National Aeronautics and Space Administration

Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, VA 23337

Reply to Attn of: 228

August 1, 2019

Accomack County Department of Public Works
Attn: Mr. Stewart Hall
Public Works Director
P.O. Box 52
Tasley, VA 23441

Subject: 2019 Sludge Sampling Report for Sludge Drying Beds located at NASA Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Virginia

Enclosed is a copy of the Wallops Flight Facility (WFF) Sludge Sampling Report for the year 2019. The sludge at WFF does not contain the following metals at or above the regulatory limits: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, and Zinc.

The WFF will continue to dispose of approximately seven tons of sludge annually, at the Accomack County Municipal North Landfill as a non-hazardous waste. NASA will provide the landfill with a minimum of 24 hours notification prior to sludge disposal.

We thank you for your cooperation in allowing us to use your facilities. If you have any questions, please contact Mr. Owen Hooks at 757-824-1941.

Glenn D. Lilly
Head, Facilities Management Branch

Enclosure

cc:
227/ Mr. W. Redmond
250/ Mr. R. Hooks
250/ Mr. T. Meyer
LJT/Mr. C. Hook
V. T. Griffin/ Mr. P. Swartz

WALLOPS FLIGHT FACILITY
FEDERALLY OWNED TREATMENT WORKS
2019 SLUDGE SAMPLING REPORT

National Aeronautics and Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, Virginia

July 2019

WALLOPS FLIGHT FACILITY
FEDERALLY OWNED TREATMENT WORKS
2019 SLUDGE SAMPLING REPORT

National Aeronautics and Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, Virginia

Prepared by:

LJT & Associates, Inc.
Wallops Island, Virginia

July 2019

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1.0 PURPOSE

Sludge at the Federally Owned Treatment Works (FOTW) at NASA Goddard Space Flight Center's Wallops Flight Facility (WFF) sludge drying beds must be tested annually under the Virginia Pollution Discharge Elimination System (VPDES) Permit VA0024457 for metals listed in 9 VAC 25-31-540 prior to disposal as a non-hazardous waste in the Accomack County North Landfill. This Sludge Sampling Report meets the 2019 sludge sampling and reporting requirements of WFF's Sludge Management Plan, last revised October 2014.

2.0 BACKGROUND

The current FOTW at WFF operates a Virginia Reliability Class I extended aeration, activated sludge wastewater treatment plant at Building D-50 under VPDES Permit VA0024457. The de-watered sludge from these facilities meets the requirements for disposal at a municipal landfill according to 12 VAC 5-585-530. The former FOTW at Building D-12, a trickling filter system and drying beds, are no longer in use and the area was demolished in 2013.

3.0 SLUDGE CLASSIFICATION

The waste generated by the FOTW is defined as Class II sludge per the VPDES permit regulation 9 VAC 25-31 of the Virginia Administrative Code. Class II sludge is sewage sludge that has normal quality and has been treated in a process equivalent to Processes to Significantly Reduce Pathogens (PSRP). The sewage sludge provisions under the VPDES Permit Regulation are consistent with federal regulations under 40 CFR part 258 (Criteria for Municipal Solid Waste Landfills) and VPDES Permit Regulations 9 VAC 25-31-420 through 9 VAC 25-31-720, which govern the sewage sludge in the state of Virginia. If biosolids are mixed with nonhazardous solid wastes, the mixture and the land onto which the mixture is placed are subject to the solid waste regulations (40 CFR Part 258) instead of Part 503 (Standards for the Use or Disposal of Sewage Sludge).

Through aerobic digestion in conjunction with the dewatering processes of the drying beds, the sludge meets the requirements to achieve Class B Pathogen Control. The sludge is, therefore, classified as non-hazardous Class II Treatment – Class B Pathogen Control. This non-hazardous sludge is disposed of by WFF at the Accomack County North Landfill.

4.0 SLUDGE SAMPLING

Laboratory personnel conducted sludge sampling at the sludge drying beds in Buildings D-53 and D-54 on May 15, 2019. Three drying beds were in use at the time of the sampling. One composite sample was collected from each bed. The drying beds were divided into imaginary grids and ten sampling points were randomly selected for each bed. The ten aliquot samples collected were then combined to make one composite sample. The samples were labeled D53-2, D53-4, and D-54. Sampling equipment was decontaminated or discarded after use.

