May 20, 2013

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Air and Radiation Management Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

Re: Air and Refuse Disposal Permitting for Frederick/Carroll County Renewable Waste-to-Energy Incinerator

Dear Ms. Heafey:

Please find these comments on behalf of the Energy Justice Network, a national non-profit environmental justice support network with a specific interest in ending trash, tire and sewage sludge incineration.

In addition to the comments below, Energy Justice Network supports, and includes by reference, the comments submitted by the Environmental Integrity Project and those submitted by the Institute for Public Representation.

Refuse Disposal permit:

The maximum amount of solid waste accepted at this facility is set too high.

Part II.C.1. allows acceptance of a maximum of 602,250 tons per year. This works out to an average of 1,650 tons per day for a facility that is rated and permitted (in the air permit) to burn 1,500 tons per day. The average per day or week should be allowed to exceed 1,500 to allow for some variability, but the average over a year should not be permitted to exceed the 1,500 tons per day that the air permits allow.

The mercury diversion plan is inadequate

The mercury diversion plan required in Part II.E. fails to cover mercury in sewage sludge.

Sewage sludge contains significant amounts of mercury, which is readily released into the air as a vapor when burned.[1] This mercury comes from business and industrial sources, as well as from domestic wastewater. Over 80% of the mercury in domestic wastewater is mercury excreted by people who have mercury-containing "silver" amalgam dental fillings, which off-gas over time. Only 15% of the mercury in domestic wastewater is from food, toiletries and household products.[2] The only larger source of mercury in sludge is the dental offices themselves, where the preparation of these "silver" fillings, which are actually half mercury,[3] cause large amounts of mercury to go down the drain. A 2001 study by the Association of Metropolitan Sewerage Agencies looked at seven municipal wastewater treatment plants and found that dental offices were "by far" the greatest contributors of mercury to the sewer system – 3 to 4 times larger than what people excrete from their leaking

[1] Jennifer Callahan and Trudy Johnston, "Biosolids Pellets Marketability as a Supplemental Biomass Fuel," Material Matters, Inc., 2012, p.4. http://materialmatters.com/publications/Callahan_Biosolids_Fuel_WEF-RBC_Paper_01-19-12_FINAL.pdf

[2] National Association of Clean Water Agencies, "Evaluation of Domestic Sources of Mercury," 2000, pp. 10-11. http://www.nacwa.org/index.php?option=com_content&view=article&id=356%3Aevaluation-of-domestic-sources-of-mercury-august-2000&catid=10%3Awatershed-water-quality&Itemid=7

[3] U.S. Environmental Protection Agency, "Health Services Industry Detailed Study -- Dental Amalgam," August 2008, p.3-2. http://water.epa.gov/lawsregs/lawsguidance/cwa/304m/upload/2008_09_08_guide_304m_2008_hsi-dental-200809.pdf

fillings. According to the report, dentists accounted for an estimated 40 percent of the mercury load.[4] Other studies have showed that dental offices may account for as much as half of the mercury ending up in sewage treatment plants.[5] This may be decreasing as consumer and environmental advocates have been succeeding in passing laws to mandate amalgam separators to capture the mercury at dental offices before it goes down the drain.[6]

EPA estimates that in 1995, when sludge incineration was at its peak, sludge incinerators released one ton of mercury into the nation's air.[7] A 1992 study by the state of Minnesota found that approximately one gram of mercury, the amount in a single fever thermometer, is deposited to a 20-acre lake each year from the atmosphere. This small amount, over time, can contaminate the fish in that lake.[8] The one ton of annual mercury emissions from sludge incineration is enough to contaminate over 900,000 of such lakes to the point where the fish could not be eaten.

Due to these concerns, the permit's mercury diversion plan must limit the incinerator's acceptance of sewage sludge to sludge only from wastewater treatment plants where all dental offices served by the sewage system use amalgam separators.

Waste acceptance requirements contain contradictions and are not broad enough.

Acceptable wastes that are not authorized later in the permit:

Part III.A.1.g. disallows acceptance of sewage sludge unless otherwise authorized, and Part III.A.1.k. disallows acceptance of scrap tires unless otherwise authorized. These wastes are disallowed by default for a reason, in part because municipal solid waste incinerators are not designed for these sorts of wastes and because of the toxic hazards associated with the combustion of these waste streams. The permit needs to be revised so that these wastes are removed in Part II.A.6. and Part II.A.8. so that it's clear that these wastes are not authorized by this permit.

