

DEPARTMENT OF THE ENVIRONMENT
WATER MANAGEMENT ADMINISTRATION
INDUSTRIAL AND GENERAL PERMITS DIVISION

Summary Report and Fact Sheet

Project Type: Industrial/Surface/New

State Application No.: 11-DP-3749 **EPA No.:** MD0071226

Facility Name: Frederick/Carroll Renewable Waste To Energy Facility

Location: 4548 Metropolitan Ct. (McKinney Industrial Park)
Frederick, MD 21701

County: Frederick

Legal Name of Applicant: Northeast Maryland Waste Disposal Authority

Mailing Address: 100 South Charles St., Tower II, Ste. 402
Baltimore, MD 21201

Contact (Name, Title): Andrew Kays, Project Manager

Phone: 410-333-2730 **FAX:** 410-333-2721

SIC Code(s): 4953 (Refuse Systems)

Applicant discharges from: a facility that burns municipal refuse to generate electricity

Via Outfall: 001

Receiving Water Name (Use): municipal sewer to Potomac R. (Use I-P) and storm water to Monocacy R. (Use I-P)

Basin Codes: 02.14.03.01 (cooling) and 02.14.03.02 (storm water)

Md. Coordinates: East: 662.9 North: 516.1 (001)
682.3 555.8 (facility)

Subject to EPA review? No **Public Hearing Req'd?** Probably

Application Rec'd: Feb. 23, '11 **Assigned:** Mar. 1, '11

Project Mgr.: Ed Gertler **Phone:** 410-537-3651

Site Visit: June 15, '11

Current Permit Expiration Date: N/A -New

Scheduled Watershed Permitting Cycle: 5:1

Date Completed: July 22, '11 **Reviewed by:** *M. Richardson* **Date:** *7/31/12*

Date Revised: 8/12/11, 12/20/11, 3/23/12, 7/3/12, 2/19/14 (**Final**)

FINAL M. Gertler 2/19/14

Biochemical Oxygen Demand	9.0 mg/l	18 mg/l
Chemical Oxygen Demand	134 mg/l	268 mg/l
Total Organic Carbon	23.4 mg/l	46.8 mg/l
Total Suspended Solids	28 mg/l	31 mg/l
Ammonia (as N)	1.5 mg/l	3.0 mg/l
Bromide	0.48 mg/l	0.96 mg/l
Chlorine	<0.1 mg/l	<0.1 mg/l
Total Phosphorus (P)	2.9 mg/l	3.8 mg/l
Total Copper (Cu)	0.022 mg/l	0.044 mg/l
Total Zinc (Zn)	0.336 mg/l	0.672 mg/l
Total Mercury (Hg)	0.0018 mg/l	0.0036 mg/l

Toxics: The biocides (chlorine) used in the cooling towers would be toxic if not restricted. Copper, zinc, and mercury may be concentrated to concentrations in excess of those specified in State water quality criteria.

The above data is from the application, and most is based on WWTP effluent quality data times the number of cycles of use. Most notable exceptions would be Phosphorus (P) and temperature, where the facility could have inputs (although, regarding P, the applicant has no plans to introduce such additives). Other metals were listed in the application but not listed above because they were in concentrations less than the testing confidence threshold.

Anti-Degradation:

As outlined in COMAR 26.08.02.04 - Anti-degradation Policy, certain waters of this State possess an existing quality that is better than the water quality standards established for them. The quality of these waters shall be maintained unless:

- (1) The Department determines a change in quality is justifiable as a result of necessary economic or social development; and
- (2) The change will not diminish uses made of, or presently existing, in these waters.

Below is the identified Tier of protection for the receiving stream for Outfall 001, in addition to the actions taken to uphold the Department's Anti-degradation Policy and in accordance with COMAR 26.08.02.04-1 - Antidegradation Policy Implementation Procedures, if applicable:

Outfall 001 will discharge into a receiving stream that is designated to receive Tier I protection, therefore this permit includes sufficient limits in order to maintain and protect water quality necessary to retain existing uses.

