Control Room Operator.
9. The Shift Supervisor and one Auxiliary Operator should report to the scene.
10. The Auxiliary Operator should proceed from the fire pump house to the front gate and await the fire department.
11. The Crane Operator should remain on station unless advised to evacuate by the Shift Supervisor or Control Room Operator.
12. All other personnel should report to the administration building parking lot.
13. The Auxiliary Operator at the front gate should perform a muster of all on-site personnel in the parking lot.
14. The Shift Supervisor should assume the duties of scene leader from the location of the fire.
15. The Control Room Operator should call the Facility Manager and Chief Engineer as soon as possible.
16. The fire department will be in charge of fire response at the scene.
17. The Shift Supervisor will remain in charge of all site activities not related to the fire until members of the management team arrive.
18. The Shift Supervisor will determine the casualty is over and personnel may leave the muster area.

NOTE: THE ELEVATOR SHOULD NOT BE USED IN THE EVENT OF A FIRE.

Revision Date: October 2010

REFUSE PIT FIRE (DAY SHIFT)

1. Crane Operator should report the fire to the Control Room Operator and sound the fire alarm.
2. Crane Operator should move the cranes to the maintenance zones and park them. He should then stand-by for instructions.
3. The Control Room Operator should announce the fire over the ComTrol system. Make 3 announcements approximately 20 seconds apart.
4. The Control Room Operator should call 911.
5. The Water Tech should report to the fire pump house and verify that the electric fire pump is running and that the diesel fire pump is in stand-by.
6. The Shift Supervisor and one Auxiliary Operator should report the scene.
7. The Water Tech should proceed to the front gate and await the fire department.
8. The Operations Supervisor should report to the tipping floor and clear all personnel and equipment from the floor.
9. The Control Room Operator will reduce boiler loads to minimum and close feed chute dampers when hopper levels are low enough.
10. The Auxiliary Operators and Shift Supervisor should man the fire cannons on the fire.
11. Only at the Shift Supervisors direction a smoldering fire should be fed to the boilers and only if the fire cannons are manned.
12. Evacuate the pit area if required.
13. All other personnel should report to the administration building parking lot. The Operations Supervisor should inform the transportation department to evacuate and turn all radios to channel 1.
14. The Maintenance Manager should perform a muster of all on-site personnel in the parking lot.
15. The Facility Manager should assume the duties of scene leader from the administration building parking lot.
16. The fire department will be in charge of fire response at the scene.
17. The Shift Supervisor should report conditions at the scene to the Facility Manager.
18. The Facility Manager will determine the casualty is over and when personnel may leave the muster area.

NOTE: ELEVATOR SHOULD NOT BE USED IN THE EVENT OF A FIRE.

Revision Date: October 2010

REFUSE PIT FIRE (NIGHT SHIFT)

1. Crane Operator should report the fire to the Control Room Operator and sound the fire alarm.
2. Crane Operator should move the cranes to the maintenance zones and park them. He should then stand-by for instructions.
3. The Control Room Operator should announce the fire over the ComTrol system. Make 3 announcements approximately 20 seconds apart.
4. The Control Room Operator should call 911.
5. One Auxiliary Operator should report to the fire pump house and verify that the electric fire pump is running and that the diesel fire pump is in stand-by.
6. The Shift Supervisor and one Auxiliary Operator should report the scene.
7. The Auxiliary Operator should proceed from the fire pump house to the front gate and await the fire department
8. The Control Room Operator will reduce boiler loads to minimum and close feed chute dampers when hopper levels are low enough.
9. The Auxiliary Operators and Shift Supervisor should man the fire cannons on the fire.
10. Only at the Shift Supervisors direction a smoldering fire should be fed to the boilers and only if the fire cannons are manned.
11. Evacuate the pit area if required.
12. All other personnel should report to the administration building parking lot.
13. The Auxiliary Operator at the front gate should perform a muster of all on-site personnel in the parking lot.
14. The Shift Supervisor should assume the duties of scene leader from the location of the fire.
15. The Control Room Operator should call the Facility Manager and Chief Engineer as soon as possible.
16. The fire department will be in charge of fire response at the scene.
17. The Shift Supervisor will remain in charge of all site activities not related to the fire until members of the management team arrive.
18. The Shift Supervisor will determine the casualty is over and personnel may leave the muster area
19. The Shift Supervisor should report conditions at the scene to the Facility Manager.