Part III.A.1.n. disallows acceptance of bulky materials, also for good reason, and does not include any "unless otherwise authorized" language, since it is inappropriate for a municipal solid waste incinerator to accept or burn such materials. The exclusion points out, rightfully so, that some of these materials will not fit in a combustion chamber or material handling systems. They also are usually metal and do not burn or have any appreciable energy value in a combustor. They do, however, often have a number of toxic metals and PVC-plastic coated electric wires which would contribute to pollution of the air, water and land when those metals are liberated and when PVC plastic is converted, in part, into dioxins and furans. Because of these concerns, and the specific exclusion in Part III.A.1.n., Part II.A.7., allowing bulky waste to be accepted, should be stricken from the permit.

Part III.A.1.c. disallows acceptance of radioactive substances. Given the known problems with radioactivity in Marcellus Shale extraction wastes, the permit should explicitly disallow acceptance of wastes from hydraulic

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[4] Association of Metropolitan Sewerage Agencies, 2002 (March. Amended July 2002). "Mercury Source Control & Pollution Prevention Program Evaluation. Final Report." Prepared by Larry Walker Associates, p.27. http://archive.nacwa.org/getfileb882.pdf?fn=finalreport.pdf

[5] U.S. Environmental Protection Agency, "Health Services Industry Detailed Study -- Dental Amalgam," August 2008, p.3-1. http://water.epa.gov/lawsregs/lawsguidance/cwa/304m/upload/2008_09_08_guide_304m_2008_hsi-dental-200809.pdf

[6] Campaign for Mercury-Free Dentistry. http://www.toxicteeth.org/about_Us.aspx

[7] U.S. Environmental Protection Agency, "Mercury Study Report to Congress – Volume II: An Inventory of Anthropogenic Mercury Emissions in the United States," December 1997, Table ES-3, p. ES-6. http://www.epa.gov/ttncaaa1/t3/reports/volume2.pdf

[8] Interstate Mercury Education and Reduction Clearinghouse, "One Gram of Mercury Can Contaminate a Twenty Acre Lake: An Clarification of This Commonly Cited Statistic," 2004. http://www.newmoa.org/prevention/mercury/mercurylake.pdf

fracturing (drill cuttings, etc.) due to radioactivity and other chemical hazards. It should also disallow acceptance of sewage sludge from wastewater treatment plants that accept wastewater from hydraulic fracturing operations.

Part III.A.1. should specifically prohibit acceptance of municipal solid waste loads containing more than 30% recyclable materials (recyclable paper, plastics, glass, metal).

To make Part III.A.1.c. more enforceable, the permit must require radiation monitoring at the gate, as Pennsylvania requires of all MSW landfills and incinerators. See: http://www.dep.state.pa.us/brp/Radiation_Control_Division/SolidWasteMonitoring/SolidWasteRadMonitoring.htm

Enclosed building requirements unclear

Part III.B. states that activities involving the unloading, separation, reduction, or alteration of solid waste shall be conducted in an enclosed building. Typically, trash incinerators have a large open hanger-like door or two where trucks routinely come in and out to tip waste. Despite efforts to run negative pressure systems, odors escape, birds and rats enter and the facility is practically not enclosed. MDE should spell out in the permit exactly how the facility must be enclosed, and whether hanging slats are required or sufficient to consider truck entry and exit openings "closed."

Ash testing requirements are inadequate

Annual ash testing for an incomplete list of toxic hazards with an improper testing method is inadequate.

In May 1994, the U.S. Supreme Court made a ruling that incinerator ash that tests hazardous for toxic heavy metals such as lead and cadmium must be disposed of in hazardous waste landfills rather than in municipal solid waste landfills. If incinerators were made to pay for the expense of disposing of their ash as hazardous waste (which it is, and is defined as such in international law), they would be out of business overnight.

To get around this, and allow the industry to continue without such fatal expense, the EPA has allowed the following:

1) The switching from a test (EP Tox test) that used to find fly ash hazardous 94% percent of the time, bottom ash 36% of the time, and combined ash 40% of the time – to the Toxicity Characteristic Leaching Procedure (TCLP) test, which changed the pH requirements in a way that allows the test to be conducted at a pH where lead doesn't leach out, saving the industry from a hazardous waste designation. Lead was the leading cause of ash failing the EP Tox test.

