National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
White Sands Test Facility
P.O. Box 20
Las Cruces, NM 88004-0020

March 22, 2022

Reply to Attn of: RE-22-039

New Mexico Environment Department
Attn: Mr. Rick Shean, Bureau Chief
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Bldg. 1
Santa Fe, NM 87505

Subject: Request for a "Contained-in" Determination for Contaminated Media Associated with the 600 Area Perched Groundwater Abbreviated Investigation Work Plan

NASA is requesting a "contained-in" determination for investigation derived waste (IDW) drill cuttings (contaminated media) generated during the 600 Area Perched Groundwater Investigation. The investigation was conducted in accordance with the Response to Disapproval of Abbreviated Investigation Work Plan for 600 Area Perched Groundwater, which was approved by NMED on March 31, 2017. IDW generated during soil boring drilling activities were accumulated in 1-cubic yard intermediate bulk containers numbered 10159 and 10164. The containers are being managed in accordance with 20.4.1.300 New Mexico Administrative Code (NMAC) and 40 CFR 262.17, with the hazardous waste codes F001 and F002. NASA collected waste characterization samples from the IDW and provides the analytical results to NMED for consideration in the requested "contained-in" determination. The earliest 90-day time limit for the waste is April 11, 2022.

Analytical results from waste characterization sampling indicate the contaminated media does not contain F001 and F002 regulated hazardous constituents. No volatile organic compounds exceed toxicity characteristic limits of 40 CFR 261.24, nor does the waste exhibit other characteristics of hazardous waste described in 40 CFR 261.21 through 261.23. NMED may approve this request if it is determined the IDW media no longer contains listed waste and does not pose a threat to human health and the environment. If NMED determines that the IDW media does not contain hazardous waste, NASA will properly dispose of the waste in a permitted Subtitle D landfill facility as nonhazardous solid waste in accordance with 20.9 NMAC.

Enclosure 1 provides a background and basis for the "contained-in" determination request. Enclosure 2 provides a summary of sampling parameters and detection summary tables of the analytical results with a comparison to applicable regulatory limits. Enclosure 3 provides the laboratory analytical reports, which contain chain of custody documentation. Enclosure 4 provides an electronic copy of Enclosures 1, 2, and 3 on CD-ROM.

I certify under penalty of law that this document and 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, try, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions or comments, please contact Antonette Doherty of my staff at 575-202-5406.

Sincerely,

TIMOTHY DAVIS
Digitally signed by TIMOTHY DAVIS
Date: 2022.03.22 07:59:25 -06'00'

Timothy J. Davis
Chief, Environmental Office

3 Enclosures

cc (w/ enclosures):
Mr. Gabriel Acevedo
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building I
Santa Fe, NM 87505

Enclosure 1
Summary

Background

NASA generated investigation derived waste (IDW) drill cuttings during the 600 Area Perched Groundwater Investigation. The investigation was conducted between January 3 and January 28, 2022 in accordance with the Response to Disapproval of Abbreviated Investigation Work Plan for 600 Area Perched Groundwater, which was approved by NMED on March 31, 2017. Five soil borings were advanced to or near the bedrock surface below the closed WSTF 600 Area Hazardous Waste Management Unit (Closure) to identify the source and migration pathway of perched groundwater in that area. Two of the borings encountered groundwater and were completed as monitoring wells.

IDW included in this contained-in determination request consists of drill cuttings from two borings, 600-PGW-2 and 600-PGW-4, where groundwater was encountered. Drill cuttings generated from groundwater bearing zones in these borings were accumulated as hazardous waste in 1-cubic yard intermediate bulk containers (IBC) numbered 10159 (600-PGW-2) and 10164 (600-PGW-4). The containers are currently being managed in accordance with 20.4.1.300 NMAC and 40 Code of Federal Regulations (CFR) 262.17 with hazardous waste codes F001 and F002. The earliest 90-day time limit for the waste is April 11, 2022.

Basis for Contained-In Determination

Results from ongoing groundwater monitoring at and near the 600 Area Closure indicate that saturated drill cuttings (environmental media) extracted from zones with perched or regional groundwater may contain hazardous constituents at concentrations exceeding regulatory limits. The IDW were initially characterized as hazardous waste through application of the Environmental Protection Agency's (EPA's) "contained-in" policy, which states that an item other than solid waste (i.e., contaminated media) that contains or is contaminated with listed hazardous waste is not a hazardous waste but must be managed as though it were a hazardous waste until the hazardous waste is removed from the item. Solid waste and environmental media that comes into contact with groundwater within WSTF groundwater plume that may contain trichloroethylene, tetrachloroethylene, trichloromonofluoromethane, or 1,1,2-trichloro-1,2,2-trifluoroethane are managed as hazardous waste with the EPA Waste Codes F001 and F002.

Six composite samples were collected from each IBC using a hollow-stem hand auger, which provided cross-sectional representative sample material for waste characterization purposes. The samples were analyzed for total and toxicity characteristic leaching procedure (TCLP) volatile organic compounds (VOCs) to indicate the presence of F001 and/or F002 constituents. Total metals, TCLP metals, hydrazine compounds, and nitrosodimethylamine (NDMA) samples were also collected to further characterize the waste. Sampling parameters are identified in Table 1 of Enclosure 2. Duplicate and matrix spike samples were collected for each analyte, as indicated in Table 1.

Analytical data were reviewed and used to completed waste characterization for the IDW drill cuttings in accordance with the WSTF Hazardous Waste Permit and RCRA requirements. The analytical results in the Laboratory Report R2201212 (Enclosure 3) indicate the IDW media does not contain 40 CFR 261 Subpart D listed hazardous constituents (F001 and F002 contaminants of concern). Analytical results for TCLP VOCs and metals are provided in Analytical Report R2201213 in Enclosure 3, and detections are provided Table 2 and Table 3 of Enclosure 2. There were no exceedances of toxicity characteristic limits of 40 CFR 261.24. NDMA is also a WSTF groundwater plume contaminant of concern and was detected at concentrations between the method detection limit and practical quantitation limit for the analysis. NDMA results are summarized in Table 4 of Enclosure 2. The NDMA analytical report is provided as report HR-779 in Enclosure 3. Hydrazine, monomethyl hydrazine, and unsymmetrical dimethylhydrazine were investigation contaminants of concern and were not detected in the waste characterization samples (Report 2B11021 in Enclosure 3).

Waste Determination Information

Listed Hazardous Waste Determination [40 CFR 262.11(b)]

F001 and F002 constituents were not detected in the waste characterization samples. There were also no results that exceeded the land disposal restriction concentrations referenced in 20.4.1.800 NMAC (incorporating 40 CFR 268.40). The analytical report for Total and TCLP results for EPA Method 8260C are provided in Enclosure 3.

Characteristic Waste Determination [40 CFR 262.11(c)]

Based on historical groundwater sampling and analysis from groundwater monitoring wells in the investigation area, contaminated groundwater at the project location contains organic constituents in the parts per billion range. Native soil in project area does not contain constituents that would cause the contaminated media to exhibit the characteristic of ignitability per §261.21(a)(1), the characteristic of reactivity per §261.23(a)(1) through (a)(8), or §261.24 toxicity characteristics. The waste does not contain free liquid, therefore, does not exhibit the characteristic of corrosivity per §261.22.

No VOCs were identified in the TCLP sample results that would cause the contaminated media to exhibit §261.24 toxicity characteristics (Table 2, Enclosure 2). The organic constituent dichloromethane (CAS # 75-09-2) was detected in the VOC TCLP sample from Container #10159, but this is not a hazardous waste toxicity characteristic contaminant. This detection is attributed to lab contamination because dichloromethane was not detected in the total VOC sample from container 10159 (Enclosure 3).

No inorganic metal constituents were identified in the TCLP sample results that would cause the contaminated media to exhibit §261.24 toxicity characteristics. Thallium, which is not a toxic contaminant identified in Table 1 of 40 CFR 261.24(b), was detected in the sample and sample duplicate for container #10159 at a concentration of 0.024 mg/L. Thallium was also detected at a concentration of 0.018 mg/L for container #10164. Barium was detected in the sample for container #10159 at a concentration of 1.6 mg/L. Barium was also detected at a concentration of 1.7 mg/L in the container #10159 sample duplicate and the sample for container 10164 (Table 4, Enclosure 2). Both of these results are below the 100 mg/L barium regulatory level for barium as a hazardous waste toxicity characteristic contaminant.

Other Considerations

No WSTF groundwater plume contaminants of concern, including listed waste F001 and F002 constituents, or project contaminants of concern were detected in the waste characterization samples collected for the subject “contained-in” determination request. If NMED concludes that the subject contaminated media do not contain listed hazardous waste and do not pose a threat to human health and the environment, NASA will downgrade the waste to non-hazardous waste and properly dispose of the waste in a permitted Subtitle D landfill facility in accordance with 20.9 NMAC.

Enclosure 2
Detection Tables

Table 1 Investigation-Derived Waste (IDW) Sampling Analytes for Container #10159 and #10164

Analyte	Sample Matrix	Analytical Method/Laboratory	Quantity
Total Volatile Organics	Solid	SW-846 Test Method 8260C: Volatile Organics Analysis	1 Sample; 1 Duplicate (#10159) & 1 Matrix Spike (#10159)
Total Metals	Solid	SW-846 Methods 6010C and 7740A: Metals Analysis	1 Sample; 1 Duplicate (#10164) & 1 Matrix Spike (#10164)
Volatile Organics (TCLP)	Solid	SW-846 Test Method 8260C: Volatile Organics Analysis incorporating EPA Method 1311 (TCLP)	1 Sample; 1 Duplicate (#10159) & 1 Matrix Spike (#10159)
Total Metals (TCLP)	Solid	SW-846 Methods 6010C and 7740A: Metals incorporating EPA Method 1311 (TCLP)	1 Sample; 1 Duplicate (#10164) & 1 Matrix Spike (#10164)
NDMA	Solid	EPA Method 607M	1 Sample; 1 Duplicate & 1 Matrix Spike
Hydrazine, MMH, UDMH	Solid	EPA Method 8315M	1 Sample; 1 Duplicate & 1 Matrix Spike

MMH – Monomethyl hydrazine
TCLP – Toxicity Characteristic Leaching Procedure
UDMH – Unsymmetrical dimethylhydrazine

Table 2 Container #10159 Volatile Organic Compounds TCLP Sample Detections

Sample ID	Analyte	CAS No.	Results (µg/L)	QA Flag	MDL (µg/L)	MRL (µg/L)	Method
2202090940	Dichloromethane	75-09-2	1,600	—	n/a	50	8260C

CAS No. – Chemical Abstracts Service Registry Number
n/a – not available

Table 3 Container #10159 and #10164 TCLP Metals Waste Characterization Sample Detections

Sample ID	Analyte	CAS No.	Results (mg/L)	QA Flag	MDL (mg/L)	MRL (mg/L)	Method	40 CFR 261.24 Limit (mg/L)	40 CFR 268.48 UTS (mg/L)
2202090941 (#10159)	Barium	7440-39-3	1.6	—	0.5	1.0	6010C	100.0	21.0
2202090941 (#10159)	Thallium	7440-28-0	0.024	—	0.010	0.010	6010C	n/a	0.020
2202090942 (#10159 Duplicate)	Barium	7440-39-3	1.7	—	0.5	1.0	6010C	100.0	21.0
2202090942 (#10159 Duplicate)	Thallium	7440-28-0	0.024	—	0.010	0.010	6010C	n/a	0.020
2202090923 (#10164)	Barium	7440-39-3	1.7	—	0.5	1.0	6010C	100.0	21.0
2202090923 (#10164)	Thallium	7440-28-0	0.018	—	0.010	0.010	6010C	n/a	0.020

CAS No. – Chemical Abstracts Service Registry Number
n/a – not applicable
UTS – Universal Treatment Standard

Table 4 Container #10159 and #10164 N-Nitrosodimethylamine (NDMA) Waste Characterization Results

WSTF Sample ID	Results	Units	Flag
2202090948 (#10159)	156	pg/g	J
2202090949 (#10159 Duplicate)	81	pg/g	J
2202090928 (#10164)	93	pg/g	J
2202090929 (#10164 Duplicate)	83	pg/g	J

J – The result is an estimated value less than the practical quantitation limit, but greater than or equal to the method detection limit

Enclosure 3a
ALS Laboratory Results

February 24, 2022 Service Request No:R2201212

J.R. Hennessey
NASA/WSTF/Navarro
P.O. Box 20
Las Cruces, NM 88004

Laboratory Results for: White Sands Test Facility

Dear J.R.,

Enclosed are the results of the sample(s) submitted to our laboratory February 11, 2022
For your reference, these analyses have been assigned our service request number **R2201212.**

All testing was performed according to our laboratory's quality assurance program and met the requirements of the TNI standards except as noted in the case narrative report. Any testing not included in the lab's accreditation is identified on a Non-Certified Analytes report. All results are intended to be considered in their entirety. ALS Environmental is not responsible for use of less than the complete report. Results apply only to the individual samples submitted to the lab for analysis, as listed in the report. The measurement uncertainty of the results included in this report is within that expected when using the prescribed method(s), and represented by Laboratory Control Sample control limits. Any events, such as QC failures or Holding Time exceedances, which may add to the uncertainty are explained in the report narrative or are flagged with qualifiers. The flags are explained in the Report Qualifiers and Definitions page of this report.

Please contact me if you have any questions. My extension is 7472. You may also contact me via email at Janice.Jaeger@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janice Jaeger
Project Manager

ADDRESS 1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
PHONE +1 585 288 5380 | FAX +1 585 288 8475
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

ALS Environmental

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility
Sample Matrix: Soil, Water

Service Request: R2201212
Date Received: 02/11/2022

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Ten soil, water samples were received for analysis at ALS Environmental on 02/11/2022. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

General Chemistry:

No significant anomalies were noted with this analysis.

Volatiles by GC/MS:

Method 8260C, 02/15/2022: The upper control criterion was exceeded for one or more analytes in the Laboratory Control Sample (LCS). There were no detections of the analyte(s) above the MRL in the associated field samples. The error associated with elevated recovery equates to a high bias. The sample data is not significantly affected. No further corrective action was appropriate.

Method 8260C, 02/15/2022: The upper control limit was exceeded for one or more analytes in the Continuing Calibration Verification (CCV). The field samples analyzed in this sequence did not contain the analyte(s) in question above the Method Reporting Limit (MRL). Since the exceedance equates to a potential high bias, the data quality was not significantly affected and no further corrective action was taken.

Method 8260C, 02/14/2022: The lower control limit was exceeded for one or more analytes in the Continuing Calibration Verification (CCV). Since there were no detections of the analyte(s) above the MRL in the associated field samples, the quantitation is not affected. The data quality was not significantly affected and no further corrective action was taken.

Approved by _____ Date 02/24/2022

SAMPLE DETECTION SUMMARY

CLIENT ID: 2202090840 1451			Lab ID: R2201212-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
2-Butanone (MEK)	11		0.78	5.0	ug/L	8260C
4-Methyl-2-pentanone	5.0	J	0.20	5.0	ug/L	8260C
Acetone	80		5.0	5.0	ug/L	8260C
Benzene	4.9		0.20	1.0	ug/L	8260C
Bromoform	0.51	J	0.25	1.0	ug/L	8260C
Dibromochloromethane	0.46	J	0.20	1.0	ug/L	8260C
Toluene	2.4		0.20	1.0	ug/L	8260C

CLIENT ID: 2202090841 1451			Lab ID: R2201212-002			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Barium, Total	0.067		0.003	0.020	mg/L	6010C
Chromium, Total	0.014		0.002	0.010	mg/L	6010C
Vanadium, Total	0.009	J	0.0007	0.050	mg/L	6010C
Zinc, Total	0.009	J	0.003	0.020	mg/L	6010C

CLIENT ID: 2202090805 1452			Lab ID: R2201212-003			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
2-Butanone (MEK)	7.7		0.78	5.0	ug/L	8260C
4-Methyl-2-pentanone	7.3		0.20	5.0	ug/L	8260C
Acetone	57		5.0	5.0	ug/L	8260C
Benzene	1.6		0.20	1.0	ug/L	8260C
Dibromochloromethane	0.73	J	0.20	1.0	ug/L	8260C
Toluene	0.77	J	0.20	1.0	ug/L	8260C

CLIENT ID: 2202090806 1452			Lab ID: R2201212-004			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Barium, Total	0.082		0.003	0.020	mg/L	6010C
Chromium, Total	0.004	J	0.002	0.010	mg/L	6010C
Vanadium, Total	0.005	J	0.0007	0.050	mg/L	6010C
Zinc, Total	0.018	J	0.003	0.020	mg/L	6010C

CLIENT ID: 2202090944 10159			Lab ID: R2201212-005			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Total Solids	93.8				Percent	ALS SOP

CLIENT ID: 2202090924 10164			Lab ID: R2201212-006			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Total Solids	95.5				Percent	ALS SOP

CLIENT ID: 2202090925 10164			Lab ID: R2201212-007			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Total Solids	94.7				Percent	ALS SOP

SAMPLE DETECTION SUMMARY

CLIENT ID: 2202090945 10159			Lab ID: R2201212-008			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Total Solids	93.4				Percent	ALS SOP
Arsenic, Total	1.17		0.70	0.97	mg/Kg	6010C
Barium, Total	134		1.5	1.9	mg/Kg	6010C
Beryllium, Total	0.43		0.03	0.29	mg/Kg	6010C
Cadmium, Total	0.14	J	0.09	0.49	mg/Kg	6010C
Chromium, Total	3.27		0.35	0.97	mg/Kg	6010C
Lead, Total	4.7	J	0.4	4.9	mg/Kg	6010C
Nickel, Total	3.2	J	0.7	3.9	mg/Kg	6010C
Thallium, Total	3.95		0.65	0.97	mg/Kg	6010C
Vanadium, Total	51.2		0.07	4.9	mg/Kg	6010C
Zinc, Total	48.9		1.4	1.9	mg/Kg	6010C

CLIENT ID: 2202090946 10159			Lab ID: R2201212-009			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Total Solids	93.6				Percent	ALS SOP
Arsenic, Total	0.89	J	0.70	0.97	mg/Kg	6010C
Barium, Total	165		1.5	1.9	mg/Kg	6010C
Beryllium, Total	0.40		0.03	0.29	mg/Kg	6010C
Cadmium, Total	0.16	J	0.09	0.49	mg/Kg	6010C
Chromium, Total	3.59		0.35	0.97	mg/Kg	6010C
Lead, Total	4.9		0.4	4.9	mg/Kg	6010C
Nickel, Total	3.1	J	0.7	3.9	mg/Kg	6010C
Thallium, Total	3.94		0.65	0.97	mg/Kg	6010C
Vanadium, Total	54.0		0.07	4.9	mg/Kg	6010C
Zinc, Total	47.9		1.4	1.9	mg/Kg	6010C

CLIENT ID: 2202090927 10164			Lab ID: R2201212-010			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Total Solids	95.1				Percent	ALS SOP
Arsenic, Total	0.9	J	0.8	1.0	mg/Kg	6010C
Barium, Total	280		1.6	2.0	mg/Kg	6010C
Beryllium, Total	0.84		0.03	0.30	mg/Kg	6010C
Cadmium, Total	0.14	J	0.09	0.51	mg/Kg	6010C
Chromium, Total	7.4		0.4	1.0	mg/Kg	6010C
Lead, Total	8.4		0.5	5.1	mg/Kg	6010C
Nickel, Total	8.7		0.7	4.0	mg/Kg	6010C
Vanadium, Total	54.3		0.07	5.1	mg/Kg	6010C
Zinc, Total	61.2		1.5	2.0	mg/Kg	6010C

Sample Receipt Information

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Client: NASA/WSTF/Navarro **Service Request:**R2201212
Project: White Sands Test Facility/20EC017B

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
R2201212-001	2202090840 1451	2/9/2022	
R2201212-002	2202090841 1451	2/9/2022	
R2201212-003	2202090805 1452	2/9/2022	
R2201212-004	2202090806 1452	2/9/2022	
R2201212-005	2202090944 10159	2/9/2022	
R2201212-006	2202090924 10164	2/9/2022	
R2201212-007	2202090925 10164	2/9/2022	
R2201212-008	2202090945 10159	2/9/2022	
R2201212-009	2202090946 10159	2/9/2022	
R2201212-010	2202090927 10164	2/9/2022	

Date: February 10, 2022

Laboratory PO's # 20EC017B-C3

Return Address for Analytical Reports

NASA WSTF Environmental Department
12,600 NASA Road
Las Cruces, NM 88012

Attn: ☒ Brian Barrick ☒
Other_____
(575) 524-5468

Analytical Requirements

Special Instructions
Please return coolers and reusable packaging materials as soon as possible.