Basis for Numerical Limits: Technology and Water Quality - Based

General Observations: While this is a new discharge permit, the

entire volume and most of the pollutants in the permit application are already authorized for discharge to State waters through 09-DP-0809, the discharge permit for the Ballenger McKinney Wastewater Treatment Plant. Therefore any non-degradable pollutants in the Ballenger McKinney effluent (nutrients, suspended solids, metals) are currently entering the Potomac via the Monocacy River. That this proposed permit would establish a new point of discharge does not change this truth or its implications. The county sewer proposed to convey the WTE facility's effluent was built expressly for the purpose of conveying Frederick's treated sewage at such time as the volume exceeds the Monocacy's assimilative capacity. This is in the current Frederick County Water and Sewer Plan (approved December 2008), and barring a radical shift in county population growth, this treated wastewater is destined to discharge via the New Design Road outfall and in greater volumes than requested in this proposed permit. Therefore, the objective of this permit is to minimize the release of pollutants associated with the waste to energy process, prevent any unintended consequences of the WTE's use of Ballenger McKinney wastewater, and take advantage of the WTE's potential to act as a final pollutant polishing step.

There are no EPA effluent limitation guidelines (ELGs) for an industry that burns municipal solid waste to generate electricity. Guidelines for steam electric power generation are limited to industries that are powered by nuclear technology or fossil fuels. All of the technology-based limits are therefore based on Best Professional Judgment, numbers for which were sometimes derived from the steam electric guidelines, because of the similarity in operations. The water quality-based limits are based on the assumption that there is mixing in accordance with COMAR 26.08.02.05.

Total Residual Chlorine or Bromine: Because the applicant intends to use chlorine as a biocide in the cooling system, there is a potential for residual chlorine in the effluent. Because bromine could conceivably be used as an alternative, we are recognizing it now, rather later through modification. The test for total residual oxidants quantifies both chlorine and bromine. Because their toxicity is similar, we use the limits established for chlorine for both. The total residual chlorine limit of <0.1 mg/l is a requirement of COMAR 26.08.03.06.D, because this facility is not considered a steam electric power station. This limit is protective of the receiving stream because of the dilution factor of 1000 and because of the diffuser providing almost instant mixing. Specifically, with such dilution, a chlorine concentration of <0.1 mg/l would then be reduced by mixing alone to 0.0001 mg/l, well below the receiving water criteria (from COMAR 26.08.02.03-2G) of 0.011 mg/l(chronic exposure) and 0.019 mg/l(acute exposure).

Temperature has the potential for a localized effect. Although the application data does not indicate an elevated temperature in the effluent, the temperature limit is appropriate because this is a relatively large volume of cooling water discharging into waters of the State. The limit is the receiving water criteria. As provided for in COMAR 26.08.03.03.C, the Department may allow a 50-ft mixing zone. Because the USGS has measured ambient river values above 90°F, specifically from the temperature gauge at Little Falls, background sampling is allowed. So while the ten-mile trip through the sewer followed by rapid mixing makes temperature compliance an unlikely challenge, this option is allowed.

Temperature is quantified as "temperature difference" to allow for entry of a single number in the compliance database. Temperature monitoring is limited to five warmest months because that is the only time it might impact the stream criteria.

pH and Dissolved Oxygen (DO): We typically set limits for these parameters where there is chemical dechlorination, because an overdose of the dechlorination reagents can depress pH and DO. But we are setting pH limits only -- a technology-based range of 6.0 to 9.0, to be measured before discharge to the sewer. This is consistent with the need for at least tech-based limits for any significant pollutant. A water-quality-based range of 6.5 to 8.5 is not needed because of the great dilution and instantaneous mixing. DO is not considered to be a pollutant, but rather a water quality parameter. In consideration of such, a tech-based limit is not appropriate. As for protection of water quality, dilution and mixing assure that this will not depress the DO in the Potomac, even taking in account any residual Biological Oxygen Demand (BOD) from the source.