2) Not testing for what is in the ash, but just what leaches out under pH-manipulated conditions.

3) Mixing of fly ash and bottom ash prior to testing, to dilute the toxicity of the fly ash. Also, the use of lime injection in scrubbers makes the ash very basic (around pH 12), where lead will leach if tested with water, but the TCLP test uses acid to lower the pH just enough so that lead won't leach – but not to the fixed pH of 5 that the EP Tox test required, where lead leaches again. The mixing of the ash prior to testing enables the lime in the fly ash to also protect the bottom ash from failing the test. Most of the metals have a U-shaped solubility curve, and the test can make it look like certain metals won't leach out, though in real-life disposal conditions, over time, the shifting pH will cause it to leach. See solubility curves on slide 7 here:

http://cpe.njit.edu/dlnotes/CHE685/Cls06-2.pdf and more on lead, here:
http://144.206.159.178/ft/1092/47128/841218.pdf

4) Allowing incinerators to store ash on-site for months so they can keep treating or diluting it until it passes the test. Some incinerators have been known to send many ash samples to a lab until one passes, then they use the good results to report to the state. One of the many tricks employed by incinerator operators to help them pass the TCLP test is to treat the fly ash with phosphoric acid prior to the testing. The phosphoric acid converts the soluble lead into the highly insoluble substance lead phosphate, thereby fixing the lead in the ash long enough to pass the test, but lead phosphate may not tie up lead indefinitely in the landfill, since phosphate is known to be a nutrient for all living things including microorganisms.

5) Infrequent ash testing (the waste stream is highly variable and ash composition can change frequently).

This series is required reading on this topic, and is to be considered submitted in full as part of these comments:
http://www.americanhealthstudies.org/wastenot/wn280.htm
http://www.americanhealthstudies.org/wastenot/wn315.htm
http://www.americanhealthstudies.org/wastenot/wn316.htm
http://www.americanhealthstudies.org/wastenot/wn317.htm
[apologies that the tables and graphs don't show up as they do in the original hardcopies]

Part III.D.1. should be revised to that the ash testing requirements include the following:

- Ash should be tested for dioxins/furans as well as zinc. Zinc is present in large quantities in tires and is a pollutant that should be monitored closely in the air and ash. An industry analysis of zinc in scrap tire fly ash found the ash to be 51.48% zinc.[9] Dioxins/furans are created on the surface of particles as they cool down through the 200-400°C temperature range.[10] Metals serve as catalysts for dioxin formation (especially copper, iron and zinc).[11] The higher levels of zinc (and certain other metals) in the ash will results in higher levels of *de novo* synthesis of dioxins/furans on the ash as it cools down.

- Testing should be done far more often due to waste variability and variable proportions of trash, sewage sludge and tires that can be readily manipulated prior to annual ash tests.

[9] "Scrap Tire Characteristics – ANALYSIS OF SCRAP TIRE FLY ASH," Scrap Tire Management Council http://www.energyjustice.net/files/tires/files/scrapchn.html#anchor545131 (formerly available at www.rma.org/scrapchn.html).

[10] 1994 EPA Dioxin Reassessment, Estimating Exposure to Dioxin-Like Compounds, Volume 2, Chapter 3. http://www.cqs.com/epa/exposure/v2chap3.htm (full report available at http://www.cqs.com/epa/exposure/) Some relevant quotes from the chapter include: "In this investigation, significant increases in total concentration of dioxin TEQ occurred between temperatures of 280-400 C, and concentrations declined at temperatures above 400 C. This is in agreement with the experimental evidence of the temperature range defined as the "window of opportunity" for catalytic formation of CDDs/CDFs on the surfaces of fly ash particles." "Formation kinetics are most favored at temperatures between 200 to 350 C." "Facilities of particular concern are those that use ESPs which operate in a temperature range of 200 - 400 C. As discussed in Section 3.5 these conditions can promote the formation of CDDs/CDFs." "Moreover, formation occurs outside and downstream of the combustion zone of a furnace to a combustion source in regions where the temperature of the combustion offgases has cooled to between 200 and 400 C (Vogg et al., 1987; Bruce et al., 1991; Cleverly et al., 1991; Gullet et al., 1990a; Commoner et al., 1987; Dickson and Karasek, 1987; Dickson et al., 1992)."

