Completeness Comments from the Michigan Department of Environmental Quality (MDEQ), Air Quality Division(AQD)

MICHIGAN DISPOSAL WASTE TREATMENT PLANT (MDWTP)
MID 000 724 831
JANUARY 18, 2019 ATTACHMENT REVISIONS

Comments 1-6

Treatment, Storage, and Disposal Facility Renewal Application Deficiencies – Air Quality Division

US Ecology, Inc.

Michigan Disposal Waste Treatment Plant

MID000724831

Belleville, Michigan

Project No. 180895

January 17, 2019

Fishbeck, Thompson, Carr & Huber, Inc.
engineers | scientists | architects | constructors

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List of Abbreviations/Acronyms

AQD	Air Quality Division
°C	degrees Celsius
CFR	Code of Federal Regulations
2,4-D	2,4-dichlorophenoxyacetic acid
FG	Flexible Group
FTCH	Fishbeck, Thompson, Carr & Huber, Inc.
HAP	hazardous air pollutant
HCl	hydrochloric acid
HDPE	high density polyethylene
lb/hr	pound(s) per hour
lb/mo	pound(s) per month
MDEQ	Michigan Department of Environmental Quality
mmHG	millimeters of mercury
MDWTP	Michigan Disposal Waste Treatment Plant
NESHAP	National Emissions Standard for Hazardous Air Pollutants
NSR	New Source Review
ppb	parts per billion
ppm	parts per million
PSD	prevention of significant deterioration
psia	pounds per square inch absolute
PTI	Permit to Install
tpy	ton(s) per year
ROP	Renewable Operating Permit
SDS	safety data sheet
SIC	Standard Industrial Classification
VOC	volatile organic compound
USEPA	U.S. Environmental Protection Agency

1.0 Introduction

Michigan Disposal Waste Treatment Plant (MDWTP), located at 49350 North I-94 Service Drive, Belleville, Michigan, is a hazardous and non-hazardous waste processing facility. MDWTP accepts bulk liquid waste, bulk solid waste, and containerized waste, which is processed in two separate buildings called the East Treatment Building (ETB) and West Treatment Building (WTB). A fabric filter, thermal oxidizer, and sodium hydroxide scrubber control emissions from the ETB; emissions from the WTB are controlled by a fabric filter. The WTB is restricted to processing waste streams which have a low VOC concentration and is permitted to process waste subject to the Benzene NESHAP, 40 CFR Part 61 Subpart FF, provided that waste is not subject to control.

MDWTP applied to renew the facility's Hazardous Waste Management Facility Operating License (MID000724831). During the completeness review, the MDEQ-AQD noted technical deficiencies in the proposed changes. The AQD has requested additional information to determine whether the proposed changes are compliant with the requirements of Part 55, *Air Pollution Control*, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. MDWTP is currently permitted under ROP No. MI-ROP-M4782-2010a. An ROP Renewal Application was submitted in a timely manner and an application shield has been received. Where revisions are necessary MDWTP will submit changes to the AQD once technical discussions with the Waste Management and Radiological Protection Division (WMRPD) are completed.

The proposed changes which require additional information are:

- Treatment in container storage areas
- Debris immobilization by alternative macroencapsulation jackets
- Treatment of (D003) reactive sulfide containing waste
- Addition of waste codes F020-023, F026-F028, K043, and K099
- Reevaluation of the maximum design capacity of the facility's treatment tanks
- Reevaluation of the maximum design capacity of the facility's container storage areas and the expansion of the Southeast Container Storage Area's liquid storage capacity

For each of the items listed above, the MDEQ-AQD has requested responses to the following:

1. Indicate whether the proposed change is allowed by the current ROP, or whether it falls under an exemption from the Rule 201 (R 336.1201) requirement to obtain a PTI.
2. If MDWTP believes the proposed change is allowed by the current ROP, please provide an analysis describing why the permit allows the proposed change. Please include the specific parts of the permit that allow the proposed change, including specific permit conditions/requirements, as applicable.
3. If MDWTP believes the proposed change falls under an exemption from the Rule 201 requirement to obtain a PTI, please provide the following information:
   a. A description of the exempt process or process equipment involved in the change.
   b. The specific exemption that MDWTP believes applies to the proposed change.