5.0 RESULTS

The sludge sampling data in Tables 5.1 and 5.2 represent the analytical results from the May 15, 2019, sampling event. The laboratory certificates of analysis can be found in Appendix I. Table 5.1 reports the laboratory results in mg/l and compares the results to the hazardous waste regulations in 40 CFR 261.24 Table 1. The Toxicity Characteristic Leaching Procedure (TCLP) is the only leaching procedure to be used for determining the characteristic of toxicity pursuant to 40 CFR 261.24. Table 5.2 shows the same results in mg/kg as calculated from the laboratory reported mg/l results. A sample calculation is included in Appendix II. Results in Table 5.2 are compared to the ceiling concentration in Table 1 of 9 VAC 25-31-540. No samples exceeded either regulatory limit.

TABLE 5.1 Metals in Sewage Sludge
Results for Samples Collected on May 15, 2019

Analyte (EPA Method)	D53-2 (mg/L)	D53-4 (mg/L)	D54 (mg/L)	Regulatory Limits (Table 1 40 CFR 261.24) (mg/L)
Arsenic (EPA1311/6010C)	ND	ND	ND	5.0
Cadmium (EPA 1311/6010C)	0.012	0.022	0.009	1.0
Chromium (EPA 1311/6010C)	ND	ND	ND	5.0
Copper (EPA 1311/6010C)	0.011	ND	0.032	N/A
Lead (EPA 1311/6010C)	ND	ND	ND	5.0
Mercury (EPA 1311/7470A)	ND	ND	ND	0.2
Molybdenum (EPA 1311/6010C)	ND	ND	ND	N/A
Nickel (EPA 1311/6010C)	ND	ND	0.068	N/A
Selenium (EPA 1311/6010C)	ND	ND	ND	1.0
Zinc (EPA 1311/6010C)	3.17	3.00	5.35	N/A

ND = Analyte NOT DETECTED at or above the reporting limit
N/A= Regulatory limit not published

TABLE 5.2 Metals in Sewage Sludge
Results for Samples Collected on May 15, 2019

Analyte (EPA Method)	D53-2 (mg/kg)	D53-4 (mg/kg)	D54 (mg/kg)	Regulatory Limits (Appendix I Table 1 9 VAC25-31-540) (mg/kg)
Arsenic (EPA1311/6010C)	ND	ND	ND	75
Cadmium (EPA 1311/6010C)	0.240	0.440	0.18	85
Chromium (EPA 1311/6010C)	ND	ND	ND	N/A
Copper (EPA 1311/6010C)	0.22	ND	0.64	4,300
Lead (EPA 1311/6010C)	ND	ND	ND	840
Mercury (EPA 1311/7470A)	ND	ND	ND	57
Molybdenum (EPA 1311/6010C)	ND	ND	ND	75
Nickel (EPA 1311/6010C)	ND	ND	1.36	420
Selenium (EPA 1311/6010C)	ND	ND	ND	100
Zinc (EPA 1311/6010C)	63.4	60.0	107.0	7,500

ND = Analyte NOT DETECTED at or above the reporting limit
N/A= Regulatory limit not published

6.0 QUALITY ASSURANCE/QUALITY CONTROL

No deviations from the field sampling plan occurred. All samples were properly preserved, packaged, and shipped by overnight courier. All samples arrived at contract lab James R. Reed & Associates in Newport News, Virginia, the morning after shipping and were prepared for analysis. All analytical results were reviewed after the receipt of certificates of analysis; all results were found to be satisfactory.

7.0 CONCLUSIONS

The results of the May 15, 2019 laboratory TCLP analyses for this sampling event indicate that the sludge at WFF's sludge drying beds does not contain the following metals at/or above regulatory limits: arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, or zinc.

Therefore, WFF intends to continue to dispose of its sludge in the Accomack County Municipal North Landfill as a non-hazardous waste.