[11] "Metals as Catalysts for Dioxin Formation," Dioxin Homepage (compilation of EPA materials and science journal articles). http://www.ejnet.org/dioxin/catalysts.html

- Fly ash and bottom ash should be tested separately and should not be permitted to be combined prior to testing.

- The fly ash should be tested daily for total metal content and used as an indicator of the effectiveness of the air pollution control devices.

- The fly ash should be tested on a monthly basis for its total content of dioxins and furans to see how well the dioxin control strategy is working.

- The fly ash should be tested with water in a leaching test, since the fly ash will already be basic due to the use of lime injection in the scrubber.

- Leach testing, especially for the bottom ash, should be done at a fixed pH, as per the EP Tox test protocol (to ensure that pH 5 is reached).

- A designation of whether the ash is hazardous waste must be done separately on fly and bottom ash, and must be based on total concentrations, not the concentration in the amount that leaches in short-term laboratory tests.

- No treating of ash with phosphoric acid prior to testing, should be allowed, nor should any other chemical manipulation of the ash be permitted prior to testing.

Whole tires should not be permitted to be accepted

Part IV allows the incinerator to receive whole tires. Whole tires are a health hazard, since they often come with water pooled in them, and import mosquitos and mosquito-borne diseases to the community. The permit should require that tires are chipped prior to receipt at the facility, and that they must be stored within a building, to keep them from the elements.

Spelling errors

Part V.F.1. & Part V.G. – it's "ensure" not "insure"

Air permit:

In support of the comments submitted by the Environmental Integrity Project and of those submitted by the Institute for Public Representation, and for the same reasons relating to legal mandates for MDE to be able to ensure compliance with emissions limits, we urge MDE to require the use of continuous emissions monitors (CEMS) for all relevant pollutants for which the technology exists, and especially those for which MDE has set emissions limits.

The technology now exists to continuously monitor for at least 40 pollutants, and the equipment for much of this has been tested and verified by U.S. EPA's Environmental Technology Verification Program (http://www.epa.gov/etv/). See their list of verified technologies here: http://www.epa.gov/nrmrl/std/etv/verifiedtechnologies.html

Emissions limits are meaningless if there is not adequate testing to ensure that they are being met. Most regulated pollutants are required to be tested once per year, or once ever. This is akin to having a speeding limit but allowing drivers to drive with no odometer. Once per year, a speed trap would be set, but drivers would be warned ahead of time, and the driver's brother would be managing the speed trap. Regulating air polluting facilities in this manner is inexcusable, especially in the age where continuous testing technology exists and where the data is able to be made available to the public real-time through a website.

Annual stack tests are inadequate, in part, because they are done by the applicant, under optimal performance, rather than capturing the day-to-day reality of operations. Emissions can be far higher during startup, shutdown, and malfunction times – especially for such temperature-sensitive pollutants like dioxins/furans (where a study has shown emissions to be 32-52 times higher in reality -- as measured with long-term samplers -- than annual stack tests show).[12]

The technology exists to do continuous monitoring of the following additional pollutants: Carbon Dioxide (CO2), Particulate Matter, Nitrous Oxide (N2O), Hydrogen Sulfide (H2S), Hydrofluoric Acid (HF), Hydrochloric Acid (HCl), Hydrogen Cyanide, Volatile Organic Compounds (VOCs), Methane, Ethylene, Acetylene, Methanol, Antimony, Arsenic, Barium, Bromine, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Thallium, Tin, Titanium, Vanadium, Zinc, Ammonia, Dioxins & furans, Polycyclic Aromatic Hydrocarbons (PAHs) and Vinyl Chloride Monomer.

Not all of these are major concerns from this sort of incinerator, but most are.

