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Waste-to-Energy Incinerators: Operation, Site Overview & Rail-to-Intermodal Facility

Photos taken at Covanta Niagara, a Waste-to-Energy (WTE) Combustion Facility.

January 25, 2024

Anthony Poupalos E.I.T., Region 9 Division of Air Resources

Incinerators

Covanta Niagara WTE Facility

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Tipping Floor – Unloading The Waste

- Waste is unloaded onto the tipping floor throughout the day. It is managed by facility personnel to ensure that a good blend of material is deposited into the waste bunker for adequate mixing by the crane cab.
- A well blended waste equates to a more consistent Btu value per pound, which aids in smoother incinerator operation.

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Tipping Floor – Waste Handling

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Waste Handling – Continued..

- The tipping floor ramp is where waste deliveries wait for access to the tipping floor. Municipal and rail waste are unloaded on the tipping floor throughout the day while commercial and industrial waste have scheduled deliveries.
- Management of various waste types allows for better handling and charging rates for various materials disposed at the facility throughout the day.

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Control Room – Around the Facility

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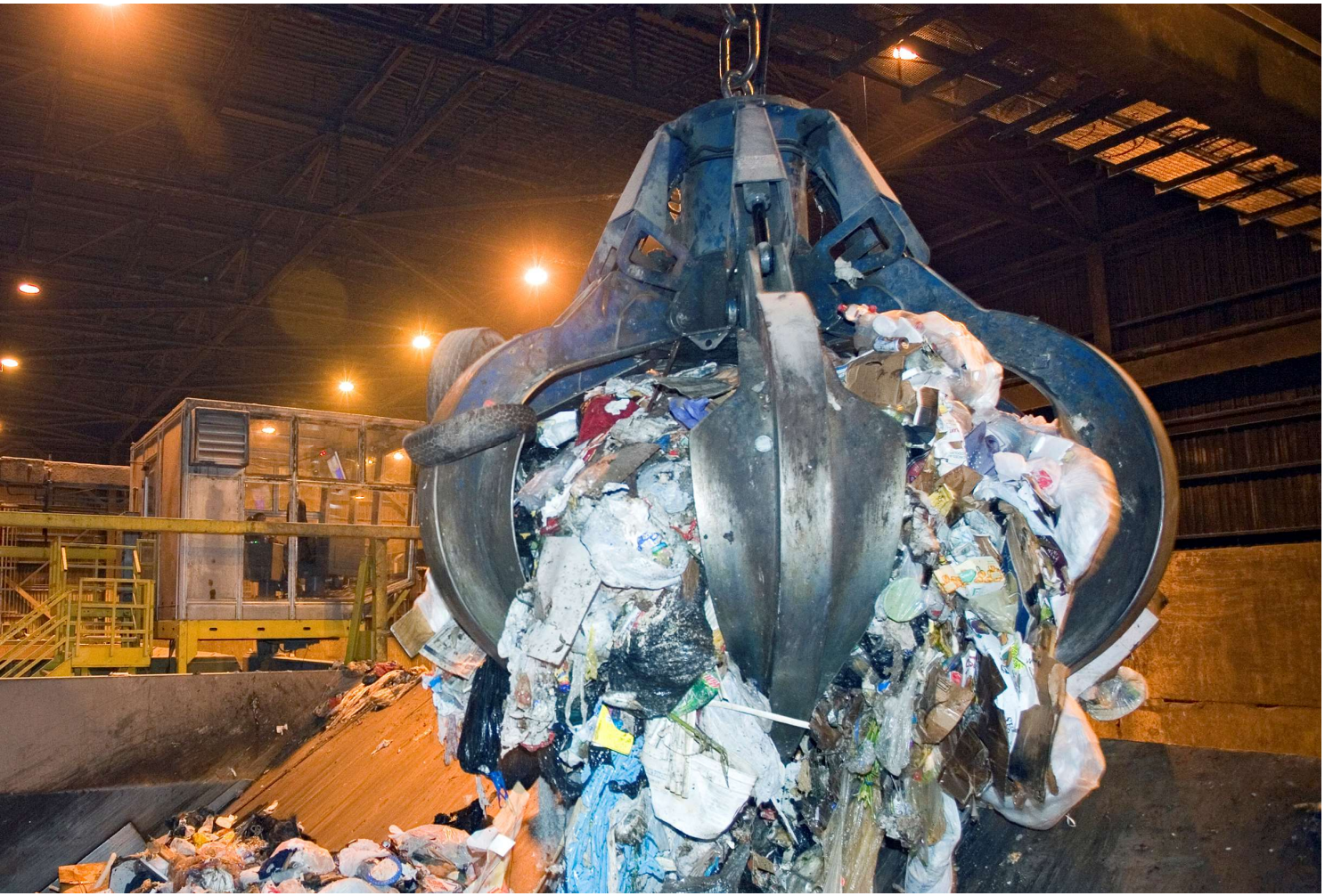
Crane Cab – Grapple