BOD: Although BOD will be concentrated by the cycling of the water, the quality of treatment at Ballenger-McKinney is consistently good enough that the levels will not be concentrated beyond secondary treatment levels. So a technology-based limit is not appropriate. As for water quality, since the Department has determined that the much smaller Monocacy River (7Q10 of 49 cfs at Jug Bridge USGS gauge) can assimilate entire load of Ballenger McKinney, it does not take another model to conclude that the much larger Potomac (7Q10 of 860 cfs at Pt. of Rocks USGS gauge) can assimilate this much smaller load.

Copper, Zinc, and Mercury: There is no justification for numerical limits. The application data indicates that the copper, zinc, and mercury concentrations in the effluent are less than treatability levels, so treatment-based, technology-based limits are not appropriate. Specifically, because there are no ELGs for this industry, to determine treatability levels, I looked towards representative ELGs as a basis for defining treatability that

passes the test of practicality. The most appropriate choice was the ELG for metal finishing (40CFR433) which established Best Available Technology Economically Achievable (BAT) limits for copper and zinc (mercury is excluded because there were no standards) at 2.07 mg/l and 1.48 mg/l monthly average, respectively. New source standards are the same. These concentrations are at least 47 times the anticipated maximum copper concentration and at least two times the anticipated maximum zinc concentration, hence the opening conclusion.

There is, however, a technology option at this facility that does not involve treatment. The facility is currently designed to supply its consumptive water uses, i.e. ash quenching and transport and air quality control, with cooling water blowdown, boiler blowdown, and reverse osmosis blowdown wastewater. Therefore, 10-25% of the cooling water blowdown generated would be diverted from the discharge for consumptive purposes. Thus all entrained pollutants, whether suspended or dissolved, and not just metals, will now become a solid waste. This is even better than treatment in that it is not subject to upsets or mismanagement. The most practical way to implement this is narratively, with a special condition requiring 10% reuse as a minimum. I did not use the 25% as a standard because that would not always be compatible with proper operation of the facility.

Water quality-based limits are not necessary for two reasons: 1) Water quality criteria in the Potomac will not be approached due to the operation of a diffuser and the effluent being mixed into the large volume of the Potomac. This scenario assures that the resultant level of metals in the river after discharge will not exceed the water quality criteria. The applicant demonstrated this assumption through a CORMIX model, and in turn I had the results verified by modeling performed by MDE staff. Additionally, since the model was based on an ambient hardness of 100 mg/l while the true hardness in the Potomac is usually higher, the results for Cu and Zn are conservative, as increased hardness reduces the toxicity of certain metals. 2) The discharge comes close to the 2001 Chesapeake Bay Agreement's goals of eliminating the need for mixing zones for toxics. Water quality criteria for Cu and Zn are hardness dependent, with the COMAR 26.08.02.03-2 criteria based on an assumption of 100 mg/l hardness. Treated wastewater from Ballenger McKinney runs around 180 mg/l hardness. After three cycles of concentration, the resultant hardness would be 540mg/l and after six cycles of concentration, hardness would rise to 1080 mg/l. The mathematical formula that correlates toxicity to hardness prevails only up to 400 ug/l hardness. That hardness would result in Cu acute toxicity criteria of 50ug/l and chronic toxicity of 29ug/l. For Zn, acute and chronic toxicity would rise to 380ug/l. For three cycle-discharges, these concentrations are higher than the anticipated effluent concentrations.

I have included quarterly monitoring of copper, zinc, and mercury as a confidence building measure. Results of this monitoring will be used to confirm that the data upon which the model was made remains valid, since the sewage treatment plant does not routinely monitor for metals. A quarterly frequency of sampling is sufficient because the gap between effluent concentration and concentrations in the river after mixing is so great; there is little likelihood that we would need to modify the permit to change this frequency. Modification would be an outcome, however, if new monitoring data invalidates the above assumptions.