The following items apply to a combination of **all** the proposed changes:

1. If any exemption is cited under Item 3 above, please provide an analysis demonstrating that Rule 278 (R 336.1278) does not apply to the *collection* of processes and process equipment involved in all the proposed changes combined.
2. A description of how MDWTP proposes to ensure compliance with the ROP restriction that waste containing diethyl sulfide and dimethyl sulfide will not be processed in FG_WEST or in FGLIQWASTETKS while treating D003 reactive sulfide wastes.

The following items apply to all the requests to treat additional waste codes (D003, F020-F023, F026-F028, K043, and K099):

1. Please describe which equipment at the facility will be used to treat each of these waste codes and estimate the emissions expected from treating each waste code, based on the maximum possible throughput that would be allowed considering the proposed change and the existing limits of the ROP. Include emission calculations and the underlying assumptions used for the calculations.
2. Recognizing that one purpose of the facility's ambient air monitoring program is to confirm that waste treatment has proceeded appropriately, please recommend compounds that should be considered to be added to the program based on the processing of these wastes. If dioxins or sulfides are not proposed, please explain why these compounds should not be added to the ambient air monitoring program.

2.0 Part 55 Applicability to Each Proposed Change

Rule 336.1201 – Permits to Install – (Rule 201) requires any process or process equipment installed after August 15,1967, which may emit an air contaminant to obtain a PTI prior to installation, construction, reconstruction, relocation, alteration, or modification, unless specifically exempt. Michigan Rules 279 through 291 provide specific exemptions for various processes with minimal emissions.

2.1 Treatment In Container Storage Areas

For purposes of pilot testing the efficacy of stabilization, neutralization, oxidation, reduction, deactivation and/or solidification or a combination of the treatment technologies, MDWTP has requested approval to perform treatment in the ETB and WTB outside of the waste treatment tanks. These buildings are already permitted as FG_East and FG_West, and MDWTP will operate the pilot testing in accordance with the existing conditions.

In addition to pilot testing MDWTP is proposing to perform macroencapsualtion in all of the container storage Section 2.2 discusses the macroencapsulation process and why it is not expected to generate emissions and as a result should not have an effect on the facility's air permit.

2.2 Debris Immobilization by Alternative Macroencapsulation Jackets

The hazardous debris treatment standards were adopted to ensure that debris is treated to minimize the hazardous constituents' toxicity or mobility prior to land disposal. MDWTP utilizes immobilization technologies listed in 40 CFR 268.45 to achieve the specified performance standards. Macroencapsulation immobilizes contaminated debris with surface coating materials such as polymeric organics (e.g., resins and plastics) or with a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media. Treatment of debris utilizing this technology constitutes compliance with the LDRs and no testing after treatment is required prior to disposal.

MDWTP is currently approved to treat hazardous debris via macroencapsulation, however MDWTP has requested a major modification from the Michigan Department of Environmental Quality's (MDEQ), Waste Management and Radiological Protection Division (WMRPD) to alter the methods of jackets used in the treatment process. Macroencapsulating hazardous debris will have no effect on the facility's ROP. The treatment technology will be used for debris with surface contamination, such as pumps. The encapsulation treatment process of placing the hazardous materials in a jacket will not generate emissions. The encapsulated jacket will then be transported to the landfill for permanent disposal. MDWTP proposes to perform macroencapsulation both inside and outside of the treatment buildings. Any waste that may generate particulates will continue to be processed with particulate controls in the WTB or ETB. Waste that has a VOC content greater than 500 ppm will continue to be processed in the ETB utilizing controls applicable to container to container transfer requirements.

