

PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

EVALUATION REPORT
ON THE
MAX ENVIRONMENTAL TECHNOLOGIES, INC.
YUKON FACILITY
PETITION FOR RULEMAKING TO DELIST
LEACHATE TREATMENT SYSTEM SLUDGE

APRIL 2020

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ACRONYMS

CFR	Code of Federal Regulations
COA	Consent Order and Agreement
DRAS	Delisting Risk Assessment System
EPA	United States Environmental Protection Agency
EQB	Environmental Quality Board
LDR	Land Disposal Restrictions
NELAC	National Environmental Laboratory Accreditation Conference
NPDES	National Pollutant Discharge Elimination System
PCBs	Polychlorinated biphenyls
QA / QC	Quality Assurance / Quality Control
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SVOC	Semi-Volatile Organic Compounds
SWMA	Solid Waste Management Act
TCLP	Toxicity Characteristic Leaching Procedure
UTS	Universal Treatment Standards
VOC	Volatile Organic Compounds

A. DESCRIPTION OF THE PETITION FOR RULEMAKING PROCEDURE

1. Background and Purpose

A delisting petition is a request to exclude waste from a particular facility from the list of hazardous wastes under the Resource Conservation and Recovery Act of 1976 (RCRA) (42 U.S.C.A. §§ 6901-6986) and Solid Waste Management Act (SWMA) (35 P.S. §§ 1608.101 et seq.) and their implementing regulations. Under 40 Code of Federal Regulations (CFR) 260.20 and 260.22 (relating to general; and petitions to amend part 261 to exclude a waste produced at a particular facility), which are incorporated by reference in accordance with 25 Pa. Code § 260a.1 (relating to incorporation by reference; purpose, scope and applicability) and modified by § 260a.20 (relating to rulemaking petitions), a person may petition the United States Environmental Protection Agency (EPA) or a state administering an EPA-approved hazardous waste management program to remove waste or the residuals resulting from effective treatment of a waste from a particular generating facility from hazardous waste regulation by excluding the waste from the lists of hazardous wastes in 40 CFR 261.31 and 261.32 (relating to hazardous wastes from non-specific sources; and hazardous wastes from specific sources). Specifically, 40 CFR 260.20 allows a person to petition to modify or revoke any provision of 40 CFR Parts 260-266, 268 and 273. Section 260.22 of 40 CFR provides a person the opportunity to petition to exclude a waste on a “generator specific” basis from the hazardous waste lists.

Under the Commonwealth’s hazardous waste regulations at 25 Pa. Code § 260a.20, delisting petitions are to be submitted to the Environmental Quality Board (EQB) in accordance with the procedures established in 25 Pa. Code Chapter 23 (relating to EQB policy for processing petitions—statement of policy) instead of the procedures in 40 CFR 260.20(b)-(e).

Effective November 27, 2000, the Pennsylvania Department of Environmental Protection (Department) received approval from the EPA, under RCRA, to administer the Commonwealth’s hazardous waste management program. As part of that program approval and delegation, the Department is authorized to review and make recommendations on delisting petitions to the EQB. The EQB is authorized to review and approve petitions for the delisting of hazardous waste.

In a delisting petition, the petitioner must show that waste generated at a facility does not meet any of the criteria for which the waste was listed in 40 CFR 261.11. In addition, a petitioner must demonstrate that the waste does not exhibit any of the hazardous waste characteristics (ignitability, corrosivity, reactivity or toxicity) and must present compelling information for the agency to decide whether factors other than those for which the waste was originally listed warrant retaining it as a hazardous waste.

Title 25 Pa. Code Chapter 23 outlines the EQB policy for processing petitions for rulemaking. Once the EQB accepts the petition, a notice of acceptance is published in the *Pennsylvania Bulletin* and a report will be prepared. 25 Pa. Code § 23.6 (relating to Notice of acceptance and Department report). When the report is completed, the Department will send a copy to the petitioner who may then submit to the Department a written response to the report within 30 days of the mailing of the report. 25 Pa. Code § 23.7 (relating to Response to report).

The Department will then prepare a recommendation to the EQB based on the report and comments received from the petitioner. If regulatory amendments are recommended, the Department will develop a proposed rulemaking for EQB consideration within six months after the Department mailed its report to the petitioner. If regulatory amendments are not recommended, the Department will present its recommendation and basis for the recommendation to the EQB at the first meeting occurring at least 45 days after the Department mailed its report to the petitioner. 25 Pa. Code § 23.8 (relating to Board consideration).

2. Statutory Authority

As described in Section 1, a person may submit a delisting petition to the EQB. If the delisting petition results in a recommendation that the EQB amend a regulation, the Department will develop a proposed regulation for EQB consideration. The proposed rulemaking would be made under the authority of sections 105, 402 and 501 of the SWMA (35 P.S. §§ 6018.105, 6018.402 and 6018.501) and section 1920-A of The Administrative Code of 1929 (71 P. S. § 510-20). Under sections 105, 402 and 501 of the SWMA, the EQB has the power and duty to adopt rules and regulations concerning the storage, treatment, disposal and transportation of hazardous waste that are necessary to protect the public's health, safety, welfare and property, and the air, water and other natural resources of this Commonwealth. Section 1920-A of The Administrative Code of 1929 grants the EQB the authority to promulgate rules and regulations that are necessary for the proper work of the Department.

B. DESCRIPTION OF THE MAX ENVIRONMENTAL, INC. PETITION – YUKON FACILITY

1. Procedural Description

On May 2, 2019, the Department received a petition (Petition) to delist F039 sludge generated in the leachate treatment plant at the MAX Environmental Technologies, Inc. (MAX) Yukon facility. The Petition has been prepared to satisfy the requirements of the March 28, 2018 Consent Order and Agreement (2018 COA) entered by and between the Department and MAX. Under the 2018 COA, MAX agreed to submit a full and complete petition in accordance with 40 CFR 260.22 to delist the sludge derived from the treatment of leachate from Yukon Impoundment 5 or sludge derived from the treatment of leachate that has been mixed with

leachate from Yukon Impoundment 5. The 2018 COA also required that MAX manage the sludge as an F039 hazardous waste unless and until such time that the sludge is delisted as a hazardous waste.