We ask that MDE require continuous monitoring of the following pollutants: Carbon Dioxide (CO_2), Particulate Matter (including PM10 and PM2.5, if possible), Nitrous Oxide (N_2O), Hydrogen Sulfide (H_2S), Hydrofluoric Acid

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[12] Wevers M. and De Fr頒., "Underestimation of dioxin emission inventories," Organohalogen Compounds, Vol. 36, pp. 19-20 (1998). http://www.ejnet.org/toxics/cems/1998_DeFre_OrgComp98_Underest_DIoxin_Em_Inv_Amesa.pdf

"The Amesa system [a long-term dioxin sampler tested and verified by U.S. EPA in 2007] was used for continuous sampling during periods of 15 days. The analysis was carried out in double by 2 laboratories, VITO and GfA. They show that a standard emission measurement according to the European standard method EN 1948 during a period of 6 hours resulted in an emission concentration of 0.25 ng TEQ/Nm3, while the average over 2 weeks in the same period was 8.2 to 12.9 ng TEG/Nm3. This illustrates that the standard measurement underestimated the avereage emission by a factor 30 to 50. [Note: it's actually 33 to 52 times higher.] As a result of these findings doubts have risen over the real emission of the incinerators, and the special commission on incineration has asked from all incinerators in the Flemish region to use the continuous sampling system in order to demonstrate their compliance with the emission limit."

(HF), Hydrochloric Acid (HCl), Volatile Organic Compounds (VOCs), Antimony, Arsenic, Barium, Bromine, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Thallium, Tin, Titanium, Vanadium, Zinc, Ammonia, Dioxins & furans and Polycyclic Aromatic Hydrocarbons (PAHs).

Most of these metals can be tested through one multi-metals monitoring device. It's especially critical that dioxins and furans are monitored with continuous technology, since they are so readily underestimated during annual stack tests, and since emissions levels are known in the scientific literature to be far higher during startup, shutdown and malfunction times. While continuous testing technology exists and has been tested and verified by EPA, the only monitors we're aware of that have been installed on commercial MSW incinerators have been those using AMESA technology, which is a long-term sampler that can take a sample of up to 30 days, providing complete coverage of the course of a year by switching out the sampler each month. This has been in use for several incinerators in Europe (mostly those in Vienna, Austria).[13] However, the real-time equipment is much more helpful to ensure compliance, since it can inform operators of operating conditions in time to adjust their operations and limit dioxin formation. Information on dioxin CEMS, and the need for them, can be found at http://www.ejnet.org/toxics/cems/dioxin.html and http://www.epa.gov/etv/vt-ams.html#dems[14]

CEMS for particulate matter have already been required in a permit issued in 2005 for the River Hill Power Plant, a waste coal burning power plant in Karthuas, PA (which was never built, for other reasons). Due to this and comments in favor of such a requirement by the National Park Service and the Forest Service, Philadelphia's Air Management Services required PM CEMS for the Sun Oil refinery in Philadelphia, PA – the first refinery required to have such CEMS. Find these comments at http://www.ejnet.org/toxics/cems/

CEMS for mercury are becoming widespread on coal power plants and are clearly commercially available now. There are also plenty of precedents for CEMS for hydrochloric acid, including all six trash incinerators in Pennsylvania. See all Pennsylvania-required CEMS here: http://www.dep.state.pa.us/dep/deputate/airwaste/aq/cemspage/docs/CSMS_List_for_the_State_of_Pennsylvania.pdf

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[13] Neil J. Carman, Ph.D., "Briefing to Joint Review Panel on Sydney Tar Ponds Agency's Plans to Use a Temporary Incinerator to Burn 120,000 tons of PCB Containing Sediments from the Tar Ponds and 26,000 tons PAH Contaminated Sediments from the Coke Ovens Site," May 13, 2006, p. 12. http://www.safecleanup.com/panlxprt/carman/neilmain.pdf

[14] Dioxin Emission Monitoring Systems, Environmental Technology Verification Program, U.S. Environmental Protection Agency. http://www.epa.gov/etv/vt-ams.html#dems This page lists the four pieces of dioxin testing equipment that EPA tested and verified in 2006. The Amesa system is one (it's a long-term sampler that can collect a sample of up to 30 days). Others are semi-continuous or actual real-time dioxin emissions monitors. Their "Technology Brief" on Dioxin Emission Monitoring Systems (http://www.epa.gov/etv/pubs/600s07002.pdf) states: "The four verified technologies fall under one of two categories: automated isokinetic sampling systems of flue gas with laboratory analysis, or semi-continuous laser-based systems that produce ions which are typically detected using a time-of-flight mass spectrometer (TOFMS). Long-term continuous samplers collect samples over time periods up to several weeks to obtain a cumulative record of source emissions and provide evidence of emission levels. Real or semi-real-time continuous monitors, with a frequency of measurement at real time or up to an hour, provide quick feed back to the plant operator by measuring dioxin emission levels on-site."