Ammonia: No limit or monitoring. The cycling of the treated wastewater will concentrate ammonia to levels higher than some of the worse-case values listed in COMAR 26.08.02.03-2.H(3), I(4), and I(5). However, the dilution and mixing described above will reduce these concentrations to nontoxic levels. No monitoring is necessary because the sewage treatment plant permit requires daily monitoring and has summer limits of 1.0 mg/l now and will have 0.5 mg/l after the expansion. The CORMIX modeling assumptions can be verified with the treatment plant's monitoring data.

Total N and P: If the applicant holds to its plan to operate without any phosphorus-based water conditioners, then there will be no net addition of these nutrients into the Bay system and even a yet unquantified reduction because of the diversion of some of the blowdown to consumptive uses. Therefore, there is currently no need to limit N and P. However, the permit still sets a phosphorus annual load limit (of net zero) to 1) allow for the situation where the permittee later determines the need to use phosphate-based additives and 2) to clarify that no increase can be allowed.

Though we do not anticipate any net nitrogen addition from this operation, this is a large enough discharge that the Department would want to verify that is the case. We set a load limit (net zero) to clarify that no increase can be allowed. More likely, the process will result in a reduction of nitrogen to State waters. Quantifying that is even more important as we will ultimately need that data for TMDL revisions.

The net increase of zero is established to prevent any new nutrient sources from discharging into the Bay watershed. This is a reasonable approach at this site, since the facility would have alternatives, specifically to treat the blowdown or to discharge back to the sewage treatment plant. Since the applicant has stated that treatment was their preferred option, this permit will require monitoring at both the intake and point of discharge from the treatment system (or, if treatment is not needed, the point of discharge into the sewer) to verify compliance.

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For monitoring, I borrowed the type and frequency from the Ballenger McKinney (BM) discharge permit (currently state number 09DP0809 and NPDES number MD0021822)-- 24-hr composite three times per week. Since BM's outfall is essentially this plant's intake, the permit will allow the permittee to use the results of BM's sample analysis rather than require redundant monitoring.

TSS: To conform to the Chesapeake Bay TMDL, this discharge should not be a new source of suspended sediments. This will be achieved because there is nothing in the process that would introduce sediments, and with the consumptive use of part of the blowdown, there will be some net reduction in solids. Because a cooling tower involuntarily also operates as a scrubber of ambient air, however, there will be some pick-up of ambient airborne dust and pollen. The amount is yet to be determined, and would probably be variable. This would not be regarded as a new source of pollutant load as all of those solids are not associated with the facility's activity and would otherwise find their way to the Chesapeake by entrainment in storm water, direct deposition, etc. Because of the complexity of the solids mass balance, it is not practical state a net zero limit as will be done for N and P.

In addition to water quality-based limits, technology-based concentration limits are appropriate because there is reasonable potential, because of evaporative losses, that TSS concentrations will be greater than secondary treatment standards. Secondary treatment standards are defined by COMAR 26.08.01.01. and are achievable by conventional technologies such as settling or filtration. Technology-based standards do not get waived for the above-mentioned entrained ambient solids.

For monitoring, I chose a frequency of monthly to be consistent with most other industrial permits that limit TSS. Not yet having a good understanding of how, when or why this parameter is present, I required a 24-hr composite three times per week since this sample collection method is more likely to present results representative of the solids suspended in the discharge. Additionally since BM's outfall is essentially this plant's intake, the permit will allow the permittee to use BM's data rather than require redundant monitoring.

Footnotes: The footnote about system cleaning (including shock treatment by chlorine) is to address surges in pollutants regulated above and to prevent release of pollutants not regulated above. The nutrient monitoring footnote is to set a protocol to alert data entry personnel when to expect nutrient data to be reported.

Whole Effluent Toxicity: WET limits are based on the premise that there will be biomonitoring. But for this facility, there would be no sources of toxic pollutants. Any toxics present would be

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coming from the Ballenger-McKinney effluent which is biomonitored as required by its own permit. Although the cooling process will concentrate this water, the dilution of the receiving water will more than offset the concentration of the effluent. Also, control of toxics in the intake water is the responsibility of the municipal operator.