2.3 Treatment of (D003) Reactive Sulfide Containing Waste

In accordance with MI-ROP-M4782-2010a FG_West SC III.9 and FGLIQWASTETKS SCIII.2, MDWTP may not process wastes containing diethyl sulfide or dimethyl sulfide. MDWTP requested permission to accept and treat waste containing reactive sulfide bearing waste, but does not intend to alter the restriction in FG_West or FGLIQWASTETKS.

In accordance with 40 CFR 261.23 (a)(5), a characteristic waste designated as D003 (as it relates to sulfide) means a waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

Sulfides would be accepted in a highly controlled environment to prevent any potentially dangerous reactions. Treatment of sulfide bearing waste consists of chemically reducing and/or oxidizing the sulfide resulting in the forming stable metal sulfide or sulfate complexes. During this process the pH of the sulfide bearing waste is neutralized and the buffering capacity of the reagents eliminates hydrogen sulfide emissions. MDWTP will continue to screen incoming wastes per the facility's standard procedures to ensure dimethyl sulfide and diethyl sulfide wastes are not processed in FG_WEST or FGLIQWASTETKS.

2.4 Acceptance of Additional Waste Codes

The facility proposed the ability to accept dioxin-bearing wastes with the listed waste codes F020 to F023, F026 to F028, K043, or K099 which are meeting land disposal restrictions for the dioxin and furan constituents associated with the waste codes. The industry which generates these listed waste streams is uncommon and as a result they are typically only associated with remediation waste such as soil and groundwater. Waste streams may require treatment for metals, VOCs and SVOCs associated with the listed waste codes, or they may only require a physical change from a liquid to solid state in order to be land disposed.

The listed waste streams would be processed in the East and West Building in treatment tanks or in containers. MDWTP would only accept wastes with a maximum dioxin concentration of 50 ppb of 2,3,7,8-tetrachlorodibenzo-para-dioxin (TCDD). Appendix 3 includes emission calculation methodology and a meaningful change analysis for dioxin waste streams up to 50 ppb.

2.5 Treatment Tanks Throughput Design Capacity

MDWTP proposed removal of the daily throughput capacity in its Part 111 Hazardous Waste Operating License. However, MDWTP proposed to keep the existing annual throughput. The necessary PTI and ROP revisions will be completed once MDWTP and the WMRPD agree to throughput numbers. It should be noted MDWTP still expects to be subject to the same emission and material limits detailed in MI-ROP-M4782-2010a

2.6 Container Storage Area Maximum Design Capacity and Expansion

MDWTP plans to expand the drum storage area. Containers are closed at all times except for the brief period where they must be opened to sample the waste within. Currently, operating procedures for drum sampling require the facility samples 10% of the drums.

When a drum is opened, there is potential that a very small amount of volatile material may be released for a short period of time during sampling activities. Sampling activities are not expected to generate particulates or semi-volatile. MDWTP conservatively estimates the total emissions based on the average VOC content of 2% for all drums containing VOCs and approximately 0.1% of the drum volume is emitted during sampling.

This process is currently exempt under Rule 290 as documented in ROP No. MI-ROP-M4782-2010a. MDWTP will continue to be exempt under Rule 290.

3.0 Rule 278 Exclusions

Rule 336.1278 states the following:

> ***R 336.1278 Exclusion from Exemption.***
> *Rule 278.*
> *(1) The exemptions specified in R 336.1280 to R 336.1291 do not apply to either of the following:*
> *(a) Any activity that is subject to prevention of significant deterioration of air quality regulations or new source review for major sources in nonattainment areas regulations.*
> *(b) Any activity that results in an increase in actual emissions greater than the significance levels defined in R 336.1119. For the purpose of this rule, "activity" means the concurrent and related installation, construction, reconstruction, relocation, or modification of any process or process equipment.*
> *(2) The exemptions specified in R 336.1280 to R 336.1291 do not apply to the construction of a new major source of hazardous air pollutants or reconstruction of a major source of hazardous air pollutants, as defined in 40 C.F.R. §63.2 and subject to §63.5(b)(3), national emission standards for hazardous air pollutants, adopted by reference in R 336.1902.*
> *(3) The exemptions specified in R 336.1280 to R 336.1291 do not apply to a construction or modification as defined in and subject to 40 C.F.R. part 61, national emission standards for hazardous air pollutants, adopted by reference in R 336.1902.*
> *(4) The exemptions in R 336.1280 to R 336.1291 apply to the requirement to obtain a permit to install only and do not exempt any source from complying with any other applicable requirement or existing permit limitation.*