The Petition was submitted by Robert J. Hubbard, P.E., Key Environmental Inc., 200 Third Avenue, Carnegie, PA 15006, on behalf of MAX, 651 Holiday Drive, Foster Plaza No. 5, Pittsburgh, PA 15220, to the Chairperson of the EQB. The Petition requests to delist an F039 leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under 40 CFR Part 261 Subpart D.

On June 3, 2019, the Department sent a letter to Mr. Hubbard notifying him that the Petition met the criteria established in Section 23.2 of the EQB's petition policy. The letter also set June 18, 2019, as the date the EQB would consider the Petition. At the June 18, 2019 EQB meeting, Carl Spadaro, Environmental General Manager of MAX and Mr. Hubbard made a brief presentation to the EQB as to why the EQB should accept the Petition for further study. The Department recommended that the EQB accept the Petition for further study, and the EQB voted unanimously to accept this recommendation. On June 29, 2019, the Department published a notice of acceptance of the Petition in the *Pennsylvania Bulletin*. (49 Pa.B. 3316 (June 29, 2019)).

2. Petition Description

The Petition requests the EQB promulgate a rule that the sludge generated at the leachate treatment system at the Yukon facility be delisted as an F039 hazardous waste. This rulemaking would allow MAX to dispose of the sludge at the Yukon facility in accordance with historical precedent or at any approved Subtitle D facility. In support of this request, MAX has submitted a delisting petition, based on the framework described in the EPA RCRA DELISTING PROGRAM GUIDANCE MANUAL FOR THE PETITIONER, March 23, 2000. (EPA RCRA Guidance Manual).

The material which is the subject of the Petition is considered a listed waste and is being managed as an F039 listed waste under the terms of the 2018 COA. The sludge is also considered to be derived from F039, defined at 40 CFR 261.31 as "Leachate (liquids that have percolated through land disposed waste) resulting from the disposal of more than one restricted waste classified as hazardous under subpart D of this part." Subpart D of 40 CFR Part 261 contains the lists of hazardous wastes including wastes from non-specific sources (i.e., F-listed wastes), and wastes from specific sources such as wood-preserving, pigments, organic chemicals, inorganic chemicals, pesticides, explosives, petroleum refining, iron and steel, primary aluminum, secondary lead, veterinary pharmaceuticals, ink formulation, and coking (K-listed wastes), discarded commercial chemical products, off-specification species, container

residues, and spill residues that are either acutely hazardous (P-listed wastes) or toxic (U-listed wastes). F039 has been assigned Hazard Code T, indicating that it is toxic.

In accordance with the EPA RCRA Guidance Manual cited above, the Petition provides the following information:

- A description of the waste for which this Petition has been prepared – The Petition describes the basis for the current hazardous listing and summarizes the history of waste generation and placement at the Yukon facility. It also presents the recent waste management methods and identifies proposed waste management methods in the event that the waste is delisted as proposed.
- A description of the processes that contribute to the waste for which this Petition has been prepared – The Petition summarizes the wastes accepted by the Yukon facility, describes general operations at the Yukon leachate treatment facility where the sludge is being generated, and provides a description of how the sludge was disposed of at the Yukon facility.
- A discussion of the development of an analytical plan for the delisting process via a multi-tiered evaluation process resulting in a comprehensive Sampling and Analysis Plan (SAP) and a comprehensive Quality Assurance Project Plan (QAPP).
- A discussion of the sludge sampling effort completed by MAX and its contractors to support the Petition for the Yukon facility sludge.
- A description of the lifecycle management of the waste material including management of the petitioned F039 waste covered by the Petition, along with groundwater and operational metrics from the current disposal facility, MAX Yukon.

C. DEPARTMENT OF ENVIRONMENTAL PROTECTION ANALYSIS OF THE PETITION

1. Hazardous Waste Definition

RCRA regulations provide a petition procedure to delist waste from the list of hazardous wastes if the waste does not possess the criteria under which the waste was listed as a hazardous or an acutely hazardous waste. The regulations describing the delisting process can be found in 40 CFR 260.22. There are two general types of hazardous waste – characteristic and listed.

- Characteristic hazardous wastes exhibit dangerous properties such as corrosivity, ignitability, reactivity, or toxicity. Characteristic hazardous wastes cannot be delisted because of these dangerous properties. (40 CFR Part 261, Subpart C)

- Listed hazardous wastes are designated hazardous because the processes that generate them have typically produced wastes with dangerous properties like those mentioned above for characteristic wastes. (40 CFR Part 261, Subpart D)

There are other ways in which a solid waste can be designated as a listed hazardous waste and eligible for exclusion. For example, the “mixture rule,” identified in 40 CFR 261.3(a)(2)(iv) lists a mixing of listed hazardous waste and solid waste as a hazardous waste. Additionally, a waste can be designated as a listed hazardous waste pursuant to the “derived-from rule,” described in 40 CFR 261.3(c)(2)(i), which states that any solid waste generated from storage, treatment, or disposal of a listed hazardous waste is a hazardous waste itself. Listed wastes are presumed to possess dangerous properties because of historical knowledge of the waste-generating-process. Only listed wastes can be delisted, and hazardous wastes remain listed until the rulemaking becomes final.

2. Basis for the Waste Delisting

The Petition relates to delisting the sludge generated from the leachate treatment system at MAX’s Yukon facility. MAX manages the petitioned material as an F039 listed waste under the terms of the 2018 COA. Under the 2018 COA, MAX agreed to submit a delisting petition for the sludge. The sludge is generated as a result of treatment of contact stormwater and leachate from land disposal units that contained multiple listed wastes. Pursuant to 40 CFR 261.3(c)(2)(i), EPA determined that the sludge is an F039 listed waste because it is derived from leachate that meets the F039 listed waste code as defined at 40 CFR 261.31.