http://www.leegov.com/solidwaste/PublishingImages/facilities/rrf/wte-how-it-works/Grapple%206-08%20255.jpg

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Primary Air Fan – Combustion Air

Combustion Zone – Roller Grates

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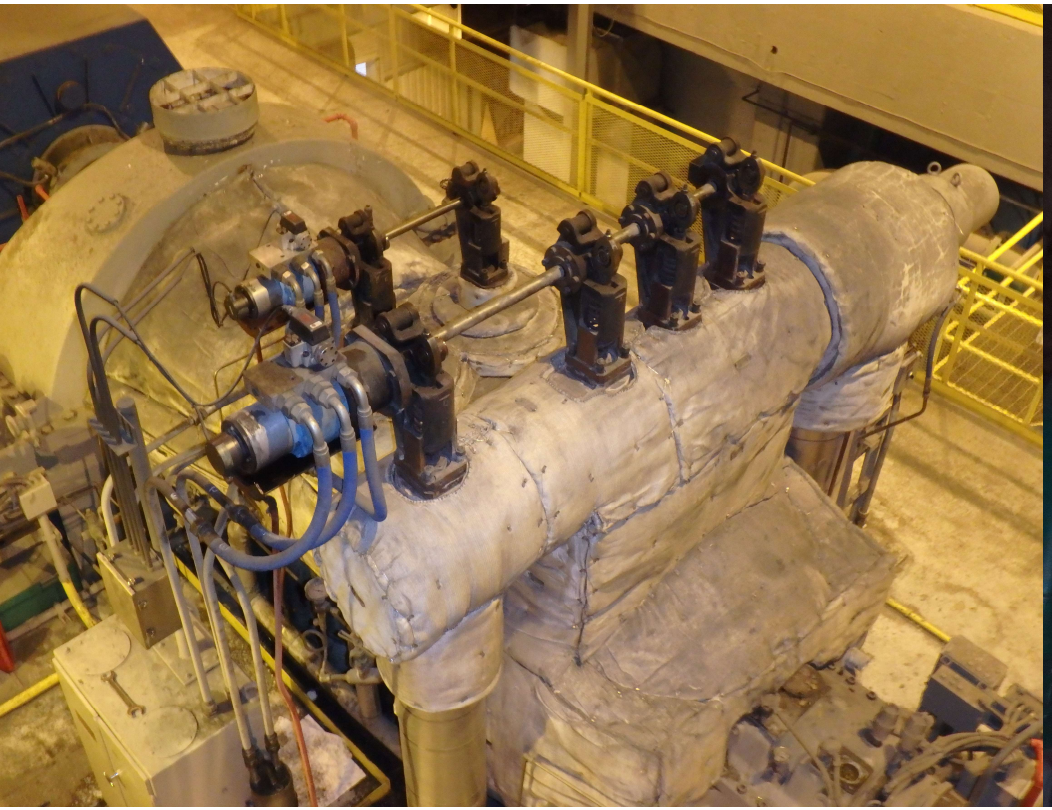
Heat Transfer – Tube Power

Turbines – The Power of Steam



Ash Extractor – Bottom Ash

Treatment – Flue Gas

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Stack – Horizontal to Vertical

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Ash Load Out – Combined Ash & Bulkies

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Cooling Tower – Wooden Gem

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Cooling Tower – How it Works

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Ash Testing

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Ash Testing – Sample Collection of Combined Ash

• Ash being sampled should be the combined fly and bottom ash. Bottom ash is dark in color while fly ash is light in color.

• Samples should be pulled every hour by a plant operator in the Ash Load Out Building with documentation (including whether ash was held or if any plant upsets occurred).

• Pulling samples consist of an operator catching quick samples using a 5 gallon bucket/pail from the conveyor before it empties into an ash truck destined for a landfill.