NOTE: ELEVATOR SHOULD NOT BE USED IN THE EVENT OF A FIRE.

Revision Date: October 2010

APPENDIX F – ADDITIONAL REFERENCED DOCUMENTS

Covanta and MCFRS Documents

Title	Date
Fire and General Emergency Plan	
Plant Operation Procedures	October 2010
MoCo RRF and Transfer Station Monthly Operation Report	December 2016
Fire Inspector Report - Department of Permitting Services Division of Fire Protection and Code Compliance	December 28, 2016
Fire Inspector Report - Department of Permitting Services Division of Fire Protection and Code Compliance	December 19, 2016
Safety Procedure No. 17 - Fire Prevention and Safety Programs	August 1, 2007
Safety Procedure No. 17A - Emergency Action Plan	December 1, 2015
Safety Procedure No. 17A - Emergency Action Plan Reference Tool	August 1, 2006
Root Cause Analysis Report Tipping Floor/Refuse Pit Fire	December 2016
Emergency Action Plan Covanta Montgomery MB	
Initial Incident Report Email	December 14, 2016
FM Global Risk Report	August 30, 2016
Operations Plan for the Montgomery RRF for January/February 2017	December 30, 2016
Fire Protection System Description No. 9	April 1995
Covanta Logbook	2016
MCFRS Incident Logs	December 2016
MCFRS Unit Incident reports	December 2016
MCFRS Incident Audio Logs	December 2016

Sprinkler Calculations

Office of Nuclear Reactor Regulation
Division of Systems Safety and Analysis
Plant Systems Branch
Fire Protection Engineering and Special Projects Section

UNI

INPUT PARAMETERS

Heat Release Rate of the Fire (Q) (Steady State)	47000.00	kW	
Sprinkler Response Time Index (RTI)	130	$(m\text{-}sec)^{1/2}$	
Activation Temperature of the Sprinkler ($T_{activation}$)	286	°F	141.11 °C
Height of Ceiling above Top of Fuel (H)	60.00	ft	18.29 m
Radial Distance to the Detector (r) **never more than 0.707 or 1/2√2 of the listed spacing**	7.00	ft	2.13 m
Ambient Air Temperature (T_a)	40.00	°F	4.44 °C
			277.44 K
Convective Heat Release Rate Fraction (χ_c)	0.70		
r/H = 0.12	Calculate		

RINKLER RESPONSE TIME INDEX (RTI)*

Common Sprinkler Type	Generic Response Time Index (RTI) $(m\text{-}sec)^{1/2}$
Standard response bulb	235
Standard response link	130
Quick response bulb	42
Quick response link	34
User Specified Value	Enter Value

Select Type of Sprinkler: Standard response link

Scroll to desired sprinkler type then Click on selection

Reference: *Madrzykowski, D., "Evaluation of Sprinkler Activation Prediction Methods" ASIAFLAM'95, International Conference on Fire Science and Engineering, 1st Proceeding, March 15-16, 1995, Kowloon, Hong Kong, pp. 211-218.*

*Note: The actual RTI should be used when the value is available.

RINKLER TEMPERATURE RATING ($T_{activation}$)*

Temperature Classification	Range of Temperature Ratings (°F)	Generic Temperature Ratings (°F)
Ordinary	135 to 170	165
Intermediate	175 to 225	212
High	250 to 300	275
Extra high	325 to 375	350
Very extra high	400 to 475	450
Ultra high	500 to 575	550
Ultra high	650	550
User Specified Value	–	Enter Value

Select Sprinkler Classification: Ordinary

Scroll to desired sprinkler class then Click on selection

Reference: *Automatic Sprinkler Systems Handbook, 6th Edition, National Fire Protection Association, Quincy, Massachusetts, 1994, Page 67.*

*Note: The actual temperature rating should be used when the value is available.