The Petition is for sludge that will be generated on a continuous basis of approximately 20 cubic yards every three months, based on the number and capacity of full roll-off boxes historically transported off site. The quantity of sludge is not expected to significantly vary over time and may decline if improvements in stormwater controls, treatment plant operation or reduction in leachate generation occurs.

3. History of Waste Generation

MAX’s Yukon facility was formerly known as Mill Service, Inc. and began operations in 1963 in a former strip mine area. Historically, the largest volume of waste processed and disposed at the facility was spent pickle liquor (K062) and electric arc furnace dust (K061). More recently, the largest volume of wastes received at the facility for treatment and disposal consist of metal-impacted soils from remediation projects and drill cuttings from the oil and gas industry.

Originally, a series of four unlined impoundments were constructed and filled. A fifth impoundment was constructed with a bentonite liner and a leachate collection system. The first

three impoundments were filled and out of service prior to 1980. The fourth impoundment was clean closed into the fifth impoundment when RCRA regulations were proposed in the mid-1970's. The fifth impoundment reached capacity in 1985 and was closed in 2002. The first three impoundments were re-closed with a RCRA cap under a COA with the Department in 2013. A sixth impoundment, which opened in 1988, was constructed with double liners, a leachate collection system, leak detection and other required features. Initially, this unit was permitted as an impoundment, however, in September 2016, it was reclassified by the Department as a landfill under permit number 301071. This unit remains in active status as a residual waste land disposal operation.

The leachate from the closed impoundments and contact stormwater is piped to the facility's leachate treatment system and treated with dolomitic lime to precipitate metals and then with acid to ensure a neutral pH (between 6.0 to 9.0 SU) prior to discharge. Leachate from units 5 and 6 is also piped to the leachate treatment system. Solids are removed via polymer addition and clarification and then transferred to thickener tanks. The thickened sludge is transferred to lined roll-off boxes, from which the water gravity drains through geotextile fabric for collection and is subsequently recycled back into the treatment system.

The treated effluent from the clarifier is subjected to pH adjustment and discharged pursuant to a National Pollutant Discharge Elimination System (NPDES) permit (NPDES Permit No. PA027715). The discharge is regulated under the Federal Clean Water Act and the Pennsylvania Clean Streams Law. The petitioned sludge was dewatered and previously land disposed as residual waste at Landfill 6 of MAX's Yukon facility located at 233 MAX Lane, Yukon, PA 15698.

However, in 2011, EPA determined that the sludge generated from the treatment of leachate from Impoundment 5 was an F039 listed waste because of the history of the waste accepted at the impoundment. Pursuant to the derived-from rule, EPA determined that the sludge generated from the leachate treatment system was an F039 listed waste. Under the mixture and derived-from rules for listed wastes, once a waste matches a listing description, unless delisted, it is forever classified as a listed hazardous waste, regardless of how it is mixed, treated, or otherwise changed. Furthermore, any material that encounters the listed waste will also be considered as a listed hazardous waste, regardless of its chemical composition. Thus, material produced by a listed hazardous waste bears the same waste code and regulatory status as the original listed waste, regardless of the material's actual properties. Therefore, the petitioned sludge is currently managed as F039 hazardous waste under the 2018 COA.

4. Waste Acceptance at Yukon

The residual waste landfill at the Yukon facility is used for disposal of a wide range of materials from the energy, construction, and manufacturing industries, as well as metal-impacted materials from site remediation projects. Initially, the facility accepted waste spent pickle liquor (K062) from western Pennsylvania steel mills for treatment via neutralization with lime. Predominant materials managed at the facility are emission control dust and sludge generated from electric arc furnace steel production (K061), wastewater treatment plant sludge generated from steel making operations, slags, dusts, and sludges from battery and cathode ray tube manufacturing operations, foundry sands, slags and soils (hazardous and non-hazardous). Since 2010, wastes received at the facility are primarily drill cuttings from the oil and gas industry.

5. Sampling and Analysis Plan and Quality Assurance Project Plan

Samples were obtained and analyzed in accordance with a Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), which were approved by the Department in October 2017, and February 2018, respectively. Six sampling events were performed over a one-year period to reflect potential variations in constituent concentrations under various seasonal conditions. Samples were collected as composites for total metals and TCLP metals. Grab samples were analyzed for Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs).

a. Sampling and Analysis Plan

The SAP developed for the Petition is based on historical knowledge of the materials handled at the Yukon Facility. The SAP is designed to provide enough data to prepare the Delisting Risk Assessment System (DRAS) simulations and complete the Petition.

DRAS is a risk assessment tool and can only provide risk analyses based on the information entered into the program. It is a software program that calculates the potential risks associated with disposing a given waste stream to a landfill or surface impoundment. The user assigns a target cancer risk and hazard index, and DRAS calculates both the waste's aggregate risks and back-calculates each waste constituent's maximum allowable concentration permissible for delisting. The risk assessment results are only one factor in a delisting decision. The risk-based approach combines state-of-the-art fate and transport modeling with standardized exposure assessment algorithms to provide sound risk assessment.

To support this Petition, the analytical results were evaluated via two mechanisms that were submitted. The first mechanism is a direct comparison of the concentrations to the Universal

Treatment Standards (UTS). The second is a simulation of potential human health or ecological risks via the use of a conservative multimedia exposure model.

This Petition was prepared using DRAS to identify constituents that could pose a threat to human or ecological receptors. Constituents of interest for the purposes of execution of the DRAS simulations were also selected. This was a relatively straightforward process given that a decision was made to simulate any targeted and detected constituent accommodated by the DRAS software. The complete list of chemicals considered constituents of interest for the DRAS simulation are listed in Table 1.