Ash Testing – Sample Collection of Combined Ash

• The facility can perform ash testing over 5 days consisting of two 12 hour composite samples. This results in 10 samples in total.

• The facility can also perform ash testing over 10 days consisting of a 24 hour composite sample (1 sample every hour for 24 hours).

• Total samples collected can amount to 2-4 buckets in total for each day.

Ash Testing – Shaking and Screening Collected Ash

https://www.hmalabsupply.com/products/gilson-ts-1-aggregate-screening-machine-without-screens

- A respirator must be worn during the processing to minimize potential exposure.
- As the ash is shaking it should be moved around the 3/8 inch filter screen using a garden tool.
- During this process you will notice incombustible material that can be removed and discarded.

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Ash Testing – Shaking and Screening Collected Ash

- Ash material that did not pass through the 3/8 inch screen should be emptied into a separate tote for tamping.
- This process will be repeated a few times with each bucket.
- Eventually the collected screened ash can be mixed for sample collection.

https://images-na.ssl-images-amazon.com/images/I/41kMvFIhN0L._SY300_.jpg

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Ash Testing – Processing Ash

https://www.diamondtool.net/jet-556606-backfill-tamper/product/3148/toku%20jet-06

- Tamping the ash after screening it helps to break down any hardened ash. A quick pass over the ash material inside a tote is all that is needed.
- This process will be repeated and you will notice diminishing returns on ash collected.

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Ash Testing – Mixing and Collecting Samples

https://www.lowes.com/pd/Kobalt-4-cu-ft-0-5-HP-Cement-Mixer/3591096

- The collected screened ash should be quickly mixed for approximately 1-2 min to ensure a homogenized sample.
- After the daily sample is collected and labeled, empty and scrape clean any residual ash.

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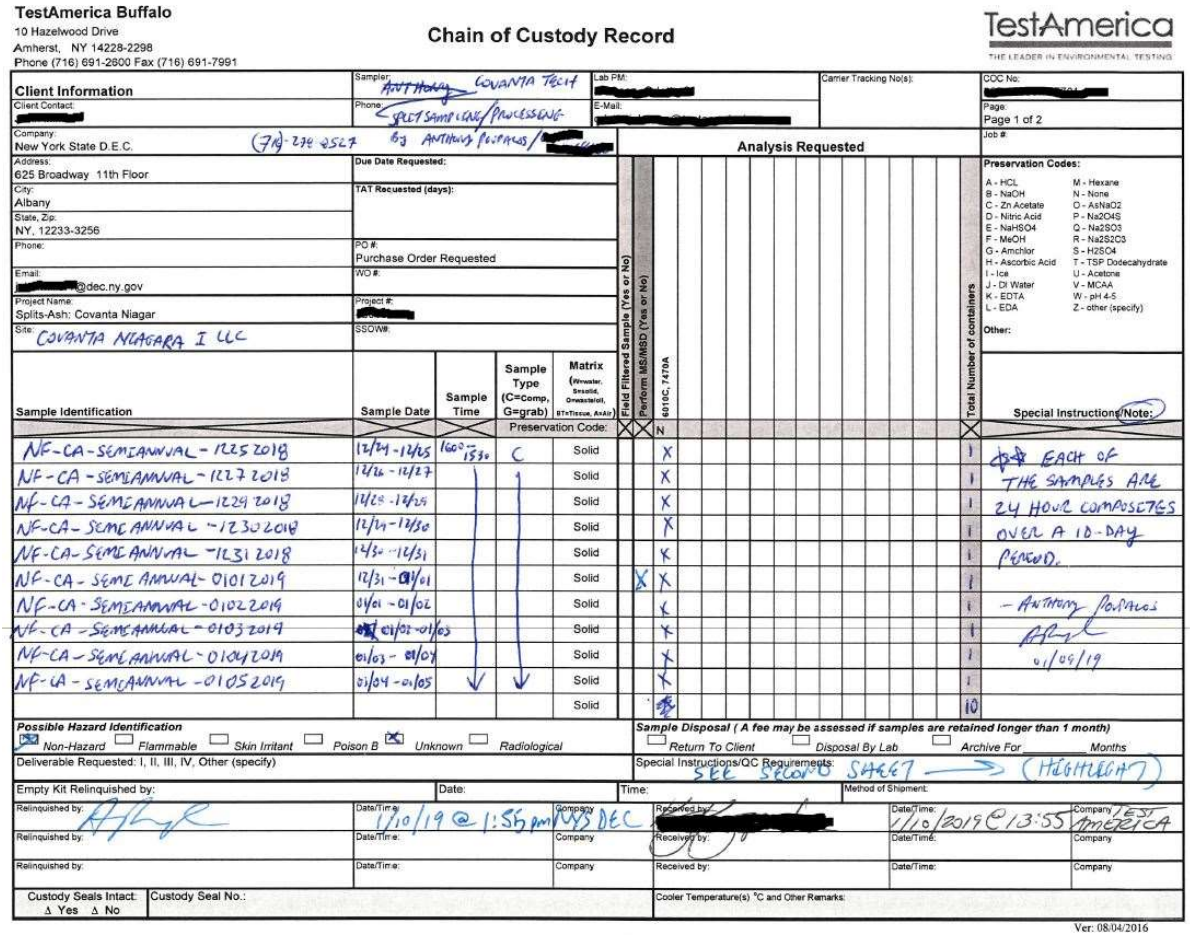
Ash Testing – Chain of Custody Form



TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Phone (716) 691-2600 Fax (716) 691-7991

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: ANTHONY COVANTA TECH	Lab PM:	Carrier Tracking No(s):	COC No:
Client Contact:	Phone: SPLIT SAMPLING/PROCESSING	E-Mail:		Page: Page 1 of 2
Company: New York State D.E.C. (716) 278 8527	BY ANTHONY POPALOS/	Analysis Requested		Job #:
Address: 625 Broadway 11th Floor	Due Date Requested:			Preservation Codes: A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
City: Albany	TAT Requested (days):			
State, Zip: NY, 12233-3256				
Phone:	PO #: Purchase Order Requested			Other:
Email: [redacted]@dec.ny.gov	WO #:			
Project Name: Splits-Ash: Covanta Niagar	Project #: [redacted]			
Site: COVANTA NIAGARA I LLC	SSOW#:			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (Water, Solid, Wastestoil, Sludge, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	6010C, 7470A	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N		
NF-CA-SEMIANNUAL-12252018	12/24-12/25	1600-1530	C	Solid			X	1	** EACH OF THE SAMPLES ARE 24 HOUR COMPOSITES OVER A 10-DAY PERIOD.
NF-CA-SEMIANNUAL-12272018	12/26-12/27			Solid			X	1	
NF-CA-SEMIANNUAL-12292018	12/28-12/29			Solid			X	1	
NF-CA-SEMIANNUAL-12302018	12/29-12/30			Solid			X	1	
NF-CA-SEMIANNUAL-12312018	12/30-12/31			Solid			X	1	
NF-CA-SEMIANNUAL-01012019	12/31-01/01			Solid	X		X	1	
NF-CA-SEMIANNUAL-01022019	01/01-01/02			Solid			X	1	- ANTHONY POPALOS
NF-CA-SEMIANNUAL-01032019	01/02-01/03			Solid			X	1	01/09/19
NF-CA-SEMIANNUAL-01042019	01/03-01/04			Solid			X	1	
NF-CA-SEMIANNUAL-01052019	01/04-01/05			Solid			X	1	
				Solid				10	

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements: SEE SECOND SHEET → (HIGHLIGHT)

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by:	Date/Time: 1/10/19 @ 1:55pm	Company: NYS DEC	Received by: [redacted] Date/Time: 1/10/2019 @ 13:55 Company: TEST AMERICA
Relinquished by:	Date/Time:	Company	Received by: Date/Time: Company
Relinquished by:	Date/Time:	Company	Received by: Date/Time: Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

Ver: 08/04/2016

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Ash Testing – Chain of Custody Form

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2223
phone 716.691.2600 fax 716.691.7991

Chain of Custody Record

TestAmerica

Regulatory Program: ☐DW ☐NPDES ☐RCRA ☑Other: **DMM - MSWI Ash Split-Sampling Project**

TestAmerica Laboratories, Inc.