Sprinkler Calculations (continued)

ESTIMATING SPRINKLER RESPONSE TIME

Reference: *NFPA Fire Protection Handbook, 19th Edition, 2003, Page 3-140.*

$t_{activation} = (RTI/(\sqrt{u_{jet}}))\ (\ln\ (T_{jet} - T_a)/(T_{jet} - T_{activation}))$

Where $t_{activation}$ = sprinkler activation response time (sec)
RTI = sprinkler response time index $(m\text{-}sec)^{1/2}$
u_{jet} = ceiling jet velocity (m/sec)
T_{jet} = ceiling jet temperature (°C)
T_a = ambient air temperature (°C)
$T_{activation}$ = activation temperature of sprinkler (°C)

Ceiling Jet Temperature Calculation

$T_{jet} - T_a = 16.9\ (Q_c)^{2/3}/H^{5/3}$ for r/H ≤ 0.18

$T_{jet} - T_a = 5.38\ (Q_c/r)^{2/3}/H$ for r/H > 0.18

Where T_{jet} = ceiling jet temperature (°C)
T_a = ambient air temperature (°C)
Q_c = convective portion of the heat release rate (kW)
H = height of ceiling above top of fuel (m)
r = radial distance from the plume centerline to the sprinkler (m)

Convective Heat Release Rate Calculation

$Q_c = \chi_c\ Q$

Where Q_c = convective portion of the heat release rate (kW)
Q = heat release rate of the fire (kW)
χ_c = convective heat release rate fraction

Q_c = **32900** kW

Radial Distance to Ceiling Height Ratio Calculation

r/H = **0.12** r/H ≤ 0.15

$T_{jet} - T_a$ = {16.9 (Qc)^2/3}/{H^5/3}
$T_{jet} - T_a$ = 136.69
T_{jet} = **141.14** (°C)

Ceiling Jet Velocity Calculation

$u_{jet} = 0.96\ (Q/H)^{1/3}$ for r/H ≤ 0.15

$u_{jet} = (0.195\ Q^{1/3}\ H^{1/2})/r^{5/6}$ for r/H > 0.15

Where u_{jet} = ceiling jet velocity (m/sec)
Q = heat release rate of the fire (kW)
H = height of ceiling above top of fuel (m)
r = radial distance from the plume centerline to the sprinkler (m)

Radial Distance to Ceiling Height Ratio Calculation

r/H = 0.12 r/H ≤ 0.15

u_{jet} = 0.96 (Q/H)^1/3
u_{jet} = **13.150** m/sec

Sprinkler Activation Time Calculation

$t_{activation} = (RTI/(\sqrt{u_{jet}}))\ (\ln\ (T_{jet} - T_a)/(T_{jet} - T_{activation}))$

$t_{activation}$ = **309.35 sec**

The sprinkler will respond in approximately	5.16 minutes	Answer

Covanta Montgomery, Inc
21204 Martinsburg Road
Dickerson, MD 20842
301-691-9001

COVANTA
Powering Today. Protecting Tomorrow.

April 21, 2017

William Broglie, Acting Chief
Montgomery County DEP / DSWS
Executive Office Building
101 Monroe Street,
Rockville, Maryland 20850

Chris Skaggs, Executive Director
Northeast Maryland Waste
Disposal Authority
100 S. Charles Street
Tower II, Suite 402
Baltimore, MD 21201

VIA ELECTRONIC TRANSMISSION

SUBJECT: **MONTGOMERY COUNTY RESOURCE RECOVERY PROJECT**
HDR December 8, 2016 Root Cause Analysis - Response

Messrs. Broglie and Skaggs:

This letter has been drafted to address a number of unsubstantiated opinions and suppositions in the HDR Root Cause Analysis Report (the "Report") on the December 8, 2016 fire event at the Montgomery County Resource Recovery Facility (MCRRF). The Report is based on a cursory review of the event and Facility operation and history. In this letter Covanta will focus on the most disconcerting conclusions in the Report.

A root cause analysis ("RCA") is a method of problem solving to identify the root causes of faults and problems. RCA is applied to methodically identify and correct the root causes, both direct and indirect, of events rather than simply addressing the symptomatic result. Focusing correction on root causes should have as a goal the prevention of recurrence of a similar problem. The report produced by HDR lacks the necessary rigor to achieve the intended purpose of a properly conducted RCA.

HDR eliminated methane from decomposing waste, hot work and smoking on the tipping floor as possible sources of the fire. They suggest that heat of decomposition, unquenched fires and waste stream components could have impacted the event. Furthermore, they report that pre-existing fires could have contributed to the fire event, yet thermal imaging employed by the County Fire Department after the July and November incidents demonstrated to the fire professionals that the fires had been quenched. HDR also fails to substantiate or support their claim that other areas of the storage pit were at a higher temperature due to decomposition. This leads one to the more immediate cause being the incoming waste stream and waste components. HDR mentions waste stream composition as a possibility, but they do not fully develop recommendations to support this finding nor provide recommendations to mitigate this as a root cause of the event. They instead

pursue other less likely causes and arrive at ineffective recommendations for future improvements, which renders the analysis non-factual in nature and more opinion based.