Return Address:

NASA WSTF Environmental Department
12600 NASA Road, Bldg. 120
Las Cruces, NM 88012
Attn: Brian Barrick

Sample No.	Sample Location	# of Containers	Sample Type: Solid (S), Aqueous (A)	**TCLP** Volatile Organic Compounds – SW-846 Method 8260B incorporating EPA Method 1311 1 ea., 8-9 oz. Amber Jar, Ice	**TCLP** Metals –SW-846 Methods 6010C and 7740A incorporating EPA Method 1311 1 ea., 8-9 oz. Amber Jar, Ice	**Total** Volatile Organic Compounds – SW-846 Method 8260B A: 3 ea., 40-mL VOA, Ice/ S: 1 ea., 8-9 oz. Amber Jar, Ice	**Total** Metals – SW-846 Methods 6010C and 7740A A: 2 ea., 125-mL Poly, HNO_3, Ice / S: 1 ea., 8-9 oz Amber Jar, Ice		Comments WSTF Info: CP1.21EEHWMU.0003-505-005
2202090840	1451	3	A			X			
2202090841	1451	3	A				X		
2202090805	1452	3	A			X			
2202090806	1452	3	A				X		
2202090940	10159	1	S	X					
2202090920	10164	1	S	X					
2202090921	10164	1	S	X					
2202090922	10164	1	S	X					Matrix Spike for 2202090920
2202090941	10159	1	S		X				
2202090942	10159	1	S		X				
2202090943	10159	1	S		X				Matrix Spike for 2202090941
2202090923	10164	1	S		X				
2202090944	10159	1	S			X			
2202090924	10164	1	S			X			

Relinquished By:	*Date/Time:*	*Accepted By:*	*Date/Time:*
	10 Feb 22 1049 hrs		2/11/22 0845

R2201212 5
NASA/WSTF/Navarro
White Sands Test Facility

WSTF – 381C (02/15)

Laboratory PO's # 20EC017B-C3

Return Address for Analytical Reports

NASA WSTF Environmental Department
12,600 NASA Road
Las Cruces, NM 88012

Attn: ☒ Brian Barrick ☒
Other_____
(575) 524-5468

Analytical Requirements

Sample No.	Sample Location	# of Containers	Sample Type: Solid (S), Aqueous (A)	TCLP Volatile Organic Compounds – SW-846 Method 8260B incorporating EPA Method 1311 1 ea., 8-9 oz. Amber Jar, Ice	TCLP Metals –SW-846 Methods 6010C and 7740A incorporating EPA Method 1311 1 ea., 8-9 oz. Amber Jar, Ice	Total Volatile Organic Compounds – SW-846 Method 8260B A: 3 ea., 40-mL VOA, Ice/ S: 1 ea., 8-9 oz. Amber Jar, Ice	Total Metals – SW-846 Methods 6010C and 7740A A: 2 ea., 125-mL Poly, HNO_3, Ice / S: 1 ea., 8-9 oz Amber Jar, Ice		Comments
									WSTF Info: CP1.21EEHWMU.0003-505-005
2202090925	10164	1	S			X			
2202090926	10164	1	S			X			Matrix Spike for 2202090924
2202090945	10159	1	S				X		
2202090946	10159	1	S				X		
2202090947	10159	1	S				X		Matrix Spike for 2202090945
2202090927	10164	1	S				X		

Special Instructions
Please return coolers and reusable packaging materials as soon as possible.

Return Address:

NASA WSTF Environmental Department
12600 NASA Road, Bldg. 120
Las Cruces, NM 88012
Attn: Brian Barrick

R2201212 5
NASA/WSTF/Navarro
White Sands Test Facility

Relinquished By:	Date/Time:		Accepted By:	Date/Time:
	10 Feb 22 1049 MST			2/11/22 0825

WSTF – 381C (02/15)

Cooler Receipt and Preservation Check Form

Project/Client NASA Folder Number

Cooler received on 2/11/22 by: CA

COURIER: ALS UPS (FEDEX) VELOCITY CLIENT

1	Were **Custody seals** on outside of cooler?	(Y) N
2	**Custody papers** properly completed (ink, signed)?	(Y) N
3	Did all bottles arrive in good **condition** (unbroken)?	Y (N)
4	Circle: (Wet Ice) **Dry Ice** (Gel packs) present?	(Y) N

5a	**Perchlorate** samples have required headspace?	Y N (NA)
5b	Did VOA vials, Alk,or Sulfide have sig* **bubbles**?	(Y) N NA
6	Where did the bottles originate?	(ALS/ROC) (CLIENT)
7	Soil VOA received as:	(Bulk) Encore 5035set (NA)

8. Temperature Readings Date: 2/11/22 Time: 0845 ID: IR#7 (IR#11) From: Temp Blank (Sample Bottle)

Observed Temp (°C)	4.2	3.4					
Within 0-6°C?	(Y) N	(Y) N	Y N	Y N	Y N	Y N	Y N
If <0°C, were samples frozen?	Y N	Y N	Y N	Y N	Y N	Y N	Y N

If out of Temperature, note packing/ice condition: _____ Ice melted Poorly Packed (described below) Same Day Rule

&Client Approval to Run Samples: _____ Standing Approval Client aware at drop-off Client notified by: _____

All samples held in storage location: R-002 by CA on 2/11/22 at 0853
5035 samples placed in storage location: _____ by _____ on _____ at _____ within 48 hours of sampling? Y N

Cooler Breakdown/Preservation Check**: Date: 2/11/22 Time: 1200 by: (AD)

9. Were all bottle labels complete (*i.e.* analysis, preservation, etc.)? (YES) NO
10. Did all bottle labels and tags agree with custody papers? (YES) NO
11. Were correct containers used for the tests indicated? (YES) NO
12. Were 5035 vials acceptable (no extra labels, not leaking)? YES NO N/A
13. Air Samples: Cassettes / Tubes Intact Y / N with MS Y / N Canisters Pressurized Tedlar® Bags Inflated (N/A)

pH	Lot of test paper	Reagent	Preserved? Yes	Preserved? No	Lot Received	Exp	Sample ID Adjusted	Vol. Added	Lot Added	Final pH
≥12		NaOH								
≤2	025320	HNO_3	✓		1121061					
≤2		H_2SO_4								
<4		$NaHSO_4$								
5-9		For 608pest			No=Notify for 3day					
Residual Chlorine (-)		For CN, Phenol, 625, 608pest, 522			If +, contact PM to add $Na_2S_2O_3$ (625, 608, CN), ascorbic (phenol).					
		$Na_2S_2O_3$								
		ZnAcetate	-	-			**VOAs and 1664 Not to be tested before analysis. Otherwise, all bottles of all samples with chemical preservatives are checked (not just representatives).			
		HCl	**	**						

Bottle lot numbers: Client, 2109-10

Explain all Discrepancies/ Other Comments:

Reid broken < 220209840 - 1451 Initial and Initial headspace — due to freezing
220209845 - 1451 Initial " " " —

HPROD	(BULK)
HTR	FLDT
SUB	HGFB
ALS	LL3541

Labels secondary reviewed by: CA
PC Secondary Review: JW 2/14/22 *significant air bubbles: VOA > 5-6 mm : WC >1 in. diameter

Miscellaneous Forms

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

REPORT QUALIFIERS AND DEFINITIONS

U	Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J	Estimated value due to either being a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration. For DoD: concentration >40% difference between two GC columns (pesticides/Arclors).
B	Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
E	Inorganics- Concentration is estimated due to the serial dilution was outside control limits.
E	Organics- Concentration has exceeded the calibration range for that specific analysis.
D	Concentration is a result of a dilution, typically a secondary analysis of the sample due to exceeding the calibration range or that a surrogate has been diluted out of the sample and cannot be assessed.
*	Indicates that a quality control parameter has exceeded laboratory limits. Under the "Notes" column of the Form I, this qualifier denotes analysis was performed out of Holding Time.
H	Analysis was performed out of hold time for tests that have an "immediate" hold time criteria.
#	Spike was diluted out.
+	Correlation coefficient for MSA is <0.995.
N	Inorganics- Matrix spike recovery was outside laboratory limits.
N	Organics- Presumptive evidence of a compound (reported as a TIC) based on the MS library search.
S	Concentration has been determined using Method of Standard Additions (MSA).
W	Post-Digestion Spike recovery is outside control limits and the sample absorbance is <50% of the spike absorbance.
P	Concentration >40% difference between the two GC columns.
C	Confirmed by GC/MS
Q	DoD reports: indicates a pesticide/Aroclor is not confirmed (≥100% Difference between two GC columns).
X	See Case Narrative for discussion.
MRL LOQ	Method Reporting Limit. Also known as: Limit of Quantitation (LOQ) The lowest concentration at which the method analyte may be reliably quantified under the method conditions.
MDL	Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).
LOD	Limit of Detection. A value at or above the MDL which has been verified to be detectable.
ND	Non-Detect. Analyte was not detected at the concentration listed. Same as U qualifier.

Rochester Lab ID # for State Accreditations[1]

NELAP States
Florida ID # E87674
New Hampshire ID # 2941
New York ID # 10145
Pennsylvania ID# 68-786
Virginia #460167

Non-NELAP States
Connecticut ID #PH0556
Delaware Approved
Maine ID #NY01587
North Carolina #36701
North Carolina #676
Rhode Island LAO00333

[1] Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state or agency requirements. The test results meet requirements of the current NELAP/TNI standards or state or agency requirements, where applicable, except as noted in the case narrative. Since not all analyte/method/matrix combinations are offered for state/NELAC accreditation, this report may contain results which are not accredited. For a specific list of accredited analytes, contact the laboratory or go to https://www.alsglobal.com/locations/americas/north-america/usa/new-york/rochester-environmental

ALS Laboratory Group

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Client: NASA/WSTF/Navarro **Service Request:** R2201212
Project: White Sands Test Facility/20EC017B

Non-Certified Analytes

Certifying Agency: New York Department of Health

Method	Matrix	Analyte
ALS SOP	Soil	Total Solids

Client: NASA/WSTF/Navarro **Service Request:** R2201212
Project: White Sands Test Facility/20EC017B

Sample Name: 2202090840 1451 **Date Collected:** 02/9/22
Lab Code: R2201212-001 **Date Received:** 02/11/22
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
8260C		FNAEGLER

Sample Name: 2202090841 1451 **Date Collected:** 02/9/22
Lab Code: R2201212-002 **Date Received:** 02/11/22
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
6010C	BDIAMOND	KMCLAEN
7470A	BDIAMOND	BDIAMOND

Sample Name: 2202090805 1452 **Date Collected:** 02/9/22
Lab Code: R2201212-003 **Date Received:** 02/11/22
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
8260C		FNAEGLER

Sample Name: 2202090806 1452 **Date Collected:** 02/9/22
Lab Code: R2201212-004 **Date Received:** 02/11/22
Sample Matrix: Water

Analysis Method	Extracted/Digested By	Analyzed By
6010C	BDIAMOND	KMCLAEN
7470A	BDIAMOND	BDIAMOND

Client: NASA/WSTF/Navarro **Service Request:** R2201212
Project: White Sands Test Facility/20EC017B

Sample Name: 2202090944 10159 **Date Collected:** 02/9/22
Lab Code: R2201212-005 **Date Received:** 02/11/22
Sample Matrix: Soil

Analysis Method	Extracted/Digested By	Analyzed By
8260C		FNAEGLER
ALS SOP		KAWONG

Sample Name: 2202090924 10164 **Date Collected:** 02/9/22
Lab Code: R2201212-006 **Date Received:** 02/11/22
Sample Matrix: Soil

Analysis Method	Extracted/Digested By	Analyzed By
8260C		FNAEGLER
ALS SOP		KAWONG

Sample Name: 2202090925 10164 **Date Collected:** 02/9/22
Lab Code: R2201212-007 **Date Received:** 02/11/22
Sample Matrix: Soil

Analysis Method	Extracted/Digested By	Analyzed By
8260C		FNAEGLER
ALS SOP		KAWONG

Sample Name: 2202090945 10159 **Date Collected:** 02/9/22
Lab Code: R2201212-008 **Date Received:** 02/11/22
Sample Matrix: Soil

Analysis Method	Extracted/Digested By	Analyzed By
6010C	BDIAMOND	KMCLAEN
7471B	BDIAMOND	BDIAMOND
ALS SOP		KAWONG

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B		

Sample Name:	2202090946 10159	**Date Collected:**	02/9/22
Lab Code:	R2201212-009	**Date Received:**	02/11/22
Sample Matrix:	Soil		

Analysis Method	Extracted/Digested By	Analyzed By
6010C	BDIAMOND	KMCLAEN
7471B	BDIAMOND	BDIAMOND
ALS SOP		KAWONG

Sample Name:	2202090927 10164	**Date Collected:**	02/9/22
Lab Code:	R2201212-010	**Date Received:**	02/11/22
Sample Matrix:	Soil		

Analysis Method	Extracted/Digested By	Analyzed By
6010C	BDIAMOND	KMCLAEN
7471B	BDIAMOND	BDIAMOND
ALS SOP		KAWONG

The preparation methods associated with this report are found in these tables unless discussed in the case narrative.

Water/Liquid Matrix

Analytical Method	Preparation Method
200.7	200.2
200.8	200.2
6010C	3005A/3010A
6020A	ILM05.3
9034 Sulfide Acid Soluble	9030B
SM 4500-CN-E Residual Cyanide	SM 4500-CN-G
SM 4500-CN-E WAD Cyanide	SM 4500-CN-I

Solid/Soil/Non-Aqueous Matrix

Analytical Method	Preparation Method
6010C	3050B
6020A	3050B
6010C TCLP (1311) extract	3005A/3010A
6010 SPLP (1312) extract	3005A/3010A
7199	3060A
300.0 Anions/ 350.1/ 353.2/ SM 2320B/ SM 5210B/ 9056A Anions	DI extraction
For analytical methods not listed, the preparation method is the same as the analytical method reference.	