Table 1. Constituents of Interest

Metals	VOCs	SVOCs	Anions
Antimony	2-Butanone	2-Methylnaphthalene	Cyanide
Arsenic	4-Methyl-2-pentanone	Aniline	Fluoride
Barium	Acetone	Benzidine	
Beryllium	Carbon disulfide	Benzo (a) anthracene	
Cadmium	Chloroform	Benzo (a) pyrene	
Chromium	Ethylbenzene	Benzo (b) fluoranthene	
Cobalt	Methylene chloride	Benzyl alcohol	
Copper	Styrene	Bis(2-ethylhexyl)phthalate	
Iron	Toluene	Chrysene	
Lead	Xylenes (total)	Dibenzofuran	
Manganese		Di-n-butyl phthalate	
Mercury		Di-n-octyl phthalate	
Nickel		Fluoranthene	
Selenium		Fluorene	
Silver		Isophorone	
Thallium		Naphthalene	
Vanadium		Phenanthrene	
Zinc		Phenol	
		Pyrene	

Source: MAX Yukon Facility – F039 Delisting Petition, May 2019.

In addition, the regulations list constituents that may not be present in the materials managed at the Yukon Facility. These include pesticides and herbicides, polychlorinated biphenyls (PCBs), and polychlorinated dibenzo-p-dioxins and furans (PCDDs/PCDFs). To identify appropriate constituents for subsequent analysis, the maximum concentrations of constituents were compared to the UTS, as well as EPA Regional Screening Levels (RSLs), such that the implications of Land Disposal Restrictions (LDRs) and potential risks were considered. The results of these analyses are more fully described in Tables 2 through 7 below.

b. Quality Assurance Project Plan

The QAPP establishes the project framework and additional requirements pertaining to field activities presented in the SAP. The QAPP provides appropriate QA procedures and QC measures applied throughout the project addressing:

- QA objectives;
- Laboratory procedures;
- Sample collection: handling and preservation;
- Sample analysis: data reduction, validation, and reporting;
- Internal QC checks;
- QA performance and system audits;
- Preventive maintenance procedures and schedules;
- Data assessment procedures, including processing, interpretation, and presentation;
- Corrective actions; and
- QA reports to management.

The QAPP details the requirements for the performance of activities associated with the sampling and laboratory analysis necessary to defensibly establish the absence or presence of SVOCs, VOCs, pesticides, herbicides, PCBs, metals or various inorganic indicator parameters in sludge samples collected during the investigation.

The requirements of this QAPP are applicable to affiliated project personnel and subcontractors. MAX maintains that all field personnel have completed a training course of at least 40 hours that meets the requirements specified in 29 CFR 1910.120(e) for employee safety and health at hazardous waste operations and a refresher course of at least 8 hours within the last 12 months that meets the requirements of 29 CFR 1910.120(e) for employee safety and health at hazardous waste operations.

Field sampling activities were completed by Field & Technical Services, LLC (FTS) under the direction of KEY Environmental utilizing current health and safety training prior to commencement of sample collection activities. No other specialized training was anticipated for this project. Field sampling personnel were trained in equipment use and procedures to ensure that they understood and complied with the applicable QAPP requirements for their individual tasks. Training records were maintained within FTS's office and available to the Department and/or MAX upon request.

The laboratory participating in this project has training programs that are equivalent to those requirements in The NELAC Institute (TNI) Standards *Volume 1: Management and Technical Requirements for Laboratories Performing Environmental Analysis Module 2: Quality Systems*

General Requirements (TNI 2009). Personnel who are responsible for performing data validation were trained by the QA Oversight Manager that conducted the evaluation of the laboratory analytical data described in this QAPP.

6. Sampling Completed to Support the Petition

Initial sampling and analysis conducted to characterize the leachate treatment system sludge generated at the Yukon facility consisted of one discrete sample collected by qualified MAX employees in early 2017 and analyzed by a Department-certified laboratory - Fairway Laboratories in Altoona, PA. The analysis of this sample consisted of:

- TCLP metals (1311/6010B/7471B)
- Total Metals (6010B/7471B)
- Volatile Organic Compounds (8260B)
- Semi-Volatile Organic Compounds (8270D)
- Pesticides (3541/8081B)
- Chlorinated Herbicides (8151A)
- Polychlorinated Biphenyls (8082)
- Total Cyanide (9014)
- Amenable Cyanide (4500)
- Fluoride (9056A)
- Sulfide (9030/9034)

Three additional rounds of samples were collected and analyzed by experienced personnel from FTS. The three additional samples were collected on October 17, 2017, December 13, 2017, and March 1, 2018. A duplicate sample was obtained during the March 2018 sampling events. Together with the earlier sample, these samples are representative of potential seasonal variations. A list of analytes was revised for the supplemental samples, as discussed in the SAP/QAPP prepared by KEY Environmental in October 2017 and the QAPP prepared by KEY Environmental in February 2018. In addition to the analysis suite above, the following analyses were performed for the additional samples to support this Petition:

- pH (9045D/1311)
- TCLP Semi-Volatile Organics (1311/3510C)
- Percent Solids (2540G)

The pH of the sludge samples (as reported by the SW-846 Test Method 9045D) covered a narrow range, from 8.38 to 8.74 standard pH units. These pH values are well within the range of > 2 and < 12.5 standard pH units, which a material is defined as not corrosive. The pH results exhibited very little variability over the course of the sampling period. Hence, it can be

concluded that this sludge is not corrosive. The sludge is also non-reactive and non-ignitable based on the material accepted at Yukon facility and generator knowledge.

Since DRAS does not consider aluminum to be a constituent of interest due to its low toxicity, 18 of 19 metals analyzed for the sludge samples were simulated using DRAS. MAX summarized the analytical results with number of detections/number of samples, maximum, and average and corresponding DRAS-generated leachate concentrations in Table 2.