8.0 CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Glenn D. Lilly
(Signature)

8/1/19
(Date)

Glenn D. Lilly, Head, Facilities Management Branch
(Printed Name and Title)

NASA Wallops Flight Facility

Building N-161, Code 228

Wallops Island, VA 23337

(757)-824-1299
(Office Name, Address, and Telephone Number)

APPENDIX I

TEST RESULTS AND CHAIN-OF-CUSTODY RECORDS

REPORT OF ANALYSIS

CLIENT: LJT & Associates, Inc.
ATTN: Brian Cornwell
ADDRESS: Wallops Flight Facility, Bldg.
CITY: Wallops Island, VA 23302
PHONE: 757-824-1155
EMAIL/FAXbrian.e.cornwell@nasa.gov

SAMPLE RECEIPT
DATE: 5/16/2019 TIME: 0820
GRAB COLLECTION
DATE: 5/15/2019 TIME: 0945
COLLECTED BY: CLIENT
PICK UP BY: FEDEX
NUMBER OF CONTAINERS: 1
GOOD CONDITION ☑ Good ☐ Other (See C-O-C)

SPECIAL NOTES:

REPORT NO: 19-08493 11:01

SAMPLE ID: D-053-2 (19-0767)
SAMPLE NO 19-08493

Parameter	EPA HW No.	Method Number	JRA QL	Regulatory Level	Result	Unit	Analyst/Date/Time
Toxic Characteristic Leaching Procedure by SW-846 Method 1311							
Arsenic	D004	6010D	0.050	5	< 0.050	mg/L	AME 5/24/2019 1319
Cadmium	D006	6010D	0.005	1	0.012	mg/L	AME 5/24/2019 1319
Chromium	D007	6010D	0.010	5	< 0.010	mg/L	AME 5/24/2019 1319
Copper		6010D	0.010		0.011	mg/L	AME 5/30/2019 1152
Lead	D008	6010D	0.050	5	< 0.050	mg/L	AME 5/24/2019 1319
Mercury	D009	7470A	0.0002	0.2	< 0.0002	mg/L	SDT 5/22/2019 1327
Molybdenum		6010D	0.050		< 0.050	mg/L	AME 5/30/2019 1152
Nickel		6010D	0.050		< 0.050	mg/L	AME 5/30/2019 1152
Selenium	D010	6010D	0.050	1	< 0.050	mg/L	AME 5/24/2019 1319
Zinc		6010D	0.005		3.17	mg/L	AME 6/3/2019 1300

REPORT OF ANALYSIS

NOTE:

JRA Quantification Level is the concentration of the lowest calibration standard above zero with a reliable signal.

Reproduction of this report is not permitted, except in full, without written approval from James R Reed & Associates.

The results on this report relate only to the sample(s) provided for analysis.

Results conform to NELAC standards, where applicable, unless otherwise indicated.

RESPECTFULLY SUBMITTED

Elaine Claiborne
Laboratory Director
04-Jun-19

James R. Reed & Associates
770 Pilot House Drive, Newport News, VA 23606
(757) 873-4703 ● Fax: (757) 873-1498

VELAP# 460013
EPA# VA00015

REPORT OF ANALYSIS

CLIENT: LJT & Associates, Inc.
ATTN: Brian Cornwell
ADDRESS: Wallops Flight Facility, Bldg.
CITY: Wallops Island, VA 23302
PHONE: 757-824-1155
EMAIL/FAXbrian.e.cornwell@nasa.gov

SAMPLE RECEIPT
DATE: 5/16/2019 TIME: 0820
GRAB COLLECTION
DATE: 5/15/2019 TIME: 0951
COLLECTED BY: CLIENT
PICK UP BY: FEDEX
NUMBER OF CONTAINERS: 1
GOOD CONDITION ☑ Good ☐ Other (See C-O-C)

SPECIAL NOTES:

REPORT NO: 19-08494 11:01

SAMPLE ID: D-053-4 (19-0768)
SAMPLE NO 19-08494

Parameter	EPA HW No.	Method Number	JRA QL	Regulatory Level	Result	Unit	Analyst/Date/Time
Toxic Characteristic Leaching Procedure by SW-846 Method 1311							
Arsenic	D004	6010D	0.050	5	< 0.050	mg/L	AME 5/24/2019 1325
Cadmium	D006	6010D	0.005	1	0.022	mg/L	AME 5/24/2019 1325
Chromium	D007	6010D	0.010	5	< 0.010	mg/L	AME 5/24/2019 1325
Copper		6010D	0.010		< 0.010	mg/L	AME 5/30/2019 1157
Lead	D008	6010D	0.050	5	< 0.050	mg/L	AME 5/24/2019 1325
Mercury	D009	7470A	0.0002	0.2	< 0.0002	mg/L	SDT 5/22/2019 1330
Molybdenum		6010D	0.050		< 0.050	mg/L	AME 5/30/2019 1157
Nickel		6010D	0.050		< 0.050	mg/L	AME 5/30/2019 1157
Selenium	D010	6010D	0.050	1	< 0.050	mg/L	AME 5/24/2019 1325
Zinc		6010D	0.050		3.00	mg/L	AME 5/30/2019 1504

REPORT OF ANALYSIS

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04-Jun-19

REPORT OF ANALYSIS

CLIENT: LJT & Associates, Inc.
ATTN: Brian Cornwell
ADDRESS: Wallops Flight Facility, Bldg.
CITY: Wallops Island, VA 23302
PHONE: 757-824-1155
EMAIL/FAXbrian.e.cornwell@nasa.gov

SAMPLE RECEIPT
DATE: 5/16/2019 TIME: 0820
GRAB COLLECTION
DATE: 5/15/2019 TIME: 0955
COLLECTED BY: CLIENT
PICK UP BY: FEDEX
NUMBER OF CONTAINERS: 1
GOOD CONDITION ☑ Good ☐ Other (See C-O-C)

SPECIAL NOTES:

REPORT NO: 19-08495 11:01

SAMPLE ID: D-054 (19-0769)
SAMPLE NO 19-08495

Parameter	EPA HW No.	Method Number	JRA QL	Regulatory Level	Result	Unit	Analyst/Date/Time
Toxic Characteristic Leaching Procedure by SW-846 Method 1311							
Arsenic	D004	6010D	0.050	5	< 0.050	mg/L	AME 5/24/2019 1330
Cadmium	D006	6010D	0.005	1	0.009	mg/L	AME 5/24/2019 1330
Chromium	D007	6010D	0.010	5	< 0.010	mg/L	AME 5/24/2019 1330
Copper		6010D	0.010		0.032	mg/L	AME 5/30/2019 1203
Lead	D008	6010D	0.050	5	< 0.050	mg/L	AME 5/24/2019 1330
Mercury	D009	7470A	0.0002	0.2	< 0.0002	mg/L	SDT 5/22/2019 1332
Molybdenum		6010D	0.050		< 0.050	mg/L	AME 5/30/2019 1203
Nickel		6010D	0.050		0.068	mg/L	AME 5/30/2019 1203
Selenium	D010	6010D	0.050	1	< 0.050	mg/L	AME 5/24/2019 1330
Zinc		6010D	0.050		5.35	mg/L	AME 5/30/2019 1510

James R. Reed & Associates
770 Pilot House Drive, Newport News, VA 23606
(757) 873-4703 ● Fax: (757) 873-1498

VELAP# 460013
EPA# VA00015

REPORT OF ANALYSIS

NOTE:

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RESPECTFULLY SUBMITTED

Elaine Claiborne
Laboratory Director
04-Jun-19

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770 Pilot House Drive, Newport News, VA 23606
(757) 873-4703 ● Fax: (757) 873-1498

VELAP# 460013
EPA# VA00015

19-039R
A

CHAIN OF CUSTODY

ANALYSES REQUESTED

Bottle ID	A	B	C
Preserv.	1,3	1	

Company Name: LJT, Inc
Company Contact: Brian Cornwell Telephone: 757-824-1155
Results To: Brian Cornwell Fax: 757-824-1819
Address: NASA Wallops Flight Facility Bldg. F-160
Wallops Island, VA 23337 email:brian.e.cornwell@nasa.gov
Project ID:

JRA ID #19-	Sample Type*	Sample Location	Composite Start Date	Composite Start Time	Composite End Date	Composite End Time	Grab Date MEC	Grab Time 5-15-19	Total # of cont.	TKN	TCLP (As, Cd, Cr, Cu, Pb, Hg, Mo, Ni, Se, Zn)
08492	WW	D-50 Final (19-0770)	5-14-19	0855	5-15-19	0855	~~5/15/19~~	~~0855~~	1	X	
08493	Sludge	D-053-2 (19-0767)					5/15/19	0945	1		X
08494	Sludge	D-053-4 (19-0768)					5/15/19	0951	1		X
08495	Sludge	D-054 (19-0769)					5/15/19	0955	1		X

Chlorine <0.5ppm Chlorine

pH<2HNO3

*WW= Wastewater, GW = Groundwater, DW - Drinking Water, HW - Hazardous Waste, OTHERS

Sampled By: Date/Time:
Relinquished By: [signature] Date/Time: 5-15-19 1600
Received By: Date/Time:
Relinquished By: [signature] Date/Time: 5-16-19 @ 0820
Received By: [signature] Date/Time: 5-16-19 @ 0820

Preservatives:
1 = <4°C 6 = $Na_2S_2O_3$ + HCl 10=Ascorbic Acid + HCl
2 = HNO_3 7 = NaOH + ZnOAc 11=HCl
3 = H_2SO_4 8 = H_2SO_4 + FAS 12=Zinc Acetate + NaOH
4 = NaOH 9 = NH_4Cl
5 = $Na_2S_2O_3$

Please send 12 TKN, 6 Nitrate/Nitrite, 8 TCLP, 6 sets of TPH-GRO containers.
MEC 5-15-19

Arrival Temp: 2.3 <°6c

JAMES R. REED and ASSOCIATES (757) 873-4703; FAX (757) 873-1498
770 Pilot House Drive, Newport News, VA 23606

APPENDIX II

UNITS CONVERSION SAMPLE CALCULATION

TCLP Unit Conversion Example

$$TCLP\left(\frac{mg}{L}\right) \rightarrow Soil\ Concentration\left(\frac{mg}{kg}\right)$$

where "mg" refers to the mass of metal,
"L" refers to the volume of extraction fluid used in the TCLP procedure,
and "kg" refers to the mass of sludge analyzed

From the TCLP procedure outlined in EPA 1311, a few conversion factors can be gleamed.

First, the extraction fluids listed in the method are dilute acetic acid solutions whose densities can be assumed to be approximately 1 g/mL. Putting this into more relevant terms:

$$1\ kg\ extraction\ fluid = 1\ L\ extraction\ fluid$$

Second, the weight of extraction fluid is given as:

$$\text{Weight of extraction fluid} = \frac{\text{20 x percent solids (Section 7.1.1) x weight of waste filtered (Section 7.2.5 or 7.2.7)}}{100}$$

So, for 1 kg of waste,

$$weight\ of\ extraction\ fluid = \frac{20\ x\ (percent\ solids)\ x\ 1\ kg}{100}$$

Assuming 100% solids (for the most conservative conversion),

$$weight\ of\ extraction\ fluid = \frac{20\ x\ 100\%\ x\ 1\ kg}{100} = 20\ kg$$

$$1\ kg\ sample = 20\ kg\ extraction\ fluid$$

Applying these conversions to a TCLP result of cadmium at 0.022 mg/L:

$$Soil\ Concentration\left(\frac{mg}{kg}\right)$$
$$= \frac{0.022\ mg\ Cd}{1\ \cancel{L\ extraction\ fluid}}\ x\ \frac{1\ \cancel{L\ extraction\ fluid}}{1\ \cancel{kg\ extraction\ fluid}}\ x\ \frac{20\ \cancel{kg\ extraction\ fluid}}{kg\ sample}$$
$$= 0.44\frac{mg}{kg}Cd$$

Based on these assumptions, the metal content in the soil can be found by multiplying the TCLP result by 20.