Covanta is puzzled that the Report fails to mention the number of fire events at the Montgomery County Transfer Station (MCTS) which required Fire Department response, 18 events in the last 26 months. Attached is a chart of the fire incidences for both the facilities. Any analysis of root causes would have to include a review of these MCTS events, as the MCRRF receives all of its incoming material from the MCTS. The composition of waste material disposed by the general public at the MCTS should be analyzed which has a robust citizen drop-off area and receives all sorts of waste streams and recyclables. It should be noted that Covanta moves more than 1.6 million tons of MSW through its network of transfer station assets, thus experienced with transfer station operations, and the rest of our fleet experienced one fire incident in the last five years.

One would be hard pressed to ignore the spike of fire incidence activity around the MCTS. Interestingly, HDR cites additional personnel for potential fire mitigation at the MCRRF. It's important to acknowledge that Covanta has proposed recommendations to the County and Authority on materially de-risking the likely source of the fires at the MCTS which is waste components and improve fire mitigation processes. These include additional personnel for supplementary waste screening and inspections, advanced fire identification and suppression systems, waste classification, vehicle tracking, traffic pattern adjustments, and increased public outreach and education.

HDR offered a number of operational procedure modifications that while having surface appeal, would not result in reduced risk of fire. As the industry leader in waste-to-energy operations, Covanta takes exception with HDR's inference that the pit level and inventory management are directly correlated with pit fire events. First, limitations on pit and tipping floor waste storage have not demonstrated to result in lower fire incidence, and high pit inventory does not equate to higher fire ignition. (Please review the fire incidents at other Covanta facilities noted on graph attached). HDR suggests that the Facility employ additional manpower to more closely monitor waste as it is being moved through the system. At present, the waste is inspected at multiple points in the processing system. First, through the waste screening inspections on the MCTS processing floor. Second, by the MCTS loader operator as waste is handled on the processing floor. Third, at the MCRRF as the material is deposited into the storage pit. And fourth, inspection as the material is mixed and prepared for feeding into the boilers. Covanta is happy to consider the addition of a surplus crane operator and tipping floor monitor, but experience would indicate that the current staffing is sufficient and additional personnel would not be a good use of County resources. However, additional resources should be employed at the MCTS to reduce the risk of fire. The County should also develop a more robust public service education campaign on what should and should not go into the waste streams.

The Report also calls into question whether Covanta is adhering to the NFPA codes. The County's insurance company, FM Global, performs annual and periodic inspections, related processes and programs at the MCRRF that are measured against FM Global's industry standards. These standards are set at or above the requirements of NFPA, and the program in place at the MCRRF has met those FM Global standards. HDR's unsubstantiated allegations that codes are not being met and generalizations that procedures are not being followed create an unfair and inaccurate impression of improper management. This is another example of misguided conclusions based on

incomplete information. FM Global recently recognized Montgomery County and the MCRRF with a significant rebate in annual premiums due to the performance (fire systems and engineering improvements) at the facility. This recognition, coupled with the numerous site reports on FM Global's inspections, demonstrates the true conditions to be quite the opposite of those described in the Report.

There are many other examples of inconsistent conclusions and recommendations proffered by HDR and while there are recommendations that will be acted upon that will improve the operation, the overall report is lacking in proper conclusions and recommendations that if acted upon would actually lead to a reduced fire risk and improved fire response. We are disappointed in what we had hoped would have been a more useful and forward looking report for all parties.