Anti-backsliding: Anti-backsliding provisions of the Clean Water Act §§402(o) & 303(d)(4) and U.S. EPA Regulations at 40 CFR 122.44(l) prohibit the relaxation of effluent limitations in reissued permits. This is not applicable to this permit, as this is a first-time permit.

OTHER SPECIAL CONDITIONS RATIONALE

Definitions: This is edited from the standard list of 40 definitions

Toxic Pollutant Reporting: Requirement to address the release of any toxic pollutants not anticipated in the permit review process. Standard inclusion.

Removed Substances: Requirement to assure that pollutants do not reach State waters by some other route. Standard inclusion, but only activated if we determine a potential need for this information.

Analytical Laboratory: We may need to know who is doing the testing. Standard inclusion.

Wastewater Operator Certification: This is to assure that a properly trained person is operating the wastewater treatment system. COMAR 26.06.01.03 allows us to waive this requirement for industries dechlorinating supply water, and this is the appropriate action here. Its inclusion is contingent on the permittee choosing to treat the water for nutrients or suspended solids.

Flow Monitoring: This is to increase the probability that flow is being monitored competently. Standard inclusion.

Flow Basis for Fee: This is to assure that we have the correct flow on which to base the annual fee. Marked "reserved" because applicant is local government entity.

Reapplication for Permit: This is normally to assure that we have the application in time to reissue the permit by its watershed schedule.

TMDL Reopener: This is to alert the permittee that the finalization of a TMDL is cause to reopen the permit.

Biomonitoring: Required per COMAR 26.08.03.07.E because the concentration of metals and other pollutants not quantified, and the possibility of synergistic effects from these constituents, do not allow us to assume that the subject water remains nontoxic. As supported by the title of this regulation, this is a technology-based requirement. The requirement is applied to water from six cycles to gauge the worst case situation.

Toxicity Reduction Evaluation: This defines the steps necessary to determine the cause of toxicity, once toxicity has been identified. Standard inclusion.

Mixing Zones and Pollution Prevention: The goal of eliminating toxic pollutants in discharges will not generally be attainable by wastewater treatment, so we are trying to get permittees to establish a pollution prevention program now. Though the proposed operations should not be a source of such pollutants, we want to both maintain that status and have the permittee look for ways to further reduce the release of toxics.

Protection of Water Quality: This condition puts the permittee on notice that there are occasions where they may be held accountable for failure to comply with state water quality standards regardless of whether there is a specific limit in the permit.

Use of Chemical Conditioners in Cooling Water is included to screen potentially toxic additives without requiring a major modification procedure. Right now, the applicant plans to use only chlorine as an additive.

Reuse of Cooling Water Blowdown: As stated in the effluent limit rationale, a 10% to 25% reduction in pollutants can be achieved by diverting the concentrated cooling water blowdown for consumptive uses. This is currently in the system design, and this provision is to commit the applicant/permittee to that standard.

Miscellaneous Discharges: COMAR 26.08.04.08 establishes the General Discharge Permit Program. This condition puts the permittee on notice that they must apply for and obtain coverage prior to commencing discharges authorized by the General Permit for Discharges From Tanks, Pipes, and Other Containment Structures at Facilities other Than Oil Terminals (11HT (NPDES No. MDG67)).

Start-up Notification: We anticipate issuing this permit long before plant starts up, and some conditions are triggered by that start-up date.

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The **Storm Water Pollution Prevention Plan** is included as it is with other similar facilities in Maryland. While 40CFR122.26 does not identify SIC4953 as an industrial activity, we use the similarity to steam electric plant as a best professional judgment justification for this provision's inclusion.

CHANGES FROM PREVIOUS PERMIT

N/A: New permit

WATER QUALITY ISSUES

The only 303(d) impairment for Frederick County segment of the Potomac is fish and benthic life, but that is limited to 1st through 4th order streams. However there are downstream impairments for sediments and nutrients that could be affected by discharges on this reach. There are no local TMDLs on this reach.

CHANGES FROM THE TENTATIVE TO THE FINAL DETERMINATION

There have not been any changes from the tentative determination to the final determination.