Sample Results

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Volatile Organic Compounds by GC/MS

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090944 10159	**Units:**	ug/Kg
Lab Code:	R2201212-005	**Basis:**	Dry

Volatile Organic Compounds by GC/MS, Unp

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
1,1,1,2-Tetrachloroethane	ND U	5.3	0.22	1	02/15/22 14:50	
1,1,1-Trichloroethane (TCA)	ND U	5.3	0.22	1	02/15/22 14:50	
1,1,2,2-Tetrachloroethane	ND U	5.3	0.47	1	02/15/22 14:50	
1,1,2-Trichloroethane	ND U	5.3	0.22	1	02/15/22 14:50	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND U	5.3	0.22	1	02/15/22 14:50	
1,1-Dichloroethene (1,1-DCE)	ND U	5.3	0.31	1	02/15/22 14:50	
1,2,3-Trichloropropane	ND U	5.3	0.22	1	02/15/22 14:50	
1,2-Dibromo-3-chloropropane (DBCP)	ND U	5.3	0.80	1	02/15/22 14:50	
1,2-Dibromoethane	ND U	5.3	0.22	1	02/15/22 14:50	
1,2-Dichlorobenzene	ND U	5.3	0.22	1	02/15/22 14:50	
1,2-Dichloroethane	ND U	5.3	0.22	1	02/15/22 14:50	
1,2-Dichloropropane	ND U	5.3	0.22	1	02/15/22 14:50	
1,3-Dichlorobenzene	ND U	5.3	0.22	1	02/15/22 14:50	
1,4-Dioxane	ND U	110	22	1	02/15/22 14:50	
2-Butanone (MEK)	ND U	5.3	2.2	1	02/15/22 14:50	
2-Chloro-1,3-butadiene	ND U	5.3	0.22	1	02/15/22 14:50	
2-Chloroethyl Vinyl Ether	ND U	5.3	0.50	1	02/15/22 14:50	
Isobutyl Alcohol	ND U	110	19	1	02/15/22 14:50	
Allyl Chloride	ND U	5.3	0.26	1	02/15/22 14:50	
4-Methyl-2-pentanone	ND U	5.3	0.25	1	02/15/22 14:50	
Acetone	ND U	5.3	5.1	1	02/15/22 14:50	
Acetonitrile	ND U	27	12	1	02/15/22 14:50	
Acrolein	ND U	27	1.3	1	02/15/22 14:50	
Acrylonitrile	ND U	27	0.95	1	02/15/22 14:50	
Benzene	ND U	5.3	0.22	1	02/15/22 14:50	
Bromodichloromethane	ND U	5.3	0.22	1	02/15/22 14:50	
Bromoform	ND U	5.3	0.54	1	02/15/22 14:50	
Bromomethane	ND U	5.3	2.3	1	02/15/22 14:50	
Carbon Disulfide	ND U	5.3	0.31	1	02/15/22 14:50	
Carbon Tetrachloride	ND U	5.3	0.28	1	02/15/22 14:50	
Chlorobenzene	ND U	5.3	0.22	1	02/15/22 14:50	
Chloroethane	ND U	5.3	0.44	1	02/15/22 14:50	
Chloroform	ND U	5.3	0.22	1	02/15/22 14:50	
Chloromethane	ND U	5.3	1.5	1	02/15/22 14:50	
Dibromochloromethane	ND U	5.3	0.22	1	02/15/22 14:50	
Dibromomethane	ND U	5.3	0.22	1	02/15/22 14:50	
Dichlorodifluoromethane (CFC 12)	ND U	5.3	0.36	1	02/15/22 14:50	
Dichloromethane	ND U	5.3	3.0	1	02/15/22 14:50	
Ethyl Methacrylate	ND U	5.3	0.22	1	02/15/22 14:50	
Ethylbenzene	ND U	5.3	0.22	1	02/15/22 14:50	
Iodomethane	ND U	11	5.6	1	02/15/22 14:50	
Methacrylonitrile	ND U	5.3	0.25	1	02/15/22 14:50	
Methyl Methacrylate	ND U	5.3	0.22	1	02/15/22 14:50	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090944 10159	**Units:**	ug/Kg
Lab Code:	R2201212-005	**Basis:**	Dry

Volatile Organic Compounds by GC/MS, Unp

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Naphthalene	ND U	5.3	1.1	1	02/15/22 14:50	
Propionitrile	ND U	27	1.3	1	02/15/22 14:50	
Tetrachloroethene (PCE)	ND U	5.3	0.25	1	02/15/22 14:50	
Toluene	ND U	5.3	0.22	1	02/15/22 14:50	
Trichloroethene (TCE)	ND U	5.3	0.24	1	02/15/22 14:50	
Trichlorofluoromethane (CFC 11)	ND U	5.3	0.28	1	02/15/22 14:50	
Vinyl Chloride	ND U	5.3	0.50	1	02/15/22 14:50	
cis-1,3-Dichloropropene	ND U	5.3	0.22	1	02/15/22 14:50	
m,p-Xylenes	ND U	11	0.40	1	02/15/22 14:50	
o-Xylene	ND U	5.3	0.22	1	02/15/22 14:50	
trans-1,2-Dichloroethene	ND U	5.3	0.22	1	02/15/22 14:50	
trans-1,3-Dichloropropene	ND U	5.3	0.22	1	02/15/22 14:50	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	104	31 - 154	02/15/22 14:50	
Dibromofluoromethane	100	63 - 138	02/15/22 14:50	
Toluene-d8	102	66 - 138	02/15/22 14:50	

Tentatively Identified Compounds

CAS#	Compound Identification	RT	Result ug/Kg	Q
	unknown	1.48	8.4	J
000124-19-6	Nonanal	12.86	8.4	JN

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090924 10164	**Units:**	ug/Kg
Lab Code:	R2201212-006	**Basis:**	Dry

Volatile Organic Compounds by GC/MS, Unp

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
1,1,1,2-Tetrachloroethane	ND U	5.2	0.21	1	02/15/22 15:13	
1,1,1-Trichloroethane (TCA)	ND U	5.2	0.21	1	02/15/22 15:13	
1,1,2,2-Tetrachloroethane	ND U	5.2	0.47	1	02/15/22 15:13	
1,1,2-Trichloroethane	ND U	5.2	0.21	1	02/15/22 15:13	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND U	5.2	0.21	1	02/15/22 15:13	
1,1-Dichloroethene (1,1-DCE)	ND U	5.2	0.31	1	02/15/22 15:13	
1,2,3-Trichloropropane	ND U	5.2	0.21	1	02/15/22 15:13	
1,2-Dibromo-3-chloropropane (DBCP)	ND U	5.2	0.79	1	02/15/22 15:13	
1,2-Dibromoethane	ND U	5.2	0.21	1	02/15/22 15:13	
1,2-Dichlorobenzene	ND U	5.2	0.21	1	02/15/22 15:13	
1,2-Dichloroethane	ND U	5.2	0.21	1	02/15/22 15:13	
1,2-Dichloropropane	ND U	5.2	0.21	1	02/15/22 15:13	
1,3-Dichlorobenzene	ND U	5.2	0.21	1	02/15/22 15:13	
1,4-Dioxane	ND U	100	21	1	02/15/22 15:13	
2-Butanone (MEK)	ND U	5.2	2.1	1	02/15/22 15:13	
2-Chloro-1,3-butadiene	ND U	5.2	0.21	1	02/15/22 15:13	
2-Chloroethyl Vinyl Ether	ND U	5.2	0.49	1	02/15/22 15:13	
Isobutyl Alcohol	ND U	100	18	1	02/15/22 15:13	
Allyl Chloride	ND U	5.2	0.26	1	02/15/22 15:13	
4-Methyl-2-pentanone	ND U	5.2	0.25	1	02/15/22 15:13	
Acetone	ND U	5.2	5.0	1	02/15/22 15:13	
Acetonitrile	ND U	26	12	1	02/15/22 15:13	
Acrolein	ND U	26	1.3	1	02/15/22 15:13	
Acrylonitrile	ND U	26	0.94	1	02/15/22 15:13	
Benzene	ND U	5.2	0.21	1	02/15/22 15:13	
Bromodichloromethane	ND U	5.2	0.21	1	02/15/22 15:13	
Bromoform	ND U	5.2	0.53	1	02/15/22 15:13	
Bromomethane	ND U	5.2	2.2	1	02/15/22 15:13	
Carbon Disulfide	ND U	5.2	0.31	1	02/15/22 15:13	
Carbon Tetrachloride	ND U	5.2	0.28	1	02/15/22 15:13	
Chlorobenzene	ND U	5.2	0.21	1	02/15/22 15:13	
Chloroethane	ND U	5.2	0.43	1	02/15/22 15:13	
Chloroform	ND U	5.2	0.21	1	02/15/22 15:13	
Chloromethane	ND U	5.2	1.5	1	02/15/22 15:13	
Dibromochloromethane	ND U	5.2	0.21	1	02/15/22 15:13	
Dibromomethane	ND U	5.2	0.21	1	02/15/22 15:13	
Dichlorodifluoromethane (CFC 12)	ND U	5.2	0.35	1	02/15/22 15:13	
Dichloromethane	ND U	5.2	3.0	1	02/15/22 15:13	
Ethyl Methacrylate	ND U	5.2	0.21	1	02/15/22 15:13	
Ethylbenzene	ND U	5.2	0.21	1	02/15/22 15:13	
Iodomethane	ND U	10	5.5	1	02/15/22 15:13	
Methacrylonitrile	ND U	5.2	0.25	1	02/15/22 15:13	
Methyl Methacrylate	ND U	5.2	0.21	1	02/15/22 15:13	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090924 10164	**Units:**	ug/Kg
Lab Code:	R2201212-006	**Basis:**	Dry

Volatile Organic Compounds by GC/MS, Unp

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Naphthalene	ND U	5.2	1.1	1	02/15/22 15:13	
Propionitrile	ND U	26	1.3	1	02/15/22 15:13	
Tetrachloroethene (PCE)	ND U	5.2	0.25	1	02/15/22 15:13	
Toluene	ND U	5.2	0.21	1	02/15/22 15:13	
Trichloroethene (TCE)	ND U	5.2	0.24	1	02/15/22 15:13	
Trichlorofluoromethane (CFC 11)	ND U	5.2	0.28	1	02/15/22 15:13	
Vinyl Chloride	ND U	5.2	0.49	1	02/15/22 15:13	
cis-1,3-Dichloropropene	ND U	5.2	0.21	1	02/15/22 15:13	
m,p-Xylenes	ND U	10	0.39	1	02/15/22 15:13	
o-Xylene	ND U	5.2	0.21	1	02/15/22 15:13	
trans-1,2-Dichloroethene	ND U	5.2	0.21	1	02/15/22 15:13	
trans-1,3-Dichloropropene	ND U	5.2	0.21	1	02/15/22 15:13	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	106	31 - 154	02/15/22 15:13	
Dibromofluoromethane	98	63 - 138	02/15/22 15:13	
Toluene-d8	103	66 - 138	02/15/22 15:13	

Tentatively Identified Compounds

CAS#	Compound Identification	RT	Result ug/Kg	Q
	unknown	1.49	8.2	J
000124-19-6	Nonanal	12.87	12	JN

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090925 10164	**Units:**	ug/Kg
Lab Code:	R2201212-007	**Basis:**	Dry

Volatile Organic Compounds by GC/MS, Unp

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
1,1,1,2-Tetrachloroethane	ND U	5.3	0.22	1	02/15/22 15:36	
1,1,1-Trichloroethane (TCA)	ND U	5.3	0.22	1	02/15/22 15:36	
1,1,2,2-Tetrachloroethane	ND U	5.3	0.47	1	02/15/22 15:36	
1,1,2-Trichloroethane	ND U	5.3	0.22	1	02/15/22 15:36	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND U	5.3	0.22	1	02/15/22 15:36	
1,1-Dichloroethene (1,1-DCE)	ND U	5.3	0.31	1	02/15/22 15:36	
1,2,3-Trichloropropane	ND U	5.3	0.22	1	02/15/22 15:36	
1,2-Dibromo-3-chloropropane (DBCP)	ND U	5.3	0.80	1	02/15/22 15:36	
1,2-Dibromoethane	ND U	5.3	0.22	1	02/15/22 15:36	
1,2-Dichlorobenzene	ND U	5.3	0.22	1	02/15/22 15:36	
1,2-Dichloroethane	ND U	5.3	0.22	1	02/15/22 15:36	
1,2-Dichloropropane	ND U	5.3	0.22	1	02/15/22 15:36	
1,3-Dichlorobenzene	ND U	5.3	0.22	1	02/15/22 15:36	
1,4-Dioxane	ND U	110	22	1	02/15/22 15:36	
2-Butanone (MEK)	ND U	5.3	2.2	1	02/15/22 15:36	
2-Chloro-1,3-butadiene	ND U	5.3	0.22	1	02/15/22 15:36	
2-Chloroethyl Vinyl Ether	ND U	5.3	0.49	1	02/15/22 15:36	
Isobutyl Alcohol	ND U	110	18	1	02/15/22 15:36	
Allyl Chloride	ND U	5.3	0.26	1	02/15/22 15:36	
4-Methyl-2-pentanone	ND U	5.3	0.25	1	02/15/22 15:36	
Acetone	ND U	5.3	5.0	1	02/15/22 15:36	
Acetonitrile	ND U	26	12	1	02/15/22 15:36	
Acrolein	ND U	26	1.3	1	02/15/22 15:36	
Acrylonitrile	ND U	26	0.94	1	02/15/22 15:36	
Benzene	ND U	5.3	0.22	1	02/15/22 15:36	
Bromodichloromethane	ND U	5.3	0.22	1	02/15/22 15:36	
Bromoform	ND U	5.3	0.53	1	02/15/22 15:36	
Bromomethane	ND U	5.3	2.3	1	02/15/22 15:36	
Carbon Disulfide	ND U	5.3	0.31	1	02/15/22 15:36	
Carbon Tetrachloride	ND U	5.3	0.28	1	02/15/22 15:36	
Chlorobenzene	ND U	5.3	0.22	1	02/15/22 15:36	
Chloroethane	ND U	5.3	0.44	1	02/15/22 15:36	
Chloroform	ND U	5.3	0.22	1	02/15/22 15:36	
Chloromethane	ND U	5.3	1.5	1	02/15/22 15:36	
Dibromochloromethane	ND U	5.3	0.22	1	02/15/22 15:36	
Dibromomethane	ND U	5.3	0.22	1	02/15/22 15:36	
Dichlorodifluoromethane (CFC 12)	ND U	5.3	0.35	1	02/15/22 15:36	
Dichloromethane	ND U	5.3	3.0	1	02/15/22 15:36	
Ethyl Methacrylate	ND U	5.3	0.22	1	02/15/22 15:36	
Ethylbenzene	ND U	5.3	0.22	1	02/15/22 15:36	
Iodomethane	ND U	11	5.5	1	02/15/22 15:36	
Methacrylonitrile	ND U	5.3	0.25	1	02/15/22 15:36	
Methyl Methacrylate	ND U	5.3	0.22	1	02/15/22 15:36	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090925 10164	**Units:**	ug/Kg
Lab Code:	R2201212-007	**Basis:**	Dry

Volatile Organic Compounds by GC/MS, Unp

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Naphthalene	ND U	5.3	1.1	1	02/15/22 15:36	
Propionitrile	ND U	26	1.3	1	02/15/22 15:36	
Tetrachloroethene (PCE)	ND U	5.3	0.25	1	02/15/22 15:36	
Toluene	ND U	5.3	0.22	1	02/15/22 15:36	
Trichloroethene (TCE)	ND U	5.3	0.24	1	02/15/22 15:36	
Trichlorofluoromethane (CFC 11)	ND U	5.3	0.28	1	02/15/22 15:36	
Vinyl Chloride	ND U	5.3	0.49	1	02/15/22 15:36	
cis-1,3-Dichloropropene	ND U	5.3	0.22	1	02/15/22 15:36	
m,p-Xylenes	ND U	11	0.40	1	02/15/22 15:36	
o-Xylene	ND U	5.3	0.22	1	02/15/22 15:36	
trans-1,2-Dichloroethene	ND U	5.3	0.22	1	02/15/22 15:36	
trans-1,3-Dichloropropene	ND U	5.3	0.22	1	02/15/22 15:36	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	109	31 - 154	02/15/22 15:36	
Dibromofluoromethane	100	63 - 138	02/15/22 15:36	
Toluene-d8	102	66 - 138	02/15/22 15:36	

Tentatively Identified Compounds

CAS#	Compound Identification	RT	Result ug/Kg	Q
000124-19-6	Nonanal	12.86	14	JN

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Water	**Date Received:**	02/11/22 08:25
Sample Name:	2202090840 1451	**Units:**	ug/L
Lab Code:	R2201212-001	**Basis:**	NA

Volatile Organic Compounds by GC/MS, Unpreserved

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
1,1,1,2-Tetrachloroethane	ND U	1.0	0.20	1	02/14/22 20:18	
1,1,1-Trichloroethane (TCA)	ND U	1.0	0.20	1	02/14/22 20:18	
1,1,2,2-Tetrachloroethane	ND U	1.0	0.20	1	02/14/22 20:18	
1,1,2-Trichloroethane	ND U	1.0	0.20	1	02/14/22 20:18	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND U	1.0	0.20	1	02/14/22 20:18	
1,1-Dichloroethene (1,1-DCE)	ND U	1.0	0.20	1	02/14/22 20:18	
1,2,3-Trichloropropane	ND U	1.0	0.26	1	02/14/22 20:18	
1,2-Dibromo-3-chloropropane (DBCP)	ND U	2.0	0.45	1	02/14/22 20:18	
1,2-Dibromoethane	ND U	1.0	0.20	1	02/14/22 20:18	
1,2-Dichlorobenzene	ND U	1.0	0.20	1	02/14/22 20:18	
1,2-Dichloroethane	ND U	1.0	0.20	1	02/14/22 20:18	
1,2-Dichloropropane	ND U	1.0	0.20	1	02/14/22 20:18	
1,3-Dichlorobenzene	ND U	1.0	0.20	1	02/14/22 20:18	
1,4-Dioxane	ND U	40	13	1	02/14/22 20:18	
2-Butanone (MEK)	**11**	5.0	0.78	1	02/14/22 20:18	
2-Chloro-1,3-butadiene	ND U	1.0	0.20	1	02/14/22 20:18	
2-Chloroethyl Vinyl Ether	ND U	1.0	0.53	1	02/14/22 20:18	
2-Methyl-1-propanol (Isobutyl Alcohol)	ND U	40	33	1	02/14/22 20:18	
Allyl Chloride	ND U	5.0	0.36	1	02/14/22 20:18	
4-Methyl-2-pentanone	**5.0 J**	5.0	0.20	1	02/14/22 20:18	
Acetone	**80**	5.0	5.0	1	02/14/22 20:18	
Acetonitrile	ND U	10	5.2	1	02/14/22 20:18	
Acrolein	ND U	10	0.90	1	02/14/22 20:18	
Acrylonitrile	ND U	10	0.90	1	02/14/22 20:18	
Benzene	**4.9**	1.0	0.20	1	02/14/22 20:18	
Bromodichloromethane	ND U	1.0	0.20	1	02/14/22 20:18	
Bromoform	**0.51 J**	1.0	0.25	1	02/14/22 20:18	
Bromomethane	ND U	1.0	0.70	1	02/14/22 20:18	
Carbon Disulfide	ND U	1.0	0.42	1	02/14/22 20:18	
Carbon Tetrachloride	ND U	1.0	0.34	1	02/14/22 20:18	
Chlorobenzene	ND U	1.0	0.20	1	02/14/22 20:18	
Chloroethane	ND U	1.0	0.23	1	02/14/22 20:18	
Chloroform	ND U	1.0	0.24	1	02/14/22 20:18	
Chloromethane	ND U	1.0	0.28	1	02/14/22 20:18	
Dibromochloromethane	**0.46 J**	1.0	0.20	1	02/14/22 20:18	
Dibromomethane	ND U	1.0	0.20	1	02/14/22 20:18	
Dichlorodifluoromethane (CFC 12)	ND U	1.0	0.21	1	02/14/22 20:18	
Dichloromethane	ND U	1.0	0.65	1	02/14/22 20:18	
Ethyl Methacrylate	ND U	2.0	0.20	1	02/14/22 20:18	
Ethylbenzene	ND U	1.0	0.20	1	02/14/22 20:18	
Iodomethane	ND U	5.0	4.3	1	02/14/22 20:18	
Methacrylonitrile	ND U	2.0	0.52	1	02/14/22 20:18	
Methyl Methacrylate	ND U	2.0	0.24	1	02/14/22 20:18	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Water	**Date Received:**	02/11/22 08:25
Sample Name:	2202090840 1451	**Units:**	ug/L
Lab Code:	R2201212-001	**Basis:**	NA