Respectfully yours,

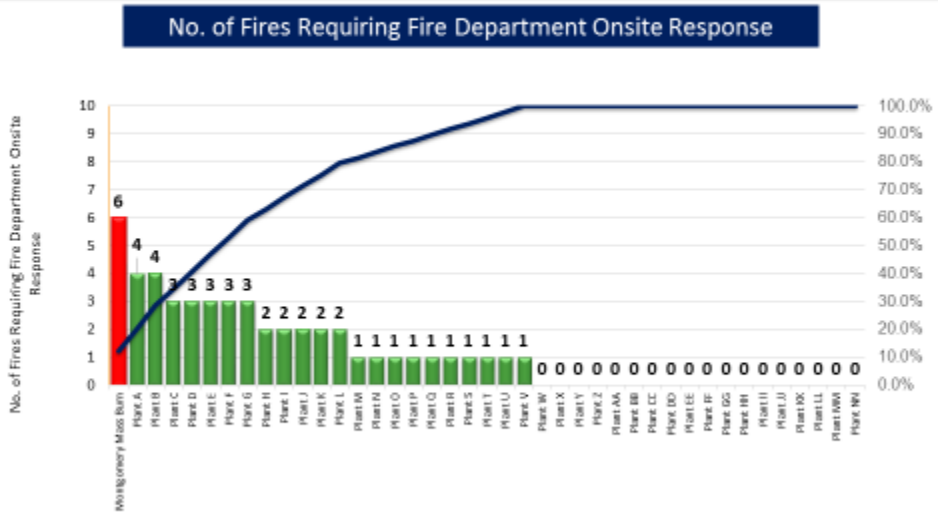
Covanta

ec: Montgomery County DEP/DSWD – Bill Davidson, Joe LaDana
NMWDA – Steve Blake, John Schott
Covanta – Joseph Neuhoff, Tim Gregan, Dave Blackmore, Pat Collins
Client Correspondence file

Covanta –
Previous 5-Year Fire Statistics

COVANTA

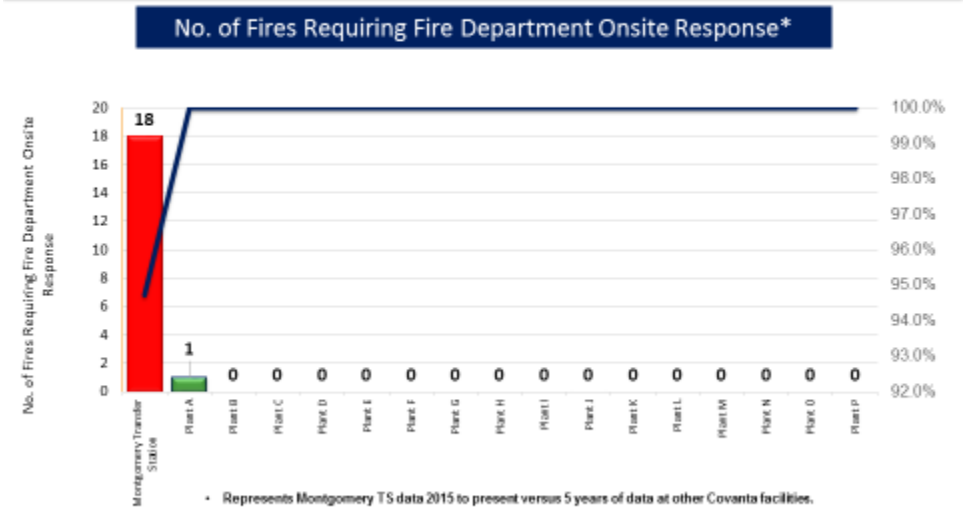
Covanta Mass Burn 5 Year Fire History



COVANTA

2

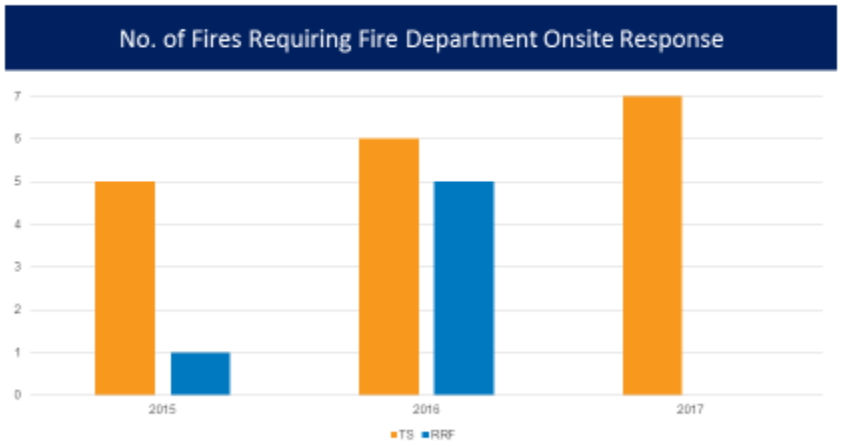
Covanta Transfer Station 5 Year Fire History



3

COVANTA

Covanta Montgomery 3 Year Fire History



4

COVANTA