Table 2. Measured Total Metal Concentrations- Leachate Treatment System Sludge

Metal	Detects / No. of Samples	Sludge Total Concentration (mg/kg)		Benchmark Values (mg/kg)	
		Maximum	Average ⁽¹⁾	UTS ⁽²⁾	DRAS Limit ⁽³⁾
Antimony	7/8	73.9	29.6	-	>1,000,000
Arsenic	8/8	389	122	-	11,700
Barium	8/8	6,680	4,101	-	>1,000,000
Beryllium	7/8	0.977	0.596	-	142,000
Cadmium	8/8	32.2	16.5	-	189,000
Chromium	8/8	781	385	-	28,300
Cobalt	4/4	32.2	20.0	-	37,800
Copper	4/4	662	434	-	>1,000,000
Iron	4/4	49,400	32,800	-	>1,000,000
Lead	8/8	2,410	1,700	-	>1,000,000
Manganese	4/4	1,360	961	-	>1,000,000
Mercury ⁽⁴⁾	8/8	1.06	0.636	-	158
Nickel	8/8	412	217	-	>1,000,000
Selenium	5/8	33.9	14.8	-	>1,000,000
Silver	7/8	31.0	17.7	-	>1,000,000
Thallium	2/8	4.92	2.10	-	5,300
Vanadium	8/8	82.9	45.4	-	>1,000,000
Zinc	8/8	7,490	2800	-	>1,000,000

Source: MAX Yukon Facility – F039 Delisting Petition, May 2019.

1. To calculate the average, all non-detects were assigned a value of the detection limit divided by 2 and the average was taken of the resulting values. However, if the detection limit divided by 2 was greater than the highest measurement observed, this value was ignored when calculating the average. Duplicate sample results were averaged first before the overall average was determined.
2. Universal Treatment Standards as listed in 40 CFR 268.48. UTS for metals are based on concentrations in the waste extract (TCLP results).
3. The DRAS delisting limit is the limiting exposure pathway-specific concentration calculated by DRAS assuming a cancer risk level of 1×10^{-6} and a hazard quotient of 1. Where the DRAS delisting limit exceeds 1,000,000 mg/kg this was assumed to be the pure substance and a concentration of 1 million parts per million is reported.

4. The DRAS delisting level for mercury is based on the fish ingestion pathway assuming that the mercury exists as methyl mercury.

Table 2 shows that the maximum and average concentrations of total metals in the sludge samples are well below the calculated DRAS limits, typically by multiple orders of magnitude. Antimony and silver were not detected in any samples.

TCLP analysis for metals was also completed and the results are used to determine compliance with the UTS for metals. TCLP data was entered into DRAS calculations to support analysis of potential exposure associated with groundwater pathways. The TCLP results for the 18 metals and the corresponding UTS/DRAS limits are summarized in Table 3.

Table 3. Measured TCLP Metal Concentrations- Leachate Treatment System Sludge

Metal	Detects/ No. of Samples	Sludge TCLP Concentration (mg/L)		Benchmark Values (mg/L)	
		Maximum	Average ⁽¹⁾	UTS ⁽²⁾	DRAS Limit ⁽³⁾
Antimony	6/8	0.0980	0.0595	1.15	9.49
Arsenic	2/8	0.0793	0.0236	5.0	0.0738
Barium	8/8	0.969	0.684	21	3,130
Beryllium	1/8	0.000832	0.000532	1.22	6.47
Cadmium	1/8	0.0229	0.00491	0.11	7.97
Chromium	2/8	0.0175	0.00460	0.60	154
Cobalt	0/4	Not Detected	0.0107	-	17.9
Copper	3/4	0.0141	0.0117	-	2,030
Iron	1/4	0.172	0.0948	-	>1,000,000
Lead	1/8	0.0380	0.0116	0.75	45.3
Manganese	4/4	3.59	2.45	-	1,420
Mercury	0/8	Not detected	0.000206	0.025	5.95
Nickel	6/8	0.246	0.117	11	1,170
Selenium	3/8	0.0224	0.0143	5.7	76.5
Silver	2/8	0.00792	0.00427	0.14	549
Thallium	2/8	0.0363	0.0160	0.20	3.19
Vanadium	3/8	0.0795	0.0193	1.6	286
Zinc	5/8	0.934	0.200	4.3	17,700

Source: MAX Yukon Facility – F039 Delisting Petition, May 2019.

1. To calculate the average, all non-detects were assigned a value of the detection limit divided by 2 and the average was taken of the resulting values. However, if the detection limit divided by 2 was greater than the highest measurement observed, this value was ignored when calculating the average. Duplicate sample results were averaged first before the overall average was determined.

2. Universal Treatment Standards as listed in 40 CFR 268.48.

3. The DRAS delisting limit is the limiting exposure pathway-specific concentration calculated by DRAS assuming a cancer risk level of 1×10^{-6} and a hazard quotient of 1. Where the DRAS delisting limit exceeds 1,000,000 mg/kg this was assumed to be the pure substance and a concentration of 1 million parts per million is reported.

The results have been compared to the UTS as codified in 40 CFR 268.48. The average concentrations for the total analysis were first determined, as summarized in Table 2, and the theoretical leachate concentration was then determined. As shown in Table 2 and Table 3, metals were detected less frequently in TCLP extract than in total analysis as expected because the leachate was treated with lime which chemically binds the metals.

Two laboratory methods were used to quantitate 119 VOCs and SVOCs concentrations in the samples. A total of 29 volatile and semi-volatile organic compounds were detected. The analytical results are summarized in Table 4.