MDWTP will continue to meet the emission limits in the facility's ROP. The hourly and annual VOC limits for both FG_EAST and FG_WEST are 22.85 lb/hr and 40.2 tpy, respectively. Potential emissions from Rule 290 sources are 1,000 lb/mo or 6 tpy; which is under the significant emission rates. Emissions of dioxins based on 50 ppb waste, will be negligible.

The emissions from changes associated with the facility's operating license renewal are negligible, or will comply with Rule 290; therefore, they are less than the significance thresholds [278(1)(b)]; As emissions are less than significant, the changes are not subject to the *PSD Regulations* [278(1)(a)], or *Nonattainment NSR Regulations* [278(2)]. The facility will continue to comply with applicable NESHAP standards. The changes do not result in a new or reconstructed major source of HAPs [278(2)]. None of the changes are associated with construction or modification pursuant to Part 61 NESHAPs [278(3)]. As previously stated, MDWTP will continue to comply with all applicable permit conditions [278(4)]. **As none of the exclusions listed in Rule 278 apply, the equipment *is* eligible for the specific exemptions identified.**

Appendix 1

Appendix 1 Emission Calculation Methodology

To complete a *Meaningful Change Analysis*, baseline emissions, established as part of a PTI, must be compared to emissions after the proposed change. FTCH used TAC permit limits as the baseline emissions from FG_EAST and FG_WEST. Screening levels at the time the permit was issued were used to calculate the baseline hazard potential. The emission limits permitted were based on compliance with R 336.1225 (Rule 225), which requires that the ambient impact of the TACs released from a rule-subject source be estimated and compared to established air quality standards. There are no proposed changes to the TAC emissions already permitted.

Conservative emission calculation methodologies are provided in the current ROP; however, the ROP allows for alternate calculations to be used. To demonstrate compliance with applicable screening levels, emissions of dioxins have been estimated using the USEPA *Industrial Waste Air Model Technical Background Document* Equations 2-5, 2-15, 2-16, 2-18, 2-19, and 2-21. The methodologies used in the detailed calculations are discussed below.

*If **Diffusivity in Air** was not provided in the USEPA Water9 Database, the Diffusivity in Air was calculated using Equation 2-5:*

$$D_a = \frac{0.00229\,(T_a + 273.16)^{1.5}\sqrt{0.034 + (\frac{1}{MW})MW_{cor}}}{(\left(\frac{MW}{2.5\rho}\right)^{0.333} + 1.8)^2}$$

Where:

T_a	=	temperature of the air (K)
MW	=	molecular weight of the constituent (g/mol)
MW_{cor}	=	molecular weight of the correlation (g/mol)
ρ	=	density of the constituent (g/cm³)

*The **Vapor-Liquid Equilibrium Coefficient** was calculated using Equation 2-15:*

$$K_{eq} = \frac{T_{corr} P_{vap} MW_{waste} \in_a}{RTL}$$

Where:

K_{eq}	=	vapor-liquid equilibrium coefficient for constituent (g/cm³ per g/cm³)
T_{corr}	=	temperature correction factor for vapor pressure for constituent (unitless)
P_{vap}	=	pure component vapor pressure of constituent at 25°C (atm)
MW_{waste}	=	average molecular weight of the waste (g/mol)
$\in_a$	=	air-filled porosity (cm³/cm³)
R	=	universal gas constant = 82.1 cm³-atm/mol-K
T	=	temperature of the system (K)
L	=	waste loading rate (g/cm³)

*The **Temperature Correction Factor** was calculated using Equation 2-16:*

$$T_{corr} = 10^{\left(VP_b\left(\frac{-1}{VP_c + T - 273.15} + \frac{1}{VP_c + 25}\right)\right)}$$

Where:

T_{corr}	=	temperature correction factor for vapor pressure for constituent (unitless)
VP_b	=	Antoine's Vapor Pressure Constant B for constituent
VP_c	=	Antoine's Vapor Pressure Constant C for constituent
T	=	temperature of the system (K)

The Antoine Vapor Pressure Coefficients were assumed to be 1.