Client Contact	**Project Manager:** [redacted]	**Site Contact:**	**Date:**
NYSDEC Division of Materials Management	**Tel/Fax:** [redacted]	**Lab Contact:** [redacted]	**Carrier:**
625 Broadway 9th Floor	**Analysis Turnaround Time**		COC No: _____ of _____ COCs
Albany, NY 12233-7260	☐CALENDAR DAYS ☐WORKING DAYS		Sampler:
(518) 402-8678 Phone	TAT if different from Below _____		**For Lab Use Only:**
(518) 402-9024 FAX	☑ 2 weeks		Walk-in Client:
Project Name: DMM Ash Split Sampling	☐ 1 week		Lab Sampling:
Site:	☐ 2 days		Job / SDG No.:
Call-Out	☐ 1 day		

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	TCLP - RCRA 8 Metals	Sample Specific Notes:
			C	S	1	N		X	
			C	S	1	N		X	
			C	S	1	N		X	
			C	S	1	N		X	
			C	S	1	N	Y	X	
			C	S	1	N		X	
			C	S	1	N		X	
			C	S	1	N		X	
			C	S	1	N		X	
			C	S	1	N		X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other 1

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.
☑Non-Hazard ☐Flammable ☐Skin Irritant ☐Poison B ☐Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐Return to Client ☐Disposal by Lab ☐Archive for _____ Months

Special Instructions/QC Requirements & Comments: Please analyze samples as per TCLP/1311. Must use 100 grams. Please provide an electronic DEC ASP Cat B data package. Also, please send under this TAL Chain-of-Custody 2 gram aliquots of each ash sample to: NYSDEC, Division of Air Resources, Air Particle ID Laboratory, 11 University Place, Room DB219, Rensselaer, NY, 12144.

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:		Cooler Temp. (°C): Obs'd: _____ Corr'd: _____		Therm ID No.: _____
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.15, dated 9/27/2017

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Stack Testing

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Stack Testing DBAs – What's Performed

- Dioxins-PCCD/PCDF
- VOCs, THC, SO2, NOx, CO
- HCL, HF, Ammonia
- Mercury, Metals
  - 5yr Additional Metals Testing: Antimony, Arsenic, Beryllium, Chromium Total, Cobalt, Copper, Hexavalent Chromium, Manganese, Nickel, Selenium, Vanadium & Zinc

- Testing Every 5 years for:
  - Formaldehyde
  - Polychlorinated Biphenyls
  - Polycyclic Aromatic Hydrocarbons

Radiation Portals

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Radiation Portals – Scalehouse & RTIF Scale

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Radiation Portals – Isolating Material

- Depending on what material is identified and whether the truck is needed, a radiological consultant can be brought on site to separate and isolate the material triggering the radiation portal. Once segregated the material will be isolated in a drum until its levels drop down below site background.

Equipment

Covanta Niagara WTE Facility

https://blog.maintenancecare.com/hs-fs/hubfs/MC-June-19-137%20PM-1.jpeg?width=1000&name=MC-June-19-137%20PM-1.jpeg

Equipment Failure – Baghouse

- Baghouse fly ash leaks at either the dual flap valve or the hopper.

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Equipment Failure – Ash Trailer

- Ash trailers can be staged onsite. These trucks must be covered to prevent dusting.

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RTIF

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Rail-to-Intermodal Facility (RTIF)

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End

Quiz Questions

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Quiz Question #1

What is the purpose of the Primary Air Duct Fan?

a) The unit pulls air, particulate and any odors from the tipping floor to provide oxygen for the incinerator.

b) The unit circulates air on the tipping floor.

c) The unit is for dust mitigation.

d) The unit is used for HVAC air filtration.

Quiz Question #2

What role do the roller grates play in the combustion process?

a) The roller grates move the waste to the ash extractor.

b) The roller grates aide in the combustion process as the burn rate can be adjusted depending on the spin.

c) The tumbling of waste down these grates also helps increase the surface area of the burn.

d) b) and c)

Quiz Question #3

During ash testing, which of the following would cause testing results to not be representative of normal operations?

a) A significant period of time holding ash.

b) Facility upset.

c) Equipment downtime.

d) All the above.

Quiz Question #4

Which of the following are used in determining general maintenance and upkeep of RTIF Containers?

a) RFID Tags & Visual Inspection.

b) Identification Number.

c) RFID Tags, Identification Number & Visual Inspection.

d) Visual Inspection.

Quiz Question #5

How many radiation portals does the facility have on site?

a) None
b) 1
c) 2
d) 3

Thank You

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- anthony.poupalos@dec.ny.gov
- 716-851-7130 Region 9 Office
  - Division of Air Resources

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X (Formerly Twitter): X.com/NYSDEC
Flickr: www.flickr.com/photos/nysdec

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