Table 4. Measured VOC and SVOC Total Concentrations – Leachate Treatment System Sludge

Organic Compound	Detects / No. of Samples	Total Concentration (mg/kg)		Benchmark Value (mg/kg)	
		Maximum	Average ⁽¹⁾	UTS ⁽²⁾	DRAS Limit ⁽³⁾
Volatile Organic Compounds					
2-Butanone	5/8	0.245	0.104	36	>1,000,000
4-Methyl-2-pentanone	3/6	0.01719	0.0253	33	>1,000,000
Acetone	1/6	0.480	0.196	160	>1,000,000
Carbon disulfide	4/8	0.138	0.0420	-	>1,000,000
Chloroform	1/8	0.00640	0.00189	6.0	56,000
Ethylbenzene	6/7	0.141	0.0324	10	>1,000,000
Methylene chloride	1/8	0.0206	0.00643	30	>1,000,000
Styrene	¾	0.485	0.165	-	>1,000,000
Toluene	4/8	0.0197	0.00980	10	>1,000,000
Xylenes (total)	6/8	0.195	0.0571	30	>1,000,000
Semi-Volatile Organic Compounds					
2-Methylnaphthalene	2/8	0.485	0.215	-	>1,000,000
Aniline	1/8	0.086	0.0409	14	>1,000,000
Benidine	1/8	6.18	1.75	-	1,420
Benzo(a)anthracene	1/8	1.27	0.242	3.4	644
Benzo(a)pyrene	1/8	0.110	0.0556	3.4	47.8
Benzo(b)fluoranthene	3/8	1.40	0.379	6.8	376
Benzyl alcohol	2/8	3.62	0.934	-	>1,000,000
Bis(2-ethylhexyl)phthalate	6/8	7.91	2.86	28	> 1,000,000
Chrysene	4/8	1.48	0.277	3.4	63,200
Dibenzofuran	1/8	0.430	0.121	-	>1,000,000
Di-n-butyl phthalate	2/8	2.01	0.739	28	>1,000,000
Di-n-octyl phthalate	3/8	0.685	0.332	28	>1,000,000
Fluoranthene	3/8	0.763	0.251	3.4	>1,000,000
Fluorene	1/8	0.0471	0.0226	3.4	>1,000,000
Isophorone	2/8	3.43	0.681	-	>1,000,000
Naphthalene	1/8	0.0707	0.0339	5.6	>1,000,000
Phenanthrene	4/8	0.890	0.257	5.6	Not applicable
Phenol	1/8	0.471	0.282	6.2	>1,000,000
Pyrene	3/8	0.573	0.269	8.2	>1,000,000

Source: MAX Yukon Facility – F039 Delisting Petition, May 2019.

- 1. To calculate the average, all non-detects were assigned a value of one half the detection limit. If one half a sample specific detection was greater than the maximum concentration, this value was excluded from the average calculation. Duplicate sample results were averaged before the overall average was determined.*
- 2. Universal Treatment Standards as listed in 40 CFR 268.48.*
- 3. The DRAS delisting limit is the limiting exposure pathway-specific concentration calculated by DRAS assuming a cancer risk level of 1×10^{-6} and a hazard quotient of 1. Where the DRAS delisting limit exceeds 1,000,000 mg/kg this was assumed to be the pure substance and a concentration of 1 million parts per million is reported.*
- 4. 2-Butanone – methyl ethyl ketone*
- 5. 4-Methyl-2pentanone – methyl isobutyl ketone*

Table 5 presents a summary of the calculated TCLP of VOC and SVOC extract concentrations for analytes detected in at least one of the samples subjected to totals analysis. Per TCLP procedure of Method 1311, “The solid phase is extracted with an amount of extraction fluid equal to 20 times the weight of the solid phase.” Therefore, the 100% extraction efficiency of any constituent present in TCLP is equal to 1/20th of that in the solid phase. As shown in Table 5, the hypothetical and measured TCLP concentrations are significantly lower than the DRAS limits.

Table 5. Calculated TCLP VOC and SVOC Concentrations – Leachate Treatment System Sludge

Organic Compound	Average Total Concentration (mg/kg) ⁽¹⁾	Calculated Leachate Concentration (mg/L) ⁽²⁾	Benchmark Value (mg/L)	
			UTS ⁽³⁾	DRAS Limit ⁽⁴⁾
Volatile Organic Compounds				
2-Butanone	0.104	0.00522	-	30,400
4-Methyl-2-pentanone	0.0253	0.00126	-	4,050
Acetone	0.196	0.00980	-	45,500
Carbon disulfide	0.0420	0.00210	4.8	4,940
Chloroform	0.00189	0.0000944	4.8	0.701
Ethylbenzene	0.0324	0.00162	-	949
Methylene chloride	0.00643	0.000321	-	6.91
Styrene	0.165	0.00826	-	132
Toluene	0.00980	0.000490	-	1,320
Xylenes (total)	0.0571	0.00285	-	837
Semi-Volatile Organic Compounds				
2-Methylnaphthalene	0.215	0.0108	-	63.6
Aniline	0.0409	0.00204	-	17.3
Benzidine ⁽⁵⁾	NA	0.00550 ⁽⁵⁾	-	0.000428
Benzo(a)anthracene	0.242	0.0121	-	0.613
Benzo(a)pyrene	0.0556	0.00278	-	230
Benzo(b)fluoranthene	0.379	0.0189	-	1,960
Benzyl alcohol	0.934	0.0467	-	25,300
Bis(2-ethylhexyl)phthalate	2.86	0.143	-	> 1,000,000
Chrysene	0.277	0.0139	-	61.3
Dibenzofuran	0.121	0.00607	-	0.649
Di-n-butyl phthalate	0.739	0.0370	-	2,150
Di-n-octyl phthalate	0.332	0.0166	-	>1,000,000
Fluoranthene	0.251	0.0125	-	215
Fluorene	0.0226	0.00113	-	429
Isophorone	0.681	0.0340	-	98.5
Naphthalene	0.0339	0.00170	-	0.286
Phenanthrene	0.257	0.0128	-	---
Phenol	0.282	0.0141	-	15,200
Pyrene	0.269	0.0135	-	389

Source: MAX Yukon Facility – F039 Delisting Petition, May 2019.

1. To calculate the average, all non-detects were assigned a value of one half the detection limit. If one half a sample specific detection was greater than the maximum concentration, this value was excluded from the average calculation. Duplicate sample results were averaged before the overall average was determined.
2. To calculate a conservative leachate concentration, the contaminant concentration in the sludge was divided by 20. These were all assumed to be below the detection limit of the TCLP analysis.
3. Universal Treatment Standards as listed in 40 CFR 268.48.
4. The DRAS delisting level is the limiting exposure pathway-specific concentration calculated by DRAS assuming a cancer risk level of 1×10^{-6} and a hazard quotient of 1. Where the DRAS delisting limit exceeds 1,000,000 mg/L this was assumed to be the pure substance and a concentration of 1 million parts per million is reported.
5. Unlike the other organic compounds, the pyridine concentration listed here is the average of one detected TCLP value and one half of the TCLP detection limits for the other non-detects. This compound was not detected in any of the sludge samples (total analysis).