*The **Effective Diffusivity** was calculated using Equation 2-18:*

$$D_{eff} = D_a \frac{\epsilon_a^{3.33} T_{C,gas}}{\epsilon_t^2}$$

Where:

D_{eff}	=	effective diffusivity of constituent in the system (cm^2/s)
D_a	=	diffusivity of constituent in air at 25°C (cm^2/s)
€	=	total porosity (cm^3/cm^3)
$T_{C,gas}$	=	temperature correction factor for gas diffusivity (unitless) (T/298.15)1.75

The diffusivity of each constituent in air at 25°C was obtained from the *USEPA Water 9 Database* or calculated.

*The **Volatilization Rate Constant** was calculated using Equation 2-19:*

$$K_v = \frac{K_{eq} D_{eff}}{D_{wmu^2}}$$

Where:

K_v	=	volatilization rate constant for constituent (1/s)
K_{eq}	=	vapor-liquid equilibrium coefficient for constituent (g/cm^3 per g/cm^3)
D_{eff}	=	effective diffusivity of constituent in the system (cm^2/s)
d_{wmu}	=	characteristic depth of the WMU (cm)

The characteristic depth used in the calculation is based on the depth of the treatment tanks.

*The **Fraction Emitted** was calculated using Equation 2-21:*

$$f_{emitted} = 2\left(\frac{K_v t_{calc}}{\pi}\right) 0.5\left[1 - \frac{t_{calc} b_{soil}}{3}\right]$$

Where:

$f_{emitted}$	=	fraction of constituent emitted to the atmosphere (unitless)
K_v	=	volatilization rate constant for constituent (1/s)
t_{calc}	=	processing time (s)
b_{soil}	=	soil biodegradation rate constant for constituent (1/s).

Processing times vary depending on type of waste treated. Two hours was estimated as the typical processing time.

*The **Average Emission Flux Rate** for the waste treatment tanks was calculated as follows:*

$$E = M \times C_{waste} \times f_{emitted}/A/t$$

Where:

E	=	emission flux rate of constituent (g/m^2 - s)
M	=	molecular weight (g/mol)
C_{waste}	=	concentration of constituent *i* in waste (mg/kg = g/Mg)
$f_{emitted}$	=	fraction of constituent *i* emitted to the atmosphere (unitless)
A	=	surface area of the tanks (m^2)
t	=	processing time(s)

The preceding calculations were performed assuming a maximum dioxin concentration of 50 ppb. The calculations were performed assuming that all waste being processed in all four treatment pans in one

treatment building was entirely comprised of dioxin-containing waste at the maximum concentration. This is an extremely conservative assumption as it is highly unlikely that MDWTP will see this much of the dioxin listed waste to be able to fill all the treatment pans in one building with dioxin waste at maximum allowable concentration. Even using these assumptions, projected emission rates were well below current emission limits.

*The **Hourly Emission Rate** was calculated as follows:*

$$E_H = E \times A \times (3{,}600\ s/hr)/453.6\ g/lb$$

Where:

E_H	=	hourly emission rate (lb/hr)
E	=	emission flux rate of constituent (g/m^2 - s)
A	=	surface area of the tanks (m^2)

The attached Table summarizes the emissions rates calculated and the meaningful change.