Volatile Organic Compounds by GC/MS, Unpreserved

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Naphthalene	ND U	1.0	0.55	1	02/14/22 20:18	
Propionitrile	ND U	5.0	3.0	1	02/14/22 20:18	
Tetrachloroethene (PCE)	ND U	1.0	0.21	1	02/14/22 20:18	
Toluene	**2.4**	1.0	0.20	1	02/14/22 20:18	
Trichloroethene (TCE)	ND U	1.0	0.20	1	02/14/22 20:18	
Trichlorofluoromethane (CFC 11)	ND U	1.0	0.24	1	02/14/22 20:18	
Vinyl Chloride	ND U	1.0	0.20	1	02/14/22 20:18	
cis-1,3-Dichloropropene	ND U	1.0	0.20	1	02/14/22 20:18	
m,p-Xylenes	ND U	2.0	0.20	1	02/14/22 20:18	
o-Xylene	ND U	1.0	0.20	1	02/14/22 20:18	
trans-1,2-Dichloroethene	ND U	1.0	0.20	1	02/14/22 20:18	
trans-1,3-Dichloropropene	ND U	1.0	0.23	1	02/14/22 20:18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	86	85 - 122	02/14/22 20:18	
Dibromofluoromethane	87	80 - 116	02/14/22 20:18	
Toluene-d8	91	87 - 121	02/14/22 20:18	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Water	**Date Received:**	02/11/22 08:25
Sample Name:	2202090805 1452	**Units:**	ug/L
Lab Code:	R2201212-003	**Basis:**	NA

Volatile Organic Compounds by GC/MS, Unpreserved

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Q
1,1,1,2-Tetrachloroethane	ND	U	1.0	0.20	1	02/16/22 13:29	
1,1,1-Trichloroethane (TCA)	ND	U	1.0	0.20	1	02/16/22 13:29	
1,1,2,2-Tetrachloroethane	ND	U	1.0	0.20	1	02/16/22 13:29	
1,1,2-Trichloroethane	ND	U	1.0	0.20	1	02/16/22 13:29	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	U	1.0	0.20	1	02/16/22 13:29	
1,1-Dichloroethene (1,1-DCE)	ND	U	1.0	0.20	1	02/16/22 13:29	
1,2,3-Trichloropropane	ND	U	1.0	0.26	1	02/16/22 13:29	
1,2-Dibromo-3-chloropropane (DBCP)	ND	U	2.0	0.45	1	02/16/22 13:29	
1,2-Dibromoethane	ND	U	1.0	0.20	1	02/16/22 13:29	
1,2-Dichlorobenzene	ND	U	1.0	0.20	1	02/16/22 13:29	
1,2-Dichloroethane	ND	U	1.0	0.20	1	02/16/22 13:29	
1,2-Dichloropropane	ND	U	1.0	0.20	1	02/16/22 13:29	
1,3-Dichlorobenzene	ND	U	1.0	0.20	1	02/16/22 13:29	
1,4-Dioxane	ND	U	40	13	1	02/16/22 13:29	
2-Butanone (MEK)	**7.7**		5.0	0.78	1	02/16/22 13:29	
2-Chloro-1,3-butadiene	ND	U	1.0	0.20	1	02/16/22 13:29	
2-Chloroethyl Vinyl Ether	ND	U	1.0	0.53	1	02/16/22 13:29	
2-Methyl-1-propanol (Isobutyl Alcohol)	ND	U	40	33	1	02/16/22 13:29	
Allyl Chloride	ND	U	5.0	0.36	1	02/16/22 13:29	
4-Methyl-2-pentanone	**7.3**		5.0	0.20	1	02/16/22 13:29	
Acetone	**57**		5.0	5.0	1	02/16/22 13:29	
Acetonitrile	ND	U	10	5.2	1	02/16/22 13:29	
Acrolein	ND	U	10	0.90	1	02/16/22 13:29	
Acrylonitrile	ND	U	10	0.90	1	02/16/22 13:29	
Benzene	**1.6**		1.0	0.20	1	02/16/22 13:29	
Bromodichloromethane	ND	U	1.0	0.20	1	02/16/22 13:29	
Bromoform	ND	U	1.0	0.25	1	02/16/22 13:29	
Bromomethane	ND	U	1.0	0.70	1	02/16/22 13:29	
Carbon Disulfide	ND	U	1.0	0.42	1	02/16/22 13:29	
Carbon Tetrachloride	ND	U	1.0	0.34	1	02/16/22 13:29	
Chlorobenzene	ND	U	1.0	0.20	1	02/16/22 13:29	
Chloroethane	ND	U	1.0	0.23	1	02/16/22 13:29	
Chloroform	ND	U	1.0	0.24	1	02/16/22 13:29	
Chloromethane	ND	U	1.0	0.28	1	02/16/22 13:29	
Dibromochloromethane	**0.73**	**J**	1.0	0.20	1	02/16/22 13:29	
Dibromomethane	ND	U	1.0	0.20	1	02/16/22 13:29	
Dichlorodifluoromethane (CFC 12)	ND	U	1.0	0.21	1	02/16/22 13:29	
Dichloromethane	ND	U	1.0	0.65	1	02/16/22 13:29	
Ethyl Methacrylate	ND	U	2.0	0.20	1	02/16/22 13:29	
Ethylbenzene	ND	U	1.0	0.20	1	02/16/22 13:29	
Iodomethane	ND	U	5.0	4.3	1	02/16/22 13:29	
Methacrylonitrile	ND	U	2.0	0.52	1	02/16/22 13:29	
Methyl Methacrylate	ND	U	2.0	0.24	1	02/16/22 13:29	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Water	**Date Received:**	02/11/22 08:25
Sample Name:	2202090805 1452	**Units:**	ug/L
Lab Code:	R2201212-003	**Basis:**	NA

Volatile Organic Compounds by GC/MS, Unpreserved

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Naphthalene	ND U	1.0	0.55	1	02/16/22 13:29	
Propionitrile	ND U	5.0	3.0	1	02/16/22 13:29	
Tetrachloroethene (PCE)	ND U	1.0	0.21	1	02/16/22 13:29	
Toluene	**0.77 J**	1.0	0.20	1	02/16/22 13:29	
Trichloroethene (TCE)	ND U	1.0	0.20	1	02/16/22 13:29	
Trichlorofluoromethane (CFC 11)	ND U	1.0	0.24	1	02/16/22 13:29	
Vinyl Chloride	ND U	1.0	0.20	1	02/16/22 13:29	
cis-1,3-Dichloropropene	ND U	1.0	0.20	1	02/16/22 13:29	
m,p-Xylenes	ND U	2.0	0.20	1	02/16/22 13:29	
o-Xylene	ND U	1.0	0.20	1	02/16/22 13:29	
trans-1,2-Dichloroethene	ND U	1.0	0.20	1	02/16/22 13:29	
trans-1,3-Dichloropropene	ND U	1.0	0.23	1	02/16/22 13:29	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	102	85 - 122	02/16/22 13:29	
Dibromofluoromethane	104	80 - 116	02/16/22 13:29	
Toluene-d8	108	87 - 121	02/16/22 13:29	

Metals

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Water	**Date Received:**	02/11/22 08:25
Sample Name:	2202090841 1451	**Basis:**	NA
Lab Code:	R2201212-002		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony, Total	6010C	ND U	mg/L	0.060	0.007	1	02/16/22 02:13	02/14/22	
Arsenic, Total	6010C	ND U	mg/L	0.010	0.006	1	02/16/22 02:13	02/14/22	
Barium, Total	6010C	**0.067**	mg/L	0.020	0.003	1	02/16/22 02:13	02/14/22	
Beryllium, Total	6010C	ND U	mg/L	0.0030	0.0002	1	02/16/22 02:13	02/14/22	
Cadmium, Total	6010C	ND U	mg/L	0.0050	0.0004	1	02/16/22 02:13	02/14/22	
Chromium, Total	6010C	**0.014**	mg/L	0.010	0.002	1	02/16/22 02:13	02/14/22	
Lead, Total	6010C	ND U	mg/L	0.050	0.003	1	02/16/22 02:13	02/14/22	
Mercury, Total	7470A	ND U	mg/L	0.00020	0.00008	1	02/17/22 14:05	02/16/22	
Nickel, Total	6010C	ND U	mg/L	0.040	0.003	1	02/16/22 02:13	02/14/22	
Selenium, Total	6010C	ND U	mg/L	0.010	0.007	1	02/16/22 02:13	02/14/22	
Silver, Total	6010C	ND U	mg/L	0.010	0.0006	1	02/16/22 02:13	02/14/22	
Thallium, Total	6010C	ND U	mg/L	0.010	0.007	1	02/16/22 02:13	02/14/22	
Vanadium, Total	6010C	**0.009 J**	mg/L	0.050	0.0007	1	02/16/22 02:13	02/14/22	
Zinc, Total	6010C	**0.009 J**	mg/L	0.020	0.003	1	02/16/22 02:13	02/14/22	

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Water	**Date Received:**	02/11/22 08:25
Sample Name:	2202090806 1452	**Basis:**	NA
Lab Code:	R2201212-004		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony, Total	6010C	ND U	mg/L	0.060	0.007	1	02/16/22 02:16	02/14/22	
Arsenic, Total	6010C	ND U	mg/L	0.010	0.006	1	02/16/22 02:16	02/14/22	
Barium, Total	6010C	**0.082**	mg/L	0.020	0.003	1	02/16/22 02:16	02/14/22	
Beryllium, Total	6010C	ND U	mg/L	0.0030	0.0002	1	02/16/22 02:16	02/14/22	
Cadmium, Total	6010C	ND U	mg/L	0.0050	0.0004	1	02/16/22 02:16	02/14/22	
Chromium, Total	6010C	**0.004 J**	mg/L	0.010	0.002	1	02/16/22 02:16	02/14/22	
Lead, Total	6010C	ND U	mg/L	0.050	0.003	1	02/16/22 02:16	02/14/22	
Mercury, Total	7470A	ND U	mg/L	0.00020	0.00008	1	02/17/22 14:07	02/16/22	
Nickel, Total	6010C	ND U	mg/L	0.040	0.003	1	02/16/22 02:16	02/14/22	
Selenium, Total	6010C	ND U	mg/L	0.010	0.007	1	02/16/22 02:16	02/14/22	
Silver, Total	6010C	ND U	mg/L	0.010	0.0006	1	02/16/22 02:16	02/14/22	
Thallium, Total	6010C	ND U	mg/L	0.010	0.007	1	02/16/22 02:16	02/14/22	
Vanadium, Total	6010C	**0.005 J**	mg/L	0.050	0.0007	1	02/16/22 02:16	02/14/22	
Zinc, Total	6010C	**0.018 J**	mg/L	0.020	0.003	1	02/16/22 02:16	02/14/22	

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090945 10159	**Basis:**	Dry
Lab Code:	R2201212-008		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony, Total	6010C	ND U	mg/Kg	5.8	0.6	1	02/16/22 20:12	02/15/22	
Arsenic, Total	6010C	**1.17**	mg/Kg	0.97	0.70	1	02/16/22 20:12	02/15/22	
Barium, Total	6010C	**134**	mg/Kg	1.9	1.5	1	02/16/22 20:12	02/15/22	
Beryllium, Total	6010C	**0.43**	mg/Kg	0.29	0.03	1	02/16/22 20:12	02/15/22	
Cadmium, Total	6010C	**0.14 J**	mg/Kg	0.49	0.09	1	02/16/22 20:12	02/15/22	
Chromium, Total	6010C	**3.27**	mg/Kg	0.97	0.35	1	02/16/22 20:12	02/15/22	
Lead, Total	6010C	**4.7 J**	mg/Kg	4.9	0.4	1	02/16/22 20:12	02/15/22	
Mercury, Total	7471B	ND U	mg/Kg	0.020	0.013	1	02/23/22 11:25	02/22/22	
Nickel, Total	6010C	**3.2 J**	mg/Kg	3.9	0.7	1	02/16/22 20:12	02/15/22	
Selenium, Total	6010C	ND U	mg/Kg	0.97	0.54	1	02/16/22 20:12	02/15/22	
Silver, Total	6010C	ND U	mg/Kg	0.97	0.09	1	02/16/22 20:12	02/15/22	
Thallium, Total	6010C	**3.95**	mg/Kg	0.97	0.65	1	02/16/22 20:12	02/15/22	
Vanadium, Total	6010C	**51.2**	mg/Kg	4.9	0.07	1	02/16/22 20:12	02/15/22	
Zinc, Total	6010C	**48.9**	mg/Kg	1.9	1.4	1	02/16/22 20:12	02/15/22	

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090946 10159	**Basis:**	Dry
Lab Code:	R2201212-009		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony, Total	6010C	ND U	mg/Kg	5.8	0.6	1	02/16/22 20:35	02/15/22	
Arsenic, Total	6010C	**0.89 J**	mg/Kg	0.97	0.70	1	02/16/22 20:35	02/15/22	
Barium, Total	6010C	**165**	mg/Kg	1.9	1.5	1	02/16/22 20:35	02/15/22	
Beryllium, Total	6010C	**0.40**	mg/Kg	0.29	0.03	1	02/16/22 20:35	02/15/22	
Cadmium, Total	6010C	**0.16 J**	mg/Kg	0.49	0.09	1	02/16/22 20:35	02/15/22	
Chromium, Total	6010C	**3.59**	mg/Kg	0.97	0.35	1	02/16/22 20:35	02/15/22	
Lead, Total	6010C	**4.9**	mg/Kg	4.9	0.4	1	02/16/22 20:35	02/15/22	
Mercury, Total	7471B	ND U	mg/Kg	0.020	0.013	1	02/23/22 11:31	02/22/22	
Nickel, Total	6010C	**3.1 J**	mg/Kg	3.9	0.7	1	02/16/22 20:35	02/15/22	
Selenium, Total	6010C	ND U	mg/Kg	0.97	0.54	1	02/16/22 20:35	02/15/22	
Silver, Total	6010C	ND U	mg/Kg	0.97	0.09	1	02/16/22 20:35	02/15/22	
Thallium, Total	6010C	**3.94**	mg/Kg	0.97	0.65	1	02/16/22 20:35	02/15/22	
Vanadium, Total	6010C	**54.0**	mg/Kg	4.9	0.07	1	02/16/22 20:35	02/15/22	
Zinc, Total	6010C	**47.9**	mg/Kg	1.9	1.4	1	02/16/22 20:35	02/15/22	

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090927 10164	**Basis:**	Dry
Lab Code:	R2201212-010		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony, Total	6010C	ND U	mg/Kg	6.1	0.6	1	02/16/22 20:38	02/15/22	
Arsenic, Total	6010C	**0.9 J**	mg/Kg	1.0	0.8	1	02/16/22 20:38	02/15/22	
Barium, Total	6010C	**280**	mg/Kg	2.0	1.6	1	02/16/22 20:38	02/15/22	
Beryllium, Total	6010C	**0.84**	mg/Kg	0.30	0.03	1	02/16/22 20:38	02/15/22	
Cadmium, Total	6010C	**0.14 J**	mg/Kg	0.51	0.09	1	02/16/22 20:38	02/15/22	
Chromium, Total	6010C	**7.4**	mg/Kg	1.0	0.4	1	02/16/22 20:38	02/15/22	
Lead, Total	6010C	**8.4**	mg/Kg	5.1	0.5	1	02/16/22 20:38	02/15/22	
Mercury, Total	7471B	ND U	mg/Kg	0.020	0.013	1	02/23/22 11:37	02/22/22	
Nickel, Total	6010C	**8.7**	mg/Kg	4.0	0.7	1	02/16/22 20:38	02/15/22	
Selenium, Total	6010C	ND U	mg/Kg	1.0	0.6	1	02/16/22 20:38	02/15/22	
Silver, Total	6010C	ND U	mg/Kg	1.0	0.10	1	02/16/22 20:38	02/15/22	
Thallium, Total	6010C	ND U	mg/Kg	1.0	0.7	1	02/16/22 20:38	02/15/22	
Vanadium, Total	6010C	**54.3**	mg/Kg	5.1	0.07	1	02/16/22 20:38	02/15/22	
Zinc, Total	6010C	**61.2**	mg/Kg	2.0	1.5	1	02/16/22 20:38	02/15/22	

General Chemistry

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Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090944 10159	**Basis:**	As Received
Lab Code:	R2201212-005		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Total Solids	ALS SOP	**93.8**	Percent	-	1	02/15/22 08:00	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090924 10164	**Basis:**	As Received
Lab Code:	R2201212-006		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Total Solids	ALS SOP	**95.5**	Percent	-	1	02/15/22 08:00	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090925 10164	**Basis:**	As Received
Lab Code:	R2201212-007		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Total Solids	ALS SOP	**94.7**	Percent	-	1	02/15/22 08:00	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090945 10159	**Basis:**	As Received
Lab Code:	R2201212-008		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Total Solids	ALS SOP	**93.4**	Percent	-	-	1	02/14/22 05:35	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090946 10159	**Basis:**	As Received
Lab Code:	R2201212-009		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Total Solids	ALS SOP	**93.6**	Percent	-	-	1	02/14/22 05:35	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090927 10164	**Basis:**	As Received
Lab Code:	R2201212-010		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Q
Total Solids	ALS SOP	**95.1**	Percent	-	-	1	02/14/22 05:35	

QC Summary Forms

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Volatile Organic Compounds by GC/MS

ALS Environmental—Rochester Laboratory
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Client: NASA/WSTF/Navarro **Service Request:** R2201212
Project: White Sands Test Facility/20EC017B
Sample Matrix: Soil

SURROGATE RECOVERY SUMMARY
Volatile Organic Compounds by GC/MS, Unp

Analysis Method: 8260C
Extraction Method: EPA 5030C

Sample Name	Lab Code	4-Bromofluorobenzene 31-154	Dibromofluoromethane 63-138	Toluene-d8 66-138
2202090944 10159	R2201212-005	104	100	102
2202090924 10164	R2201212-006	106	98	103
2202090925 10164	R2201212-007	109	100	102
Method Blank	RQ2201472-04	105	98	101
Lab Control Sample	RQ2201472-03	103	103	100
2202090924 10164 MS	RQ2201472-05	107	102	101
2202090924 10164 DMS	RQ2201472-06	108	104	103