Additionally, cyanide (total and amendable), fluoride, and sulfide analyses were completed in accordance with the Department approved SAP/QAPP. The results also were compared to the UTS as codified in 40 CFR 268.40, referenced in 40 CFR 261.31 and DRAS simulation to calculate the limit for the constituents of interest presented in Tables 6 and 7. UTS have not been established for cyanide or sulfide and DRAS does not include dose-response information for sulfide. The anion concentrations are below their respective UTS and the DRAS limits calculation. Table 7 presents the theoretical worst-case extract concentrations for cyanide and fluoride, which are several orders of magnitude below the DRAS limits.

Table 6. Measured Anion Concentrations – Leachate Treatment System Sludge

Anion	Detects / No. of Samples	Sludge Concentration (mg/kg)		Benchmark Values (mg/kg)	
		Maximum	Average ⁽¹⁾	UTS ⁽²⁾	DRAS Limit ⁽³⁾
Cyanide (total)	7/8	23.5	10.6	590	>1,000,000
Cyanide (amendable)	4/8	23.5	4.43	30	-
Fluoride	8/8	83.6	54.2	-	>1,000,000
Sulfide	1/8	13.4	2.90	-	-

Source: MAX Yukon Facility – F039 Delisting Petition, May 2019.

1. To calculate the average, all non-detects were assigned a value of the detection limit divided by 2 and the average was taken of the resulting values. However, if the detection limit divided by 2 was greater than the highest measurement observed, this value was ignored when calculating the average. Duplicate sample results were averaged first before the overall average was determined.
2. Universal Treatment Standards as listed in 40 CFR 268.48. UTS for metals are based on concentrations in the waste extract (TCLP results).
3. The DRAS delisting limit is the limiting exposure pathway-specific concentration calculated by DRAS assuming a cancer risk level of 1×10^{-6} and a hazard quotient of 1. Where the DRAS delisting limit exceeds 1,000,000 mg/kg this was assumed to be the pure substance and a concentration of 1 million parts per million is reported.

Table 7. Calculated Anion Extract Concentrations – Leachate Treatment System Sludge

Anion	Average Total Concentration (mg/kg)	Calculated Leachate Concentration (mg/L)	Benchmark Values (mg/L)	
			UTS	DRAS Limit
Cyanide (total)	10.6	0.531	-	270
Cyanide (amendable)	4.43	0.222	-	-
Fluoride	54.2	2.71	-	3,430

Source: MAX Yukon Facility – F039 Delisting Petition, May 2019.

7. Management of Waste Material

The waste of interest for this proposed delisting action is sludge generated from the treatment of leachate at the Yukon facility. The materials disposed in various impoundments at MAX Yukon were either placed prior to the advent of the RCRA and LDRs or considered exempt from the hazardous waste regulations. As a result, the sludge generated in the leachate treatment system at the Yukon facility was managed as a residual waste and was transported via covered roll-off boxes to Landfill 6 for disposal. In 2011, EPA determined that the sludge was an F039 listed waste under the derived-from rule because of the leachate from Impoundment 5.

Perimeter drains collect runoff, leachate from closed impoundments, and leachate from units 5 and 6 and then the collected run off and leachates are piped to the facility's leachate treatment system. Leachate is treated with lime to precipitate metals and then with acid to ensure a neutral pH (i.e., between 6.0 – 9.0 SU) prior to discharge. Treatment of leachate via polymer addition and clarification is conducted for solids removal. Sludge from the clarifier is placed in thickener tanks, and the thickened sludge is subsequently transferred to containers or a filter press for dewatering. The water from the dewatering process is collected and recycled back into the treatment system. MAX Yukon is currently managing the sludge generated from the treatment of leachate as a listed hazardous waste, specifically F039, through a COA with the Department. Unless delisted, the material would need to continue to be managed as a listed hazardous waste.

8. Volume of Petitioned Waste

This Petition is for sludge that is generated on a continuous basis. Historically, approximately one roll-off box (20 cubic yards) of sludge was generated and transported to Landfill 6 every quarter. Currently, approximately 20 cubic yards are transported from the Yukon facility every quarter for hazardous waste disposal. The quantity of sludge is not expected to vary significantly over time, though it may decline if improvements are made to the stormwater controls or treatment plant operation, or reduction in leachate generation occurs.

9. Recommendation

Sampling and analysis indicate that the sludge no longer meets the criteria for listing as an F039 hazardous waste as set forth in 40 CFR 261.31. It is recommended that the sludge generated in the leachate treatment system at MAX Yukon facility be delisted as an F039 waste.

The samples that have been collected reveal that metals are the most commonly detected constituents of the material accepted at the facility. Sporadic detections of volatile and semi-volatile organic compounds have also been observed. However, analysis of the sludge indicates that the concentrations of constituents of interest do not exceed the UTS promulgated at 40 CFR 268.48. In fact, they are one or more orders of magnitude below the chemical specific UTS.

The analyses reveal that the sludge does not exhibit the characteristics of hazardous waste. The pH of the additional sludge samples show that the material is not corrosive and the nature of the material together with generator knowledge demonstrates that the sludge is also non-reactive and non-ignitable. The analytical data confirmed that none of the target pesticides, herbicides, or PCBs were detected. The EPA Delisting Guidance Manual also stipulates that reactive sulfide and reactive cyanide should be analyzed if their total concentration results exceed 500 and 250 parts per million, respectively. The maximum total sulfide and total cyanide concentrations measured for the leachate treatment system sludge were 13.4 mg/kg and 23.5 mg/kg, respectively. Cyanide and sulfide concentrations are below the calculated DRAS limits.