Table -Dioxin-Bearing Waste Emissions
US Ecology - Michigan Disposal Waste Treatment Plant, Belleville, Michigan

Temperature of System:	366.483 K	Pressure:	1 atm
Waste Molecular Weight:	80 g/mol	Molecular Weight of Air (Ma):	28.97 g/mol
Air-Filled Porosity:	0.25 cm^3/cm^3	Molecular Volume of Air (Va):	20.1 cm^3/mol
Gas Constant:	82.1 cm^3-atm/mol-K	Chaz,max:	0.05 ppm
Waste Bulk Density:	1.4 g/cm^3	Chonhaz,max:	0.000005 %
Temperature Correction (Tc):	1.435		
Total Porosity:	0.5 cm^3/cm^3	Combined Permitted to treat:	576,000 gal/day
Characteristic Depth of Pan (dwmu):	441.96 cm		17,856,000 gal/mo
Processing Time:	7200 s		210,240,000 gal/yr
Biodegredation Rate in Soil (bsoil):	1.00E-20 1/s		
Mass of Waste of Processed:	1032.7 Mg	Container Capacities	194,940 gal
Mixing Ratio of Pollutant in Waste (Cwaste):	500 ppm		
Area of Pan:	168.97 m^2	VOC Control Eff	0% assume no control

Name	CAS No	CAS No	A	B	C	Pvap (mmHg)	Pvap (atm)	Tcorr		Keq	MW (g/mol)	MWcorr
DIOXIN	1746-01-6	1746016	1.00	1.00	1.00	1.52E-09	2.00E-12	1.066		1.01E-15	321.97	0.400

Density	Da (cm^2/s)	CALCULATED Da (cm^2/s)	Deff (cm^2/s)	Kv (1/s)	femitted	Concentration (ppm)	E (g/m^2-s)	Eh (lb/hr)	lb/mo	lb/yr
1.830	0.104000	0.026	5.90E-03	3.06E-23	5.30E-10	0.05	7.60E-15	3.01E-11	2.24E-08	2.64E-07

				IRSL			ITSL						EMISSIONS	
Chemical	CAS		BASELINE PTE (lb/hr)	IRSL (ug/m3)	HP (PTE÷ IRSL)	Change in IRSL	ITSL (ug/m3)	ITSL Averaging Time	ITSL AT conversion factor	Adjusted annual AT ITSL	HP (PTE÷ ITSL)	Change in ITSL	PROPOSED PTE (lb/hr)	CHANGE in Emissions
BASELINE IN 1998														
Methylene Chloride	75-09-2		14.92	2.00	7.46	YES	3,050	8 hr	0.11	336	0.04	YES	no change	--
Benzene	71-43-2		0.71	0.10	7.10	YES	13,000	24 hr	0.17	2,210	3.21E-04	YES	no change	--
1,1,2,2 Tetrachloroethane	79-34-5		0.16	0.02	8.00	YES	6,000	annual	1.00	6,000	2.67E-05	YES	no change	--
Carbon Tetrachloride	56-23-5		0.28	0.04	7.00	YES	0.60	24 hr	0.17	0.10	2.75	YES	no change	--
Chloroform	67-66-3		3.02	0.40	7.55	YES	0.60	24 hr	0.17	0.10	29.61	YES	no change	--
Trichloroethene	79-01-6		4.52	0.60	7.53	YES	700	24 hr	0.17	119	0.04	YES	no change	--
Tetrachloroethene	127-18-4		12.70	1.70	7.47	YES	30	24 hr	0.17	5.10	2.49	YES	no change	--
MAX					**8.00**						**29.61**			

				IRSL			ITSL						EMISSIONS		
Chemical	CAS	MAXIMUM Allowable Concentration	PROPOSED PTE (lb/hr)	IRSL (ug/m3)	HP (PTE÷ IRSL)	Change in HP	ITSL (ug/m3)	ITSL Averaging Time	ITSL AT conversion factor	Adjusted annual AT ITSL	HP (PTE÷ ITSL)	Change in HP	BASELINE PTE (lb/hr)		CHANGE in Emissions
PROPOSED CHANGE															
DIOXIN	1746-01-6	0.000005%	3.01E-11	2.30E-08	1.31E-03	-99.98%	2.00E-06	Annual	1.00	2.00E-06	1.51E-05	-100.00%			
MAX					**1.31E-03**	**-99.98%**					**1.51E-05**	**-100.00%**		-	