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22
		Date Analyzed:	02/15/22
		Date Extracted:	NA

Duplicate Matrix Spike Summary
Volatile Organic Compounds by GC/MS, Unp

Sample Name:	2202090924 10164	**Units:**	ug/Kg
Lab Code:	R2201212-006	**Basis:**	Dry
Analysis Method:	8260C		
Prep Method:	EPA 5030C		

		Matrix Spike			Duplicate Matrix Spike				
		RQ2201472-05			RQ2201472-06				
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
1,1,1,2-Tetrachloroethane	ND U	59.2	52.4	113	60.3	52.4	115	41-124	2	30
1,1,1-Trichloroethane (TCA)	ND U	54.0	52.4	103	53.2	52.4	102	44-124	<1	30
1,1,2,2-Tetrachloroethane	ND U	43.1	52.4	82	42.5	52.4	81	41-155	1	30
1,1,2-Trichloroethane	ND U	48.1	52.4	92	49.8	52.4	95	48-124	3	30
1,1,2-Trichloro-1,2,2-trifluoroethane	ND U	45.2	52.4	86	43.5	52.4	83	40-117	4	30
1,1-Dichloroethene (1,1-DCE)	ND U	46.3	52.4	88	45.0	52.4	86	46-124	2	30
1,2,3-Trichloropropane	ND U	47.6	52.4	91	48.2	52.4	92	39-160	1	30
1,2-Dibromo-3-chloropropane (DBCP)	ND U	67.0	52.4	128	69.7	52.4	133	30-136	4	30
1,2-Dibromoethane	ND U	49.5	52.4	95	53.0	52.4	101	38-129	6	30
1,2-Dichlorobenzene	ND U	43.3	52.4	83	45.2	52.4	86	11-152	4	30
1,2-Dichloroethane	ND U	45.3	52.4	87	46.2	52.4	88	49-119	1	30
1,2-Dichloropropane	ND U	44.5	52.4	85	44.1	52.4	84	60-126	1	30
1,3-Dichlorobenzene	ND U	45.1	52.4	86	45.3	52.4	86	13-151	<1	30
1,4-Dioxane	ND U	876	1050	84	978	1050	93	49-188	10	30
2-Butanone (MEK)	ND U	46.1	52.4	88	46.7	52.4	89	13-176	1	30
2-Chloro-1,3-butadiene	ND U	46.8	52.4	89	44.6	52.4	85	57-147	5	30
2-Chloroethyl Vinyl Ether	ND U	43.0	52.4	82	41.4	52.4	79	10-167	4	30
Isobutyl Alcohol	ND U	1240	1050	118	1350	1050	129	10-159	9	30
Allyl Chloride	ND U	55.0	52.4	105	55.2	52.4	105	60-160	<1	30
4-Methyl-2-pentanone	ND U	47.7	52.4	91	50.9	52.4	97	38-148	6	30
Acetone	ND U	59.6	52.4	114	60.7	52.4	116	11-183	2	30
Acetonitrile	ND U	169	262	65	170	262	65	29-400	<1	30
Acrolein	ND U	80.3	105	77	79.2	105	76	10-164	1	30
Acrylonitrile	ND U	219	262	84	226	262	86	33-152	2	30
Benzene	ND U	42.9	52.4	82	42.9	52.4	82	51-123	<1	30
Bromodichloromethane	ND U	51.9	52.4	99	52.3	52.4	100	39-122	1	30
Bromoform	ND U	68.7	52.4	131	71.1	52.4	136 *	16-135	4	30
Bromomethane	ND U	38.2	52.4	73	35.8	52.4	68	10-150	7	30
Carbon Disulfide	ND U	47.0	52.4	90	45.1	52.4	86	44-139	5	30
Carbon Tetrachloride	ND U	62.4	52.4	119	61.5	52.4	117	46-137	2	30
Chlorobenzene	ND U	46.8	52.4	89	47.5	52.4	91	25-129	2	30
Chloroethane	ND U	46.1	52.4	88	44.6	52.4	85	10-166	3	30
Chloroform	ND U	44.4	52.4	85	43.0	52.4	82	55-118	4	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22
		Date Analyzed:	02/15/22
		Date Extracted:	NA

Duplicate Matrix Spike Summary
Volatile Organic Compounds by GC/MS, Unp

Sample Name:	2202090924 10164	**Units:**	ug/Kg
Lab Code:	R2201212-006	**Basis:**	Dry
Analysis Method:	8260C		
Prep Method:	EPA 5030C		

		Matrix Spike RQ2201472-05			Duplicate Matrix Spike RQ2201472-06					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Chloromethane	ND U	46.7	52.4	89	45.4	52.4	87	10-139	2	30
Dibromochloromethane	ND U	63.3	52.4	121	62.7	52.4	120	36-125	<1	30
Dibromomethane	ND U	47.6	52.4	91	47.9	52.4	91	29-115	<1	30
Dichlorodifluoromethane (CFC 12)	ND U	46.4	52.4	89	44.1	52.4	84	51-144	6	30
Dichloromethane	ND U	41.0	52.4	78	40.9	52.4	78	49-125	<1	30
Ethyl Methacrylate	ND U	50.3	52.4	96	52.4	52.4	100	10-200	4	30
Ethylbenzene	ND U	49.6	52.4	95	49.7	52.4	95	23-132	<1	30
Iodomethane	ND U	42.8	52.4	82	40.9	52.4	78	10-165	5	30
Methacrylonitrile	ND U	47.1	52.4	90	49.7	52.4	95	24-152	5	30
Methyl Methacrylate	ND U	51.5	52.4	98	53.8	52.4	103	27-162	5	30
Naphthalene	ND U	46.4	52.4	89	53.2	52.4	102	10-188	14	30
Propionitrile	ND U	225	262	86	232	262	89	39-158	3	30
Tetrachloroethene (PCE)	ND U	47.0	52.4	90	47.0	52.4	90	21-137	<1	30
Toluene	ND U	46.9	52.4	90	46.2	52.4	88	11-152	2	30
Trichloroethene (TCE)	ND U	51.0	52.4	97	52.1	52.4	100	23-140	3	30
Trichlorofluoromethane (CFC 11)	ND U	46.9	52.4	90	44.7	52.4	85	47-129	6	30
Vinyl Chloride	ND U	50.0	52.4	95	47.1	52.4	90	59-153	5	30
cis-1,3-Dichloropropene	ND U	62.0	52.4	118	61.0	52.4	116	14-139	2	30
m,p-Xylenes	ND U	98.9	105	94	98.2	105	94	20-135	<1	30
o-Xylene	ND U	49.9	52.4	95	50.6	52.4	97	26-137	2	30
trans-1,2-Dichloroethene	ND U	48.1	52.4	92	47.3	52.4	90	34-128	2	30
trans-1,3-Dichloropropene	ND U	68.1	52.4	130	68.8	52.4	131	17-155	<1	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	RQ2201472-04	**Basis:**	Dry

Volatile Organic Compounds by GC/MS, Unp

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
1,1,1,2-Tetrachloroethane	ND U	5.0	0.20	1	02/15/22 12:40	
1,1,1-Trichloroethane (TCA)	ND U	5.0	0.20	1	02/15/22 12:40	
1,1,2,2-Tetrachloroethane	ND U	5.0	0.44	1	02/15/22 12:40	
1,1,2-Trichloroethane	ND U	5.0	0.20	1	02/15/22 12:40	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND U	5.0	0.20	1	02/15/22 12:40	
1,1-Dichloroethene (1,1-DCE)	ND U	5.0	0.29	1	02/15/22 12:40	
1,2,3-Trichloropropane	ND U	5.0	0.20	1	02/15/22 12:40	
1,2-Dibromo-3-chloropropane (DBCP)	ND U	5.0	0.75	1	02/15/22 12:40	
1,2-Dibromoethane	ND U	5.0	0.20	1	02/15/22 12:40	
1,2-Dichlorobenzene	ND U	5.0	0.20	1	02/15/22 12:40	
1,2-Dichloroethane	ND U	5.0	0.20	1	02/15/22 12:40	
1,2-Dichloropropane	ND U	5.0	0.20	1	02/15/22 12:40	
1,3-Dichlorobenzene	**0.21 J**	5.0	0.20	1	02/15/22 12:40	
1,4-Dioxane	ND U	100	20	1	02/15/22 12:40	
2-Butanone (MEK)	ND U	5.0	2.0	1	02/15/22 12:40	
2-Chloro-1,3-butadiene	ND U	5.0	0.20	1	02/15/22 12:40	
2-Chloroethyl Vinyl Ether	ND U	5.0	0.46	1	02/15/22 12:40	
Isobutyl Alcohol	ND U	100	17	1	02/15/22 12:40	
Allyl Chloride	ND U	5.0	0.24	1	02/15/22 12:40	
4-Methyl-2-pentanone	ND U	5.0	0.23	1	02/15/22 12:40	
Acetone	ND U	5.0	4.7	1	02/15/22 12:40	
Acetonitrile	ND U	25	11	1	02/15/22 12:40	
Acrolein	ND U	25	1.2	1	02/15/22 12:40	
Acrylonitrile	ND U	25	0.89	1	02/15/22 12:40	
Benzene	ND U	5.0	0.20	1	02/15/22 12:40	
Bromodichloromethane	ND U	5.0	0.20	1	02/15/22 12:40	
Bromoform	ND U	5.0	0.50	1	02/15/22 12:40	
Bromomethane	ND U	5.0	2.1	1	02/15/22 12:40	
Carbon Disulfide	ND U	5.0	0.29	1	02/15/22 12:40	
Carbon Tetrachloride	ND U	5.0	0.26	1	02/15/22 12:40	
Chlorobenzene	ND U	5.0	0.20	1	02/15/22 12:40	
Chloroethane	ND U	5.0	0.41	1	02/15/22 12:40	
Chloroform	ND U	5.0	0.20	1	02/15/22 12:40	
Chloromethane	ND U	5.0	1.4	1	02/15/22 12:40	
Dibromochloromethane	ND U	5.0	0.20	1	02/15/22 12:40	
Dibromomethane	ND U	5.0	0.20	1	02/15/22 12:40	
Dichlorodifluoromethane (CFC 12)	ND U	5.0	0.33	1	02/15/22 12:40	
Dichloromethane	ND U	5.0	2.8	1	02/15/22 12:40	
Ethyl Methacrylate	ND U	5.0	0.20	1	02/15/22 12:40	
Ethylbenzene	ND U	5.0	0.20	1	02/15/22 12:40	
Iodomethane	ND U	10	5.2	1	02/15/22 12:40	
Methacrylonitrile	ND U	5.0	0.23	1	02/15/22 12:40	
Methyl Methacrylate	ND U	5.0	0.20	1	02/15/22 12:40	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	RQ2201472-04	**Basis:**	Dry

Volatile Organic Compounds by GC/MS, Unp

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Naphthalene	**1.1 J**	5.0	0.99	1	02/15/22 12:40	
Propionitrile	ND U	25	1.2	1	02/15/22 12:40	
Tetrachloroethene (PCE)	ND U	5.0	0.23	1	02/15/22 12:40	
Toluene	ND U	5.0	0.20	1	02/15/22 12:40	
Trichloroethene (TCE)	ND U	5.0	0.22	1	02/15/22 12:40	
Trichlorofluoromethane (CFC 11)	ND U	5.0	0.26	1	02/15/22 12:40	
Vinyl Chloride	ND U	5.0	0.46	1	02/15/22 12:40	
cis-1,3-Dichloropropene	ND U	5.0	0.20	1	02/15/22 12:40	
m,p-Xylenes	ND U	10	0.37	1	02/15/22 12:40	
o-Xylene	ND U	5.0	0.20	1	02/15/22 12:40	
trans-1,2-Dichloroethene	ND U	5.0	0.20	1	02/15/22 12:40	
trans-1,3-Dichloropropene	ND U	5.0	0.20	1	02/15/22 12:40	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	105	31 - 154	02/15/22 12:40	
Dibromofluoromethane	98	63 - 138	02/15/22 12:40	
Toluene-d8	101	66 - 138	02/15/22 12:40	

Tentatively Identified Compounds

CAS#	Compound Identification	RT	Result ug/Kg	Q
	unknown	1.48	6.3	J

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility/20EC017B
Sample Matrix: Soil

Service Request: R2201212
Date Analyzed: 02/15/22

Lab Control Sample Summary
Volatile Organic Compounds by GC/MS, Unp

Units:ug/Kg
Basis: Dry

Lab Control Sample
RQ2201472-03

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
1,1,1,2-Tetrachloroethane	8260C	25.1	20.0	125	69-127
1,1,1-Trichloroethane (TCA)	8260C	21.6	20.0	108	68-123
1,1,2,2-Tetrachloroethane	8260C	15.7	20.0	79	78-121
1,1,2-Trichloroethane	8260C	19.0	20.0	95	84-117
1,1,2-Trichloro-1,2,2-trifluoroethane	8260C	18.0	20.0	90	54-121
1,1-Dichloroethene (1,1-DCE)	8260C	18.4	20.0	92	65-115
1,2,3-Trichloropropane	8260C	18.9	20.0	95	78-115
1,2-Dibromo-3-chloropropane (DBCP)	8260C	28.3	20.0	142 *	54-135
1,2-Dibromoethane	8260C	20.2	20.0	101	77-117
1,2-Dichlorobenzene	8260C	17.6	20.0	88	75-116
1,2-Dichloroethane	8260C	17.7	20.0	88	74-116
1,2-Dichloropropane	8260C	17.5	20.0	87	79-112
1,3-Dichlorobenzene	8260C	18.3	20.0	92	72-118
1,4-Dioxane	8260C	362	400	91	59-147
2-Butanone (MEK)	8260C	16.6	20.0	83	67-129
2-Chloro-1,3-butadiene	8260C	18.4	20.0	92	57-147
2-Chloroethyl Vinyl Ether	8260C	15.9	20.0	79	10-167
Isobutyl Alcohol	8260C	454	400	114	10-122
Allyl Chloride	8260C	22.3	20.0	111	66-147
4-Methyl-2-pentanone	8260C	17.6	20.0	88	64-123
Acetone	8260C	22.8	20.0	114	32-154
Acetonitrile	8260C	71.5	100	72	36-400
Acrolein	8260C	30.6	40.0	77	30-147
Acrylonitrile	8260C	79.6	100	80	71-124
Benzene	8260C	17.2	20.0	86	77-114
Bromodichloromethane	8260C	20.3	20.0	101	72-118
Bromoform	8260C	27.4	20.0	137 *	55-134
Bromomethane	8260C	16.4	20.0	82	10-150
Carbon Disulfide	8260C	18.9	20.0	95	44-139
Carbon Tetrachloride	8260C	24.3	20.0	122	51-123
Chlorobenzene	8260C	18.0	20.0	90	79-115
Chloroethane	8260C	18.6	20.0	93	10-140
Chloroform	8260C	17.0	20.0	85	76-115

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility/20EC017B
Sample Matrix: Soil

Service Request: R2201212
Date Analyzed: 02/15/22

Lab Control Sample Summary
Volatile Organic Compounds by GC/MS, Unp

Units:ug/Kg
Basis: Dry

Lab Control Sample
RQ2201472-03

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Chloromethane	8260C	18.7	20.0	93	10-131
Dibromochloromethane	8260C	26.0	20.0	130 *	68-121
Dibromomethane	8260C	18.1	20.0	90	29-115
Dichlorodifluoromethane (CFC 12)	8260C	18.0	20.0	90	51-144
Dichloromethane	8260C	16.3	20.0	82	72-118
Ethyl Methacrylate	8260C	19.3	20.0	97	68-119
Ethylbenzene	8260C	19.1	20.0	96	64-118
Iodomethane	8260C	16.3	20.0	81	10-192
Methacrylonitrile	8260C	19.6	20.0	98	70-118
Methyl Methacrylate	8260C	20.1	20.0	101	67-120
Naphthalene	8260C	24.2	20.0	121	68-127
Propionitrile	8260C	82.8	100	83	68-126
Tetrachloroethene (PCE)	8260C	19.2	20.0	96	58-124
Toluene	8260C	18.1	20.0	91	72-116
Trichloroethene (TCE)	8260C	20.3	20.0	102	69-118
Trichlorofluoromethane (CFC 11)	8260C	18.0	20.0	90	52-127
Vinyl Chloride	8260C	19.5	20.0	98	59-153
cis-1,3-Dichloropropene	8260C	25.8	20.0	129 *	66-117
m,p-Xylenes	8260C	39.5	40.0	99	68-118
o-Xylene	8260C	19.7	20.0	98	71-116
trans-1,2-Dichloroethene	8260C	19.6	20.0	98	73-114
trans-1,3-Dichloropropene	8260C	29.1	20.0	145 *	57-135

Client: NASA/WSTF/Navarro **Service Request:** R2201212
Project: White Sands Test Facility/20EC017B
Sample Matrix: Water

SURROGATE RECOVERY SUMMARY
Volatile Organic Compounds by GC/MS, Unpreserved

Analysis Method: 8260C
Extraction Method: EPA 5030C

Sample Name	Lab Code	4-Bromofluorobenzene 85-122	Dibromofluoromethane 80-116	Toluene-d8 87-121
2202090840 1451	R2201212-001	86	87	91
2202090805 1452	R2201212-003	102	104	108
Method Blank	RQ2201414-05	87	87	90
Method Blank	RQ2201538-06	101	105	107
Lab Control Sample	RQ2201414-03	98	101	100
Lab Control Sample	RQ2201538-03	101	103	105

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	RQ2201414-05	**Basis:**	NA

Volatile Organic Compounds by GC/MS, Unpreserved

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
1,1,1,2-Tetrachloroethane	ND U	1.0	0.20	1	02/14/22 14:35	
1,1,1-Trichloroethane (TCA)	ND U	1.0	0.20	1	02/14/22 14:35	
1,1,2,2-Tetrachloroethane	ND U	1.0	0.20	1	02/14/22 14:35	
1,1,2-Trichloroethane	ND U	1.0	0.20	1	02/14/22 14:35	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND U	1.0	0.20	1	02/14/22 14:35	
1,1-Dichloroethene (1,1-DCE)	ND U	1.0	0.20	1	02/14/22 14:35	
1,2,3-Trichloropropane	ND U	1.0	0.26	1	02/14/22 14:35	
1,2-Dibromo-3-chloropropane (DBCP)	ND U	2.0	0.45	1	02/14/22 14:35	
1,2-Dibromoethane	ND U	1.0	0.20	1	02/14/22 14:35	
1,2-Dichlorobenzene	ND U	1.0	0.20	1	02/14/22 14:35	
1,2-Dichloroethane	ND U	1.0	0.20	1	02/14/22 14:35	
1,2-Dichloropropane	ND U	1.0	0.20	1	02/14/22 14:35	
1,3-Dichlorobenzene	ND U	1.0	0.20	1	02/14/22 14:35	
1,4-Dioxane	ND U	40	13	1	02/14/22 14:35	
2-Butanone (MEK)	ND U	5.0	0.78	1	02/14/22 14:35	
2-Chloro-1,3-butadiene	ND U	1.0	0.20	1	02/14/22 14:35	
2-Chloroethyl Vinyl Ether	ND U	1.0	0.53	1	02/14/22 14:35	
2-Methyl-1-propanol (Isobutyl Alcohol)	ND U	40	33	1	02/14/22 14:35	
Allyl Chloride	ND U	5.0	0.36	1	02/14/22 14:35	
4-Methyl-2-pentanone	ND U	5.0	0.20	1	02/14/22 14:35	
Acetone	ND U	5.0	5.0	1	02/14/22 14:35	
Acetonitrile	ND U	10	5.2	1	02/14/22 14:35	
Acrolein	ND U	10	0.90	1	02/14/22 14:35	
Acrylonitrile	ND U	10	0.90	1	02/14/22 14:35	
Benzene	ND U	1.0	0.20	1	02/14/22 14:35	
Bromodichloromethane	ND U	1.0	0.20	1	02/14/22 14:35	
Bromoform	ND U	1.0	0.25	1	02/14/22 14:35	
Bromomethane	ND U	1.0	0.70	1	02/14/22 14:35	
Carbon Disulfide	ND U	1.0	0.42	1	02/14/22 14:35	
Carbon Tetrachloride	ND U	1.0	0.34	1	02/14/22 14:35	
Chlorobenzene	ND U	1.0	0.20	1	02/14/22 14:35	
Chloroethane	ND U	1.0	0.23	1	02/14/22 14:35	
Chloroform	ND U	1.0	0.24	1	02/14/22 14:35	
Chloromethane	ND U	1.0	0.28	1	02/14/22 14:35	
Dibromochloromethane	ND U	1.0	0.20	1	02/14/22 14:35	
Dibromomethane	ND U	1.0	0.20	1	02/14/22 14:35	
Dichlorodifluoromethane (CFC 12)	ND U	1.0	0.21	1	02/14/22 14:35	
Dichloromethane	ND U	1.0	0.65	1	02/14/22 14:35	
Ethyl Methacrylate	ND U	2.0	0.20	1	02/14/22 14:35	
Ethylbenzene	ND U	1.0	0.20	1	02/14/22 14:35	
Iodomethane	ND U	5.0	4.3	1	02/14/22 14:35	
Methacrylonitrile	ND U	2.0	0.52	1	02/14/22 14:35	
Methyl Methacrylate	ND U	2.0	0.24	1	02/14/22 14:35	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	RQ2201414-05	**Basis:**	NA

Volatile Organic Compounds by GC/MS, Unpreserved

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Naphthalene	ND U	1.0	0.55	1	02/14/22 14:35	
Propionitrile	ND U	5.0	3.0	1	02/14/22 14:35	
Tetrachloroethene (PCE)	ND U	1.0	0.21	1	02/14/22 14:35	
Toluene	ND U	1.0	0.20	1	02/14/22 14:35	
Trichloroethene (TCE)	ND U	1.0	0.20	1	02/14/22 14:35	
Trichlorofluoromethane (CFC 11)	ND U	1.0	0.24	1	02/14/22 14:35	
Vinyl Chloride	ND U	1.0	0.20	1	02/14/22 14:35	
cis-1,3-Dichloropropene	ND U	1.0	0.20	1	02/14/22 14:35	
m,p-Xylenes	ND U	2.0	0.20	1	02/14/22 14:35	
o-Xylene	ND U	1.0	0.20	1	02/14/22 14:35	
trans-1,2-Dichloroethene	ND U	1.0	0.20	1	02/14/22 14:35	
trans-1,3-Dichloropropene	ND U	1.0	0.23	1	02/14/22 14:35	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	87	85 - 122	02/14/22 14:35	
Dibromofluoromethane	87	80 - 116	02/14/22 14:35	
Toluene-d8	90	87 - 121	02/14/22 14:35	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	RQ2201538-06	**Basis:**	NA

Volatile Organic Compounds by GC/MS, Unpreserved

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
1,1,1,2-Tetrachloroethane	ND U	1.0	0.20	1	02/16/22 12:45	
1,1,1-Trichloroethane (TCA)	ND U	1.0	0.20	1	02/16/22 12:45	
1,1,2,2-Tetrachloroethane	ND U	1.0	0.20	1	02/16/22 12:45	
1,1,2-Trichloroethane	ND U	1.0	0.20	1	02/16/22 12:45	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND U	1.0	0.20	1	02/16/22 12:45	
1,1-Dichloroethene (1,1-DCE)	ND U	1.0	0.20	1	02/16/22 12:45	
1,2,3-Trichloropropane	ND U	1.0	0.26	1	02/16/22 12:45	
1,2-Dibromo-3-chloropropane (DBCP)	ND U	2.0	0.45	1	02/16/22 12:45	
1,2-Dibromoethane	ND U	1.0	0.20	1	02/16/22 12:45	
1,2-Dichlorobenzene	ND U	1.0	0.20	1	02/16/22 12:45	
1,2-Dichloroethane	ND U	1.0	0.20	1	02/16/22 12:45	
1,2-Dichloropropane	ND U	1.0	0.20	1	02/16/22 12:45	
1,3-Dichlorobenzene	ND U	1.0	0.20	1	02/16/22 12:45	
1,4-Dioxane	ND U	40	13	1	02/16/22 12:45	
2-Butanone (MEK)	ND U	5.0	0.78	1	02/16/22 12:45	
2-Chloro-1,3-butadiene	ND U	1.0	0.20	1	02/16/22 12:45	
2-Chloroethyl Vinyl Ether	ND U	1.0	0.53	1	02/16/22 12:45	
2-Methyl-1-propanol (Isobutyl Alcohol)	ND U	40	33	1	02/16/22 12:45	
Allyl Chloride	ND U	5.0	0.36	1	02/16/22 12:45	
4-Methyl-2-pentanone	ND U	5.0	0.20	1	02/16/22 12:45	
Acetone	ND U	5.0	5.0	1	02/16/22 12:45	
Acetonitrile	ND U	10	5.2	1	02/16/22 12:45	
Acrolein	ND U	10	0.90	1	02/16/22 12:45	
Acrylonitrile	ND U	10	0.90	1	02/16/22 12:45	
Benzene	ND U	1.0	0.20	1	02/16/22 12:45	
Bromodichloromethane	ND U	1.0	0.20	1	02/16/22 12:45	
Bromoform	ND U	1.0	0.25	1	02/16/22 12:45	
Bromomethane	ND U	1.0	0.70	1	02/16/22 12:45	
Carbon Disulfide	ND U	1.0	0.42	1	02/16/22 12:45	
Carbon Tetrachloride	ND U	1.0	0.34	1	02/16/22 12:45	
Chlorobenzene	ND U	1.0	0.20	1	02/16/22 12:45	
Chloroethane	ND U	1.0	0.23	1	02/16/22 12:45	
Chloroform	ND U	1.0	0.24	1	02/16/22 12:45	
Chloromethane	ND U	1.0	0.28	1	02/16/22 12:45	
Dibromochloromethane	ND U	1.0	0.20	1	02/16/22 12:45	
Dibromomethane	ND U	1.0	0.20	1	02/16/22 12:45	
Dichlorodifluoromethane (CFC 12)	ND U	1.0	0.21	1	02/16/22 12:45	
Dichloromethane	ND U	1.0	0.65	1	02/16/22 12:45	
Ethyl Methacrylate	ND U	2.0	0.20	1	02/16/22 12:45	
Ethylbenzene	ND U	1.0	0.20	1	02/16/22 12:45	
Iodomethane	ND U	5.0	4.3	1	02/16/22 12:45	
Methacrylonitrile	ND U	2.0	0.52	1	02/16/22 12:45	
Methyl Methacrylate	ND U	2.0	0.24	1	02/16/22 12:45	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	RQ2201538-06	**Basis:**	NA

Volatile Organic Compounds by GC/MS, Unpreserved

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Q
Naphthalene	ND U	1.0	0.55	1	02/16/22 12:45	
Propionitrile	ND U	5.0	3.0	1	02/16/22 12:45	
Tetrachloroethene (PCE)	ND U	1.0	0.21	1	02/16/22 12:45	
Toluene	ND U	1.0	0.20	1	02/16/22 12:45	
Trichloroethene (TCE)	ND U	1.0	0.20	1	02/16/22 12:45	
Trichlorofluoromethane (CFC 11)	ND U	1.0	0.24	1	02/16/22 12:45	
Vinyl Chloride	ND U	1.0	0.20	1	02/16/22 12:45	
cis-1,3-Dichloropropene	ND U	1.0	0.20	1	02/16/22 12:45	
m,p-Xylenes	ND U	2.0	0.20	1	02/16/22 12:45	
o-Xylene	ND U	1.0	0.20	1	02/16/22 12:45	
trans-1,2-Dichloroethene	ND U	1.0	0.20	1	02/16/22 12:45	
trans-1,3-Dichloropropene	ND U	1.0	0.23	1	02/16/22 12:45	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	101	85 - 122	02/16/22 12:45	
Dibromofluoromethane	105	80 - 116	02/16/22 12:45	
Toluene-d8	107	87 - 121	02/16/22 12:45	

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility/20EC017B
Sample Matrix: Water

Service Request: R2201212
Date Analyzed: 02/14/22

Lab Control Sample Summary
Volatile Organic Compounds by GC/MS, Unpreserved

Units:ug/L
Basis:NA

Lab Control Sample
RQ2201414-03

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
1,1,1,2-Tetrachloroethane	8260C	19.4	20.0	97	76-129
1,1,1-Trichloroethane (TCA)	8260C	19.3	20.0	96	75-125
1,1,2,2-Tetrachloroethane	8260C	17.5	20.0	87	78-126
1,1,2-Trichloroethane	8260C	18.6	20.0	93	82-121
1,1,2-Trichloro-1,2,2-Trifluoroethane	8260C	19.4	20.0	97	67-124
1,1-Dichloroethene (1,1-DCE)	8260C	20.1	20.0	100	71-118
1,2,3-Trichloropropane	8260C	17.2	20.0	86	75-118
1,2-Dibromo-3-chloropropane (DBCP)	8260C	17.7	20.0	89	55-136
1,2-Dibromoethane	8260C	17.7	20.0	89	82-127
1,2-Dichlorobenzene	8260C	18.9	20.0	95	80-119
1,2-Dichloroethane	8260C	18.3	20.0	92	71-127
1,2-Dichloropropane	8260C	19.0	20.0	95	80-119
1,3-Dichlorobenzene	8260C	19.4	20.0	97	83-121
1,4-Dioxane	8260C	292	400	73	44-154
2-Butanone (MEK)	8260C	18.7	20.0	93	61-137
2-Chloro-1,3-butadiene	8260C	20.3	20.0	102	68-139
2-Chloroethyl Vinyl Ether	8260C	16.6	20.0	83	19-162
2-Methyl-1-propanol (Isobutyl Alcohol)	8260C	333	400	83	51-143
Allyl Chloride	8260C	18.8	20.0	94	61-143
4-Methyl-2-pentanone	8260C	16.1	20.0	81	66-124
Acetone	8260C	18.3	20.0	91	40-161
Acetonitrile	8260C	92.5	100	92	46-154
Acrolein	8260C	38.8	40.0	97	13-165
Acrylonitrile	8260C	92.4	100	92	71-130
Benzene	8260C	19.2	20.0	96	79-119
Bromodichloromethane	8260C	19.7	20.0	98	81-123
Bromoform	8260C	18.6	20.0	93	65-146
Bromomethane	8260C	18.9	20.0	95	42-166
Carbon Disulfide	8260C	18.7	20.0	94	66-128
Carbon Tetrachloride	8260C	18.9	20.0	95	70-127
Chlorobenzene	8260C	18.7	20.0	93	80-121
Chloroethane	8260C	22.7	20.0	114	62-131
Chloroform	8260C	19.4	20.0	97	79-120

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility/20EC017B
Sample Matrix: Water

Service Request: R2201212
Date Analyzed: 02/14/22

Lab Control Sample Summary
Volatile Organic Compounds by GC/MS, Unpreserved

Units:ug/L
Basis:NA

Lab Control Sample
RQ2201414-03

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Chloromethane	8260C	26.8	20.0	134	65-135
Dibromochloromethane	8260C	18.5	20.0	92	72-128
Dibromomethane	8260C	18.6	20.0	93	80-118
Dichlorodifluoromethane (CFC 12)	8260C	20.7	20.0	104	59-155
Dichloromethane	8260C	19.7	20.0	98	73-122
Ethyl Methacrylate	8260C	17.2	20.0	86	68-132
Ethylbenzene	8260C	18.4	20.0	92	76-120
Iodomethane	8260C	15.0	20.0	75	18-160
Methacrylonitrile	8260C	19.0	20.0	95	68-123
Methyl Methacrylate	8260C	18.1	20.0	91	68-129
Naphthalene	8260C	18.0	20.0	90	59-140
Propionitrile	8260C	90.1	100	90	69-126
Tetrachloroethene (PCE)	8260C	18.8	20.0	94	72-125
Toluene	8260C	19.0	20.0	95	79-119
Trichloroethene (TCE)	8260C	18.7	20.0	93	74-122
Trichlorofluoromethane (CFC 11)	8260C	20.3	20.0	101	71-136
Vinyl Chloride	8260C	24.7	20.0	124	74-159
cis-1,3-Dichloropropene	8260C	19.8	20.0	99	77-122
m,p-Xylenes	8260C	38.2	40.0	96	80-126
o-Xylene	8260C	19.3	20.0	96	79-123
trans-1,2-Dichloroethene	8260C	20.7	20.0	103	73-118
trans-1,3-Dichloropropene	8260C	19.4	20.0	97	71-133

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility/20EC017B
Sample Matrix: Water

Service Request: R2201212
Date Analyzed: 02/16/22

Lab Control Sample Summary
Volatile Organic Compounds by GC/MS, Unpreserved

Units:ug/L
Basis:NA

Lab Control Sample
RQ2201538-03

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
1,1,1,2-Tetrachloroethane	8260C	19.1	20.0	96	76-129
1,1,1-Trichloroethane (TCA)	8260C	18.0	20.0	90	75-125
1,1,2,2-Tetrachloroethane	8260C	19.8	20.0	99	78-126
1,1,2-Trichloroethane	8260C	19.5	20.0	97	82-121
1,1,2-Trichloro-1,2,2-Trifluoroethane	8260C	17.9	20.0	89	67-124
1,1-Dichloroethene (1,1-DCE)	8260C	19.3	20.0	96	71-118
1,2,3-Trichloropropane	8260C	20.0	20.0	100	75-118
1,2-Dibromo-3-chloropropane (DBCP)	8260C	19.4	20.0	97	55-136
1,2-Dibromoethane	8260C	19.0	20.0	95	82-127
1,2-Dichlorobenzene	8260C	19.1	20.0	95	80-119
1,2-Dichloroethane	8260C	19.4	20.0	97	71-127
1,2-Dichloropropane	8260C	20.4	20.0	102	80-119
1,3-Dichlorobenzene	8260C	19.0	20.0	95	83-121
1,4-Dioxane	8260C	394	400	98	44-154
2-Butanone (MEK)	8260C	20.9	20.0	104	61-137
2-Chloro-1,3-butadiene	8260C	19.9	20.0	100	68-139
2-Chloroethyl Vinyl Ether	8260C	18.4	20.0	92	19-162
2-Methyl-1-propanol (Isobutyl Alcohol)	8260C	447	400	112	51-143
Allyl Chloride	8260C	18.9	20.0	94	61-143
4-Methyl-2-pentanone	8260C	19.1	20.0	95	66-124
Acetone	8260C	21.6	20.0	108	40-161
Acetonitrile	8260C	118	100	118	46-154
Acrolein	8260C	43.6	40.0	109	13-165
Acrylonitrile	8260C	110	100	110	71-130
Benzene	8260C	19.3	20.0	96	79-119
Bromodichloromethane	8260C	19.9	20.0	99	81-123
Bromoform	8260C	19.0	20.0	95	65-146
Bromomethane	8260C	19.3	20.0	96	42-166
Carbon Disulfide	8260C	18.2	20.0	91	66-128
Carbon Tetrachloride	8260C	17.4	20.0	87	70-127
Chlorobenzene	8260C	18.8	20.0	94	80-121
Chloroethane	8260C	22.4	20.0	112	62-131
Chloroform	8260C	19.1	20.0	95	79-120

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility/20EC017B
Sample Matrix: Water

Service Request: R2201212
Date Analyzed: 02/16/22

Lab Control Sample Summary
Volatile Organic Compounds by GC/MS, Unpreserved

Units:ug/L
Basis:NA

Lab Control Sample
RQ2201538-03

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Chloromethane	8260C	26.6	20.0	133	65-135
Dibromochloromethane	8260C	18.2	20.0	91	72-128
Dibromomethane	8260C	19.9	20.0	100	80-118
Dichlorodifluoromethane (CFC 12)	8260C	19.3	20.0	97	59-155
Dichloromethane	8260C	19.5	20.0	98	73-122
Ethyl Methacrylate	8260C	19.4	20.0	97	68-132
Ethylbenzene	8260C	18.5	20.0	92	76-120
Iodomethane	8260C	13.3	20.0	67	18-160
Methacrylonitrile	8260C	21.0	20.0	105	68-123
Methyl Methacrylate	8260C	22.0	20.0	110	68-129
Naphthalene	8260C	20.0	20.0	100	59-140
Propionitrile	8260C	112	100	112	69-126
Tetrachloroethene (PCE)	8260C	18.6	20.0	93	72-125
Toluene	8260C	19.3	20.0	97	79-119
Trichloroethene (TCE)	8260C	19.4	20.0	97	74-122
Trichlorofluoromethane (CFC 11)	8260C	18.8	20.0	94	71-136
Vinyl Chloride	8260C	24.2	20.0	121	74-159
cis-1,3-Dichloropropene	8260C	20.5	20.0	102	77-122
m,p-Xylenes	8260C	38.4	40.0	96	80-126
o-Xylene	8260C	18.7	20.0	94	79-123
trans-1,2-Dichloroethene	8260C	19.8	20.0	99	73-118
trans-1,3-Dichloropropene	8260C	19.8	20.0	99	71-133

Metals

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Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	Dry
Lab Code:	R2201212-MB1		

Inorganic Parameters

Analyte Name	Analysis Method	Result		Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony, Total	6010C	ND	U	mg/Kg	6.0	0.6	1	02/16/22 19:53	02/15/22	
Arsenic, Total	6010C	ND	U	mg/Kg	1.0	0.7	1	02/16/22 19:53	02/15/22	
Barium, Total	6010C	ND	U	mg/Kg	2.0	1.5	1	02/16/22 19:53	02/15/22	
Beryllium, Total	6010C	ND	U	mg/Kg	0.30	0.03	1	02/16/22 19:53	02/15/22	
Cadmium, Total	6010C	ND	U	mg/Kg	0.50	0.09	1	02/16/22 19:53	02/15/22	
Chromium, Total	6010C	ND	U	mg/Kg	1.0	0.4	1	02/16/22 19:53	02/15/22	
Lead, Total	6010C	ND	U	mg/Kg	5.0	0.4	1	02/16/22 19:53	02/15/22	
Mercury, Total	7471B	ND	U	mg/Kg	0.020	0.013	1	02/23/22 11:19	02/22/22	
Nickel, Total	6010C	ND	U	mg/Kg	4.0	0.7	1	02/16/22 19:53	02/15/22	
Selenium, Total	6010C	ND	U	mg/Kg	1.0	0.6	1	02/16/22 19:53	02/15/22	
Silver, Total	6010C	ND	U	mg/Kg	1.0	0.09	1	02/16/22 19:53	02/15/22	
Thallium, Total	6010C	ND	U	mg/Kg	1.0	0.7	1	02/16/22 19:53	02/15/22	
Vanadium, Total	6010C	ND	U	mg/Kg	5.0	0.07	1	02/16/22 19:53	02/15/22	
Zinc, Total	6010C	ND	U	mg/Kg	2.0	1.4	1	02/16/22 19:53	02/15/22	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	R2201212-MB2		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony, Total	6010C	ND U	mg/L	0.060	0.007	1	02/16/22 00:42	02/14/22	
Arsenic, Total	6010C	ND U	mg/L	0.010	0.006	1	02/16/22 00:42	02/14/22	
Barium, Total	6010C	ND U	mg/L	0.020	0.003	1	02/16/22 00:42	02/14/22	
Beryllium, Total	6010C	ND U	mg/L	0.0030	0.0002	1	02/16/22 00:42	02/14/22	
Cadmium, Total	6010C	ND U	mg/L	0.0050	0.0004	1	02/16/22 00:42	02/14/22	
Chromium, Total	6010C	ND U	mg/L	0.010	0.002	1	02/16/22 00:42	02/14/22	
Lead, Total	6010C	ND U	mg/L	0.050	0.003	1	02/16/22 00:42	02/14/22	
Mercury, Total	7470A	ND U	mg/L	0.00020	0.00008	1	02/17/22 13:07	02/16/22	
Nickel, Total	6010C	ND U	mg/L	0.040	0.003	1	02/16/22 00:42	02/14/22	
Selenium, Total	6010C	ND U	mg/L	0.010	0.007	1	02/16/22 00:42	02/14/22	
Silver, Total	6010C	ND U	mg/L	0.010	0.0006	1	02/16/22 00:42	02/14/22	
Thallium, Total	6010C	ND U	mg/L	0.010	0.007	1	02/16/22 00:42	02/14/22	
Vanadium, Total	6010C	ND U	mg/L	0.050	0.0007	1	02/16/22 00:42	02/14/22	
Zinc, Total	6010C	ND U	mg/L	0.020	0.003	1	02/16/22 00:42	02/14/22	

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility/20EC017B
Sample Matrix: Soil

Service Request:R2201212
Date Collected:02/09/22
Date Received:02/11/22
Date Analyzed:02/16/22 - 02/23/22

Duplicate Matrix Spike Summary
Inorganic Parameters

Sample Name: 2202090945 10159
Lab Code: R2201212-008

Units:mg/Kg
Basis: Dry

			Matrix Spike			Duplicate Matrix Spike					
			R2201212-008MS			R2201212-008DMS					
Analyte Name	**Method**	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Antimony, Total	6010C	ND U	30.7	52.5	58 *	29.3	52.5	56 *	75-125	5	20
Arsenic, Total	6010C	1.17	4.6	4.2	81	4.4	4.2	78	75-125	3	20
Barium, Total	6010C	134	341	210	98	357	210	106	75-125	5	20
Beryllium, Total	6010C	0.43	5.12	5.25	89	5.08	5.25	89	75-125	<1	20
Cadmium, Total	6010C	0.14 J	4.85	5.25	90	4.85	5.25	90	75-125	<1	20
Chromium, Total	6010C	3.27	22.8	21.0	93	22.8	21.0	93	75-125	<1	20
Lead, Total	6010C	4.7 J	54.4	52.5	95	53.9	52.5	94	75-125	<1	20
Mercury, Total	7471B	ND U	0.109	0.103	106	0.106	0.101	105	80-120	2	20
Nickel, Total	6010C	3.2 J	50.7	52.5	91	50.7	52.5	90	75-125	<1	20
Selenium, Total	6010C	ND U	89.0	106	84	88.5	106	84	75-125	<1	20
Silver, Total	6010C	ND U	5.3	5.2	101	5.3	5.2	101	75-125	<1	20
Thallium, Total	6010C	3.95	218	210	102	218	210	102	75-125	<1	20
Vanadium, Total	6010C	51.2	97.9	52.5	89	102	52.5	96	75-125	4	20
Zinc, Total	6010C	48.9	92.6	52.5	83	95.4	52.5	89	75-125	3	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility/20EC017B
Sample Matrix: Soil

Service Request: R2201212
Date Analyzed: 02/16/22 - 02/23/22

Lab Control Sample Summary
Inorganic Parameters

Units:mg/Kg
Basis: Dry

Lab Control Sample
R2201212-LCS1

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Antimony, Total	6010C	47.1	50.0	94	80-120
Arsenic, Total	6010C	4.0	4.0	100	80-120
Barium, Total	6010C	207	200	104	80-120
Beryllium, Total	6010C	4.78	5.00	96	80-120
Cadmium, Total	6010C	5.06	5.00	101	80-120
Chromium, Total	6010C	20.6	20.0	103	80-120
Lead, Total	6010C	50.2	50.0	100	80-120
Mercury, Total	7471B	0.106	0.100	106	80-120
Nickel, Total	6010C	50.7	50.0	101	80-120
Selenium, Total	6010C	89.3	101	88	80-120
Silver, Total	6010C	4.8	5.0	97	80-120
Thallium, Total	6010C	185	200	92	80-120
Vanadium, Total	6010C	50.5	50.0	101	80-120
Zinc, Total	6010C	50.6	50.0	101	80-120

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility/20EC017B
Sample Matrix: Water

Service Request: R2201212
Date Analyzed: 02/16/22 - 02/17/22

Lab Control Sample Summary
Inorganic Parameters

Units:mg/L
Basis:NA

Lab Control Sample
R2201212-LCS2

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Antimony, Total	6010C	0.487	0.500	97	80-120
Arsenic, Total	6010C	0.0367	0.040	92	80-120
Barium, Total	6010C	2.09	2.00	104	80-120
Beryllium, Total	6010C	0.0487	0.0500	97	80-120
Cadmium, Total	6010C	0.0518	0.0500	104	80-120
Chromium, Total	6010C	0.204	0.200	102	80-120
Lead, Total	6010C	0.508	0.500	102	80-120
Mercury, Total	7470A	0.000996	0.00100	100	80-120
Nickel, Total	6010C	0.509	0.500	102	80-120
Selenium, Total	6010C	1.01	1.01	100	80-120
Silver, Total	6010C	0.050	0.050	99	80-120
Thallium, Total	6010C	1.89	2.00	95	80-120
Vanadium, Total	6010C	0.503	0.500	101	80-120
Zinc, Total	6010C	0.503	0.500	101	80-120

General Chemistry

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ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22
		Date Analyzed:	02/15/22

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	2202090924 10164	**Units:**	Percent
Lab Code:	R2201212-006	**Basis:**	As Received

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample R2201212-006DUP Result	Average	RPD	RPD Limit
Total Solids	ALS SOP	-	95.5	95.3	95.4	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201212
Project	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22
		Date Analyzed:	02/14/22

Replicate Sample Summary

General Chemistry Parameters

Sample Name:	2202090945 10159	**Units:**	Percent
Lab Code:	R2201212-008	**Basis:**	As Received

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample R2201212-008DUP Result	Average	RPD	RPD Limit
Total Solids	ALS SOP	-	-	93.4	93.8	93.6	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

March 02, 2022 Service Request No:R2201213

J.R. Hennessey
NASA/WSTF/Navarro
P.O. Box 20
Las Cruces, NM 88004

Laboratory Results for: White Sands Test Facility

Dear J.R.,

Enclosed are the results of the sample(s) submitted to our laboratory February 11, 2022
For your reference, these analyses have been assigned our service request number **R2201213.**

All testing was performed according to our laboratory's quality assurance program and met the requirements of the TNI standards except as noted in the case narrative report. Any testing not included in the lab's accreditation is identified on a Non-Certified Analytes report. All results are intended to be considered in their entirety. ALS Environmental is not responsible for use of less than the complete report. Results apply only to the individual samples submitted to the lab for analysis, as listed in the report. The measurement uncertainty of the results included in this report is within that expected when using the prescribed method(s), and represented by Laboratory Control Sample control limits. Any events, such as QC failures or Holding Time exceedances, which may add to the uncertainty are explained in the report narrative or are flagged with qualifiers. The flags are explained in the Report Qualifiers and Definitions page of this report.

Please contact me if you have any questions. My extension is 7472. You may also contact me via email at Janice.Jaeger@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janice Jaeger
Project Manager

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Narrative Documents

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ALS Environmental

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility
Sample Matrix: Soil

Service Request: R2201213
Date Received: 02/11/2022

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Six soil samples were received for analysis at ALS Environmental on 02/11/2022. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Semivoa GC:

No significant anomalies were noted with this analysis.

Metals:

No significant anomalies were noted with this analysis.

Volatiles by GC/MS:

Method 8260C, 02/24/2022: The lower control limit was exceeded for one or more analytes in the Continuing Calibration Verification (CCV). Since there were no detections of the analyte(s) above the MRL in the associated field samples, the quantitation is not affected. The data quality was not significantly affected and no further corrective action was taken.

Approved by _____ Date 03/02/2022

SAMPLE DETECTION SUMMARY

CLIENT ID: 2202090940 10159			Lab ID: R2201213-001			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Dichloromethane	1600			50	ug/L	8260C

CLIENT ID: 2202090941 10159			Lab ID: R2201213-004			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Barium	1.6		0.5	1.0	mg/L	6010C
Thallium	0.024		0.010	0.010	mg/L	6010C

CLIENT ID: 2202090942 10159			Lab ID: R2201213-005			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Barium	1.7		0.5	1.0	mg/L	6010C
Thallium	0.024		0.010	0.010	mg/L	6010C

CLIENT ID: 2202090923 10164			Lab ID: R2201213-006			
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Barium	1.7		0.5	1.0	mg/L	6010C
Thallium	0.018		0.010	0.010	mg/L	6010C

Sample Receipt Information

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Client: NASA/WSTF/Navarro **Service Request:**R2201213
Project: White Sands Test Facility/20EC017B

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
R2201213-001	2202090940 10159	2/9/2022	
R2201213-002	2202090920 10164	2/9/2022	
R2201213-003	2202090921 10164	2/9/2022	
R2201213-004	2202090941 10159	2/9/2022	
R2201213-005	2202090942 10159	2/9/2022	
R2201213-006	2202090923 10164	2/9/2022	

Date: February 10, 2022

Laboratory PO's # 20EC017B-C3

Return Address for Analytical Reports

NASA WSTF Environmental Department
12,600 NASA Road
Las Cruces, NM 88012

Attn: ☒ Brian Barrick ☒
Other_____
(575) 524-5468

Analytical Requirements

Special Instructions
Please return coolers and reusable packaging materials as soon as possible.

Return Address:

NASA WSTF Environmental Department
12600 NASA Road, Bldg. 120
Las Cruces, NM 88012
Attn: Brian Barrick

Sample No.	Sample Location	# of Containers	Sample Type: Solid (S), Aqueous (A)	**TCLP** Volatile Organic Compounds – SW-846 Method 8260B incorporating EPA Method 1311 1 ea., 8-9 oz. Amber Jar, Ice	**TCLP** Metals –SW-846 Methods 6010C and 7740A incorporating EPA Method 1311 1 ea., 8-9 oz. Amber Jar, Ice	**Total** Volatile Organic Compounds – SW-846 Method 8260B A: 3 ea., 40-mL VOA, Ice/ S: 1 ea., 8-9 oz. Amber Jar, Ice	**Total** Metals – SW-846 Methods 6010C and 7740A A: 2 ea., 125-mL Poly, HNO_3, Ice / S: 1 ea., 8-9 oz Amber Jar, Ice		Comments WSTF Info: CP1.21EEHWMU.0003-505-005
2202090840	1451	3	A			X			
2202090841	1451	3	A				X		
2202090805	1452	3	A			X			
2202090806	1452	3	A				X		
2202090940	10159	1	S	X					
2202090920	10164	1	S	X					
2202090921	10164	1	S	X					
2202090922	10164	1	S	X					Matrix Spike for 2202090920
2202090941	10159	1	S		X				
2202090942	10159	1	S		X				
2202090943	10159	1	S		X				Matrix Spike for 2202090941
2202090923	10164	1	S		X				
2202090944	10159	1	S			X			
2202090924	10164	1	S			X			

R2201213 5
NASA/WSTF/Navarro
White Sands Test Facility

Relinquished By:	*Date/Time:*		*Accepted By:*	*Date/Time:*
	10 FEB 22 1049 hrs			2/11/22 0825

WSTF – 381C (02/15)

Laboratory PO's # 20EC017B-C3

Return Address for Analytical Reports

NASA WSTF Environmental Department
12,600 NASA Road
Las Cruces, NM 88012

Attn: ☒ Brian Barrick ☒
Other_____
(575) 524-5468

Analytical Requirements

Special Instructions
Please return coolers and reusable packaging materials as soon as possible.

Return Address:

NASA WSTF Environmental Department
12600 NASA Road, Bldg. 120
Las Cruces, NM 88012
Attn: Brian Barrick

Sample No.	Sample Location	# of Containers	Sample Type: Solid (S), Aqueous (A)	**TCLP** Volatile Organic Compounds – SW-846 Method 8260B incorporating EPA Method 1311 1 ea., 8-9 oz. Amber Jar, Ice	**TCLP** Metals –SW-846 Methods 6010C and 7740A incorporating EPA Method 1311 1 ea., 8-9 oz. Amber Jar, Ice	**Total** Volatile Organic Compounds – SW-846 Method 8260B A: 3 ea., 40-mL VOA, Ice/ S: 1 ea., 8-9 oz. Amber Jar, Ice	**Total** Metals – SW-846 Methods 6010C and 7740A A: 2 ea., 125-mL Poly, HNO_3, Ice / S: 1 ea., 8-9 oz Amber Jar, Ice		Comments WSTF Info: CP1.21EEHWMU.0003-505-005
2202090925	10164	1	S			X			
2202090926	10164	1	S			X			Matrix Spike for 2202090924
2202090945	10159	1	S				X		
2202090946	10159	1	S				X		
2202090947	10159	1	S				X		Matrix Spike for 2202090945
2202090927	10164	1	S				X		

R2201213 5
NASA/WSTF/Navarro
White Sands Test Facility

Relinquished By:	*Date/Time:*		*Accepted By:*	*Date/Time:*
	10 Feb 22 1049 Mtn			2/11/22 0825

WSTF – 381C (02/15)

R2201213 NASA/WSTF/Navarro White Sands Test Facility 5

Cooler Receipt and Preservation Check Form

Project/Client NASA Folder Number ______

Cooler received on 2/11/22 by: [initials] COURIER: ALS UPS (FEDEX) VELOCITY CLIENT

1	Were Custody seals on outside of cooler?	(Y) N	5a	**Perchlorate** samples have required headspace?	Y N (NA)
2	**Custody papers** properly completed (ink, signed)?	(Y) N	5b	Did VOA vials, Alk,or Sulfide have sig* **bubbles**?	(Y) N NA
3	Did all bottles arrive in good **condition** (unbroken)?	Y (N)	6	Where did the bottles originate?	(ALS/ROC) (CLIENT)
4	Circle: (Wet Ice) Dry Ice (Gel packs) present?	(Y) N	7	Soil VOA received as: Bulk Encore 5035set	(NA)

8. Temperature Readings Date: 2/11/22 Time: 0845 ID: IR#7 (IR#11) From: Temp Blank (Sample Bottle)

Observed Temp (°C)	4.2	3.4					
Within 0-6°C?	(Y) N	(Y) N	Y N	Y N	Y N	Y N	Y N
If <0°C, were samples frozen?	Y N	Y N	Y N	Y N	Y N	Y N	Y N

If out of Temperature, note packing/ice condition: ______ Ice melted Poorly Packed (described below) Same Day Rule

&Client Approval to Run Samples: ______ Standing Approval Client aware at drop-off Client notified by: ______

All samples held in storage location: R-002 by [initials] on 2/11/22 at 0853
5035 samples placed in storage location: ______ by ______ on ______ at ______ within 48 hours of sampling? Y N

Cooler Breakdown/Preservation Check**: Date: 2/11/22 Time: 1210 by: [initials]

9. Were all bottle labels complete (*i.e.* analysis, preservation, etc.)? (YES) NO
10. Did all bottle labels and tags agree with custody papers? (YES) NO
11. Were correct containers used for the tests indicated? (YES) NO
12. Were 5035 vials acceptable (no extra labels, not leaking)? YES NO (N/A)
13. Air Samples: Cassettes / Tubes Intact Y / N with MS Y / N Canisters Pressurized Tedlar® Bags Inflated (N/A)

pH	Lot of test paper	Reagent	Preserved? Yes	Preserved? No	Lot Received	Exp	Sample ID Adjusted	Vol. Added	Lot Added	Final pH
≥12		NaOH								
≤2		HNO_3								
≤2		H_2SO_4								
<4		$NaHSO_4$								
5-9		For 608pest			No=Notify for 3day					
Residual Chlorine (-)		For CN, Phenol, 625, 608pest, 522			If +, contact PM to add $Na_2S_2O_3$ (625, 608, CN), ascorbic (phenol).					
		$Na_2S_2O_3$								
		ZnAcetate	-	-			**VOAs and 1664 Not to be tested before analysis. Otherwise, all bottles of all samples with chemical preservatives are checked (not just representatives).			
		HCl	**	**						

Bottle lot numbers: Client

Explain all Discrepancies/ Other Comments:

Rec'd broken < 1 vial 220208840 - 1451 and 1 vial headspace - due to freezing
220209845 - 1451 1 vial " " " -

HPROD	BULK
HTR	FLDT
SUB	HGFB
ALS	LL3541

Labels secondary reviewed by: [initials]
PC Secondary Review: [initials] 2/14/22 *significant air bubbles: VOA > 5-6 mm : WC >1 in. diameter

P:\INTRANET\QAQC\Forms Controlled\Cooler Receipt r19.doc 03/02/2021

Miscellaneous Forms

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

REPORT QUALIFIERS AND DEFINITIONS

U	Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J	Estimated value due to either being a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration. For DoD: concentration >40% difference between two GC columns (pesticides/Arclors).
B	Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
E	Inorganics- Concentration is estimated due to the serial dilution was outside control limits.
E	Organics- Concentration has exceeded the calibration range for that specific analysis.
D	Concentration is a result of a dilution, typically a secondary analysis of the sample due to exceeding the calibration range or that a surrogate has been diluted out of the sample and cannot be assessed.
*	Indicates that a quality control parameter has exceeded laboratory limits. Under the "Notes" column of the Form I, this qualifier denotes analysis was performed out of Holding Time.
H	Analysis was performed out of hold time for tests that have an "immediate" hold time criteria.
#	Spike was diluted out.
+	Correlation coefficient for MSA is <0.995.
N	Inorganics- Matrix spike recovery was outside laboratory limits.
N	Organics- Presumptive evidence of a compound (reported as a TIC) based on the MS library search.
S	Concentration has been determined using Method of Standard Additions (MSA).
W	Post-Digestion Spike recovery is outside control limits and the sample absorbance is <50% of the spike absorbance.
P	Concentration >40% difference between the two GC columns.
C	Confirmed by GC/MS
Q	DoD reports: indicates a pesticide/Aroclor is not confirmed (≥100% Difference between two GC columns).
X	See Case Narrative for discussion.
MRL LOQ	Method Reporting Limit. Also known as: Limit of Quantitation (LOQ) The lowest concentration at which the method analyte may be reliably quantified under the method conditions.
MDL	Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).
LOD	Limit of Detection. A value at or above the MDL which has been verified to be detectable.
ND	Non-Detect. Analyte was not detected at the concentration listed. Same as U qualifier.

Rochester Lab ID # for State Accreditations[1]

NELAP States
Florida ID # E87674
New Hampshire ID # 2941
New York ID # 10145
Pennsylvania ID# 68-786
Virginia #460167

Non-NELAP States
Connecticut ID #PH0556
Delaware Approved
Maine ID #NY01587
North Carolina #36701
North Carolina #676
Rhode Island LAO00333

[1] Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state or agency requirements. The test results meet requirements of the current NELAP/TNI standards or state or agency requirements, where applicable, except as noted in the case narrative. Since not all analyte/method/matrix combinations are offered for state/NELAC accreditation, this report may contain results which are not accredited. For a specific list of accredited analytes, contact the laboratory or go to https://www.alsglobal.com/locations/americas/north-america/usa/new-york/rochester-environmental

ALS Laboratory Group

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Client: NASA/WSTF/Navarro **Service Request:** R2201213
Project: White Sands Test Facility/20EC017B

Sample Name: 2202090940 10159 **Date Collected:** 02/9/22
Lab Code: R2201213-001 **Date Received:** 02/11/22
Sample Matrix: Soil

Analysis Method	Extracted/Digested By	Analyzed By
8260C		KRUEST

Sample Name: 2202090920 10164 **Date Collected:** 02/9/22
Lab Code: R2201213-002 **Date Received:** 02/11/22
Sample Matrix: Soil

Analysis Method	Extracted/Digested By	Analyzed By
8260C		KRUEST

Sample Name: 2202090921 10164 **Date Collected:** 02/9/22
Lab Code: R2201213-003 **Date Received:** 02/11/22
Sample Matrix: Soil

Analysis Method	Extracted/Digested By	Analyzed By
8260C		KRUEST

Sample Name: 2202090941 10159 **Date Collected:** 02/9/22
Lab Code: R2201213-004 **Date Received:** 02/11/22
Sample Matrix: Soil

Analysis Method	Extracted/Digested By	Analyzed By
6010C	KMCLAEN	KMCLAEN
6010C	BDIAMOND	KMCLAEN
7470A	BDIAMOND	BDIAMOND

Client: NASA/WSTF/Navarro **Service Request:** R2201213
Project: White Sands Test Facility/20EC017B

Sample Name: 2202090942 10159 **Date Collected:** 02/9/22
Lab Code: R2201213-005 **Date Received:** 02/11/22
Sample Matrix: Soil

Analysis Method	Extracted/Digested By	Analyzed By
6010C	BDIAMOND	KMCLAEN
6010C	KMCLAEN	KMCLAEN
7470A	BDIAMOND	BDIAMOND

Sample Name: 2202090923 10164 **Date Collected:** 02/9/22
Lab Code: R2201213-006 **Date Received:** 02/11/22
Sample Matrix: Soil

Analysis Method	Extracted/Digested By	Analyzed By
6010C	KMCLAEN	KMCLAEN
6010C	BDIAMOND	KMCLAEN
7470A	BDIAMOND	BDIAMOND

The preparation methods associated with this report are found in these tables unless discussed in the case narrative.

Water/Liquid Matrix

Analytical Method	Preparation Method
200.7	200.2
200.8	200.2
6010C	3005A/3010A
6020A	ILM05.3
9034 Sulfide Acid Soluble	9030B
SM 4500-CN-E Residual Cyanide	SM 4500-CN-G
SM 4500-CN-E WAD Cyanide	SM 4500-CN-I

Solid/Soil/Non-Aqueous Matrix

Analytical Method	Preparation Method
6010C	3050B
6020A	3050B
6010C TCLP (1311) extract	3005A/3010A
6010 SPLP (1312) extract	3005A/3010A
7199	3060A
300.0 Anions/ 350.1/ 353.2/ SM 2320B/ SM 5210B/ 9056A Anions	DI extraction
For analytical methods not listed, the preparation method is the same as the analytical method reference.	

Sample Results

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Volatile Organic Compounds by GC/MS

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090940 10159	**Units:**	ug/L
Lab Code:	R2201213-001	**Basis:**	As Received

TCLP Volatile Organics by GC/MS

Analysis Method:	8260C	**Pre-Prep Method:**	EPA 1311
Prep Method:	EPA 5030C	**Pre-Prep Date:**	2/22/22

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1,2-Tetrachloroethane	ND U	50	10	02/24/22 15:50	
1,1,1-Trichloroethane (TCA)	ND U	50	10	02/24/22 15:50	
1,1,2,2-Tetrachloroethane	ND U	50	10	02/24/22 15:50	
1,1,2-Trichloroethane	ND U	50	10	02/24/22 15:50	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND U	50	10	02/24/22 15:50	
1,1-Dichloroethene (1,1-DCE)	ND U	50	10	02/24/22 15:50	
1,2,3-Trichloropropane	ND U	50	10	02/24/22 15:50	
1,2-Dibromo-3-chloropropane (DBCP)	ND U	50	10	02/24/22 15:50	
1,2-Dibromoethane	ND U	50	10	02/24/22 15:50	
1,2-Dichlorobenzene	ND U	50	10	02/24/22 15:50	
1,2-Dichloroethane	ND U	50	10	02/24/22 15:50	
1,2-Dichloropropane	ND U	50	10	02/24/22 15:50	
1,3-Dichlorobenzene	ND U	50	10	02/24/22 15:50	
1,4-Dioxane	ND U	1000	10	02/24/22 15:50	
2-Butanone (MEK)	ND U	100	10	02/24/22 15:50	
2-Chloro-1,3-butadiene	ND U	50	10	02/24/22 15:50	
Isobutyl Alcohol	ND U	1000	10	02/24/22 15:50	
Allyl Chloride	ND U	50	10	02/24/22 15:50	
4-Methyl-2-pentanone	ND U	100	10	02/24/22 15:50	
Acetone	ND U	100	10	02/24/22 15:50	
Acetonitrile	ND U	1000	10	02/24/22 15:50	
Acrolein	ND U	1000	10	02/24/22 15:50	
Acrylonitrile	ND U	1000	10	02/24/22 15:50	
Benzene	ND U	50	10	02/24/22 15:50	
Bromodichloromethane	ND U	50	10	02/24/22 15:50	
Bromoform	ND U	50	10	02/24/22 15:50	
Bromomethane	ND U	50	10	02/24/22 15:50	
Carbon Disulfide	ND U	100	10	02/24/22 15:50	
Carbon Tetrachloride	ND U	50	10	02/24/22 15:50	
Chlorobenzene	ND U	50	10	02/24/22 15:50	
Chloroethane	ND U	50	10	02/24/22 15:50	
Chloroform	ND U	50	10	02/24/22 15:50	
Chloromethane	ND U	50	10	02/24/22 15:50	
Dibromochloromethane	ND U	50	10	02/24/22 15:50	
Dibromomethane	ND U	50	10	02/24/22 15:50	
Dichlorodifluoromethane (CFC 12)	ND U	50	10	02/24/22 15:50	
Dichloromethane	**1600**	50	10	02/24/22 15:50	
Ethyl Methacrylate	ND U	100	10	02/24/22 15:50	
Ethylbenzene	ND U	50	10	02/24/22 15:50	
Iodomethane	ND U	100	10	02/24/22 15:50	
Methacrylonitrile	ND U	200	10	02/24/22 15:50	
Methyl Methacrylate	ND U	100	10	02/24/22 15:50	
Naphthalene	ND U	50	10	02/24/22 15:50	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090940 10159	**Units:**	ug/L
Lab Code:	R2201213-001	**Basis:**	As Received

TCLP Volatile Organics by GC/MS

Analysis Method:	8260C	**Pre-Prep Method:**	EPA 1311
Prep Method:	EPA 5030C	**Pre-Prep Date:**	2/22/22

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
Propionitrile	ND U	1000	10	02/24/22 15:50	
Tetrachloroethene (PCE)	ND U	50	10	02/24/22 15:50	
Toluene	ND U	50	10	02/24/22 15:50	
Trichloroethene (TCE)	ND U	50	10	02/24/22 15:50	
Trichlorofluoromethane (CFC 11)	ND U	50	10	02/24/22 15:50	
Vinyl Chloride	ND U	50	10	02/24/22 15:50	
cis-1,3-Dichloropropene	ND U	50	10	02/24/22 15:50	
m,p-Xylenes	ND U	50	10	02/24/22 15:50	
o-Xylene	ND U	50	10	02/24/22 15:50	
trans-1,2-Dichloroethene	ND U	50	10	02/24/22 15:50	
trans-1,3-Dichloropropene	ND U	50	10	02/24/22 15:50	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	91	85 - 122	02/24/22 15:50	
Dibromofluoromethane	93	80 - 116	02/24/22 15:50	
Toluene-d8	94	87 - 121	02/24/22 15:50	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090920 10164	**Units:**	ug/L
Lab Code:	R2201213-002	**Basis:**	As Received

TCLP Volatile Organics by GC/MS

Analysis Method:	8260C	**Pre-Prep Method:**	EPA 1311
Prep Method:	EPA 5030C	**Pre-Prep Date:**	2/22/22

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1,2-Tetrachloroethane	ND U	50	10	02/24/22 16:12	
1,1,1-Trichloroethane (TCA)	ND U	50	10	02/24/22 16:12	
1,1,2,2-Tetrachloroethane	ND U	50	10	02/24/22 16:12	
1,1,2-Trichloroethane	ND U	50	10	02/24/22 16:12	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND U	50	10	02/24/22 16:12	
1,1-Dichloroethene (1,1-DCE)	ND U	50	10	02/24/22 16:12	
1,2,3-Trichloropropane	ND U	50	10	02/24/22 16:12	
1,2-Dibromo-3-chloropropane (DBCP)	ND U	50	10	02/24/22 16:12	
1,2-Dibromoethane	ND U	50	10	02/24/22 16:12	
1,2-Dichlorobenzene	ND U	50	10	02/24/22 16:12	
1,2-Dichloroethane	ND U	50	10	02/24/22 16:12	
1,2-Dichloropropane	ND U	50	10	02/24/22 16:12	
1,3-Dichlorobenzene	ND U	50	10	02/24/22 16:12	
1,4-Dioxane	ND U	1000	10	02/24/22 16:12	
2-Butanone (MEK)	ND U	100	10	02/24/22 16:12	
2-Chloro-1,3-butadiene	ND U	50	10	02/24/22 16:12	
Isobutyl Alcohol	ND U	1000	10	02/24/22 16:12	
Allyl Chloride	ND U	50	10	02/24/22 16:12	
4-Methyl-2-pentanone	ND U	100	10	02/24/22 16:12	
Acetone	ND U	100	10	02/24/22 16:12	
Acetonitrile	ND U	1000	10	02/24/22 16:12	
Acrolein	ND U	1000	10	02/24/22 16:12	
Acrylonitrile	ND U	1000	10	02/24/22 16:12	
Benzene	ND U	50	10	02/24/22 16:12	
Bromodichloromethane	ND U	50	10	02/24/22 16:12	
Bromoform	ND U	50	10	02/24/22 16:12	
Bromomethane	ND U	50	10	02/24/22 16:12	
Carbon Disulfide	ND U	100	10	02/24/22 16:12	
Carbon Tetrachloride	ND U	50	10	02/24/22 16:12	
Chlorobenzene	ND U	50	10	02/24/22 16:12	
Chloroethane	ND U	50	10	02/24/22 16:12	
Chloroform	ND U	50	10	02/24/22 16:12	
Chloromethane	ND U	50	10	02/24/22 16:12	
Dibromochloromethane	ND U	50	10	02/24/22 16:12	
Dibromomethane	ND U	50	10	02/24/22 16:12	
Dichlorodifluoromethane (CFC 12)	ND U	50	10	02/24/22 16:12	
Dichloromethane	ND U	50	10	02/24/22 16:12	
Ethyl Methacrylate	ND U	100	10	02/24/22 16:12	
Ethylbenzene	ND U	50	10	02/24/22 16:12	
Iodomethane	ND U	100	10	02/24/22 16:12	
Methacrylonitrile	ND U	200	10	02/24/22 16:12	
Methyl Methacrylate	ND U	100	10	02/24/22 16:12	
Naphthalene	ND U	50	10	02/24/22 16:12	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090920 10164	**Units:**	ug/L
Lab Code:	R2201213-002	**Basis:**	As Received

TCLP Volatile Organics by GC/MS

Analysis Method:	8260C	**Pre-Prep Method:**	EPA 1311
Prep Method:	EPA 5030C	**Pre-Prep Date:**	2/22/22

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
Propionitrile	ND U	1000	10	02/24/22 16:12	
Tetrachloroethene (PCE)	ND U	50	10	02/24/22 16:12	
Toluene	ND U	50	10	02/24/22 16:12	
Trichloroethene (TCE)	ND U	50	10	02/24/22 16:12	
Trichlorofluoromethane (CFC 11)	ND U	50	10	02/24/22 16:12	
Vinyl Chloride	ND U	50	10	02/24/22 16:12	
cis-1,3-Dichloropropene	ND U	50	10	02/24/22 16:12	
m,p-Xylenes	ND U	50	10	02/24/22 16:12	
o-Xylene	ND U	50	10	02/24/22 16:12	
trans-1,2-Dichloroethene	ND U	50	10	02/24/22 16:12	
trans-1,3-Dichloropropene	ND U	50	10	02/24/22 16:12	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	88	85 - 122	02/24/22 16:12	
Dibromofluoromethane	95	80 - 116	02/24/22 16:12	
Toluene-d8	92	87 - 121	02/24/22 16:12	

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090921 10164	**Units:**	ug/L
Lab Code:	R2201213-003	**Basis:**	As Received

TCLP Volatile Organics by GC/MS

Analysis Method:	8260C	**Pre-Prep Method:**	EPA 1311
Prep Method:	EPA 5030C	**Pre-Prep Date:**	2/22/22

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1,2-Tetrachloroethane	ND U	50	10	02/24/22 16:34	
1,1,1-Trichloroethane (TCA)	ND U	50	10	02/24/22 16:34	
1,1,2,2-Tetrachloroethane	ND U	50	10	02/24/22 16:34	
1,1,2-Trichloroethane	ND U	50	10	02/24/22 16:34	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND U	50	10	02/24/22 16:34	
1,1-Dichloroethene (1,1-DCE)	ND U	50	10	02/24/22 16:34	
1,2,3-Trichloropropane	ND U	50	10	02/24/22 16:34	
1,2-Dibromo-3-chloropropane (DBCP)	ND U	50	10	02/24/22 16:34	
1,2-Dibromoethane	ND U	50	10	02/24/22 16:34	
1,2-Dichlorobenzene	ND U	50	10	02/24/22 16:34	
1,2-Dichloroethane	ND U	50	10	02/24/22 16:34	
1,2-Dichloropropane	ND U	50	10	02/24/22 16:34	
1,3-Dichlorobenzene	ND U	50	10	02/24/22 16:34	
1,4-Dioxane	ND U	1000	10	02/24/22 16:34	
2-Butanone (MEK)	ND U	100	10	02/24/22 16:34	
2-Chloro-1,3-butadiene	ND U