DRAS was run assuming a target cancer risk level of 1×10^{-6} and a target hazard quotient of 1 (non-carcinogenic human health effects and ecological receptors). As shown in Table 2, the maximum and average concentrations of total metals in the sludge samples are below the calculated limits. A comparison of the TCLP analysis of the leachate concentrations with the concentrations from the DRAS simulation model shows that the constituents of interest are non-carcinogenic for human health effects and ecological receptors because they are significantly lower than the DRAS model acceptable concentrations limits.

D. CONCLUSION

In conclusion, the Department recommends that the EQB approve this Petition. Following the approval of the Petition, regulatory amendments will be proposed in a future rulemaking package that will codify the delisting of F039 as a hazardous waste from the MAX Environmental Technologies, Inc. – Yukon Facility upon promulgation. MAX has completed sampling and analysis of the sludge generated from the leachate treatment system at the Yukon facility in accordance with the Department-approved SAP and QAPP. It is evident that the total concentrations and the extract concentrations for the leachate treatment system sludge are well below the UTS and limits based on the most protective pathway as determined via the DRAS simulation software.

The required management of the sludge as an F039 hazardous waste imposes unnecessary operating costs on MAX. The sludge does not exhibit the characteristics of hazardous waste and concentrations of the constituents of interest are below levels that are protective of human health and the environment. Since MAX owns and operates the Yukon facility which is permitted to accept residual waste, delisting the sludge as a hazardous waste will allow MAX to dispose of the sludge onsite. Environmental benefits associated with the approval of the Petition and promulgation of a subsequent rulemaking include the reduction of fuel consumption and the elimination of vehicular emissions associated with long distance off-site transportation.

E. REGULATORY LANGUAGE SUGGESTED BY PETITIONER

Please Note: The suggested regulatory language that follows was provided by the petitioner and is not a product of the Department. This language is for reference only. However, the Department recommends some changes to the text with underlining for new language and brackets for [deleted language].

APPENDIX IXa. WASTES EXCLUDED UNDER 25 Pa. Code § 260a.20 AND 40 CFR 260.20 AND 260.22

Table Ia. Wastes Excluded from Nonspecific Sources

Waste Description

Wastewater treatment sludge from former landfill operations (EPA Hazardous Waste No. F039), generated at an expected annual rate of 80 cubic yards, after *the effective date of this notice*, and disposed in the MAX Yukon Landfill or other approved Subtitle D landfill. MAX must meet the following conditions for the exclusion to be valid:

(1) *Delisting Levels:* All leachable concentrations for the following constituents measured using the SW-846 Method 1311 (the TCLP) must not exceed the following levels (mg/L):

<u>Constituent:</u>	[Maximum Allowable] <u>Leachate Concentration</u> ⁽¹⁾
Arsenic.....	0.30
Barium	100
Cadmium	1.0
Chromium	5.0
Lead	5.0
Mercury	0.2
Selenium	1.0
Silver	5.0

The delisting levels are based on precedent for delisted PA F039 waste (arsenic), and Toxicity Criteria per 40 CFR 261.24.

- (2) *Verification Testing Schedule:* MAX must analyze representative samples of the treatment sludge at a frequency of one sample per every 20 cubic yards of material to be [disposed/] shipped, using the SW-846 Method 1311 with appropriate detection levels and quality control procedures. Shipments shall not exceed 20 cubic yards per three-month period.
- (i) *Sample Collection:* Representative samples of the waste shall be collected. Composite samples shall be collected at a rate of one composite per every 20 cubic yards and shall be generated from four grab samples (one grab sample from each quadrant of the vessel). Sampling shall be completed in accordance with the approved Sampling and Analysis Plan (dated October 2017) used for the purposes of this [d]Delisting [p]Petition. Each sample collection event shall include all necessary QA/QC samples and a duplicate.
- (ii) *Sample Analysis:* Each composite sample [will] shall be analyzed for all of the constituents listed in Paragraph (1). If the level of any constituent measured in the sample of the sludge equals or exceeds [the levels] a level set forth in Paragraph (1), then the waste is hazardous and must be managed in accordance with Subtitle C of RCRA. The analytical data [will] shall be submitted to the Pennsylvania Department of Environmental Protection, Southwest Regional Office, Bureau of Waste Management, [Rachel Carson State Office Building, P.O. Box 69170, Harrisburg, PA 17106-9170] 400 Waterfront Drive, Pittsburgh, PA 15222-4745. All data must be accompanied by a signed copy of the statement set forth in 40 CFR 260.22(i)(12) to certify to the truth and accuracy of the data submitted. Records of operating conditions and analytical data must be compiled, summarized, and maintained on-site for a minimum of three (3) years and must be furnished upon request by any employee or representative of the Department, and made available for inspection.
- (i) *Management of sludge pending verification analyses:* The treated, dewatered sludge shall be stored in containers that are to remain covered, except when sludge is being added or removed and must be managed in accordance with Subtitle C of RCRA until verification testing confirms compliance with this delisting.
- (3) *Changes in Operating Conditions:* If MAX significantly changes the treatment process described in the petition, the treatment sludge generated from the new process may not be managed under this exclusion until it has met the following conditions: (a) MAX must demonstrate that the new waste meets the delisting levels set forth in Paragraph (1); (b) MAX must demonstrate that no new hazardous constituents listed in appendix VIII of 40 CFR part 261 have been introduced into the treatment process; (c) MAX must obtain written approval from the Department's Southwest Regional Office to manage the waste under this exclusion.

(4) *Reopener:*

- (i) If MAX discovers that a condition at the facility or an assumption related to the disposal of the excluded waste that was modeled or predicted in the petition does not occur as modeled or predicted, then MAX must report any information relevant to that condition, in writing, to the Department's Southwest Regional Office within 10 days of the discovery of that condition.

- (ii) Upon receiving information described in subparagraph (i) [of this Section], regardless of its source, the Department's Southwest Regional Office will determine whether the reported condition requires further action. Further action may include repealing the exclusion, modifying the exclusion, or other appropriate response necessary to protect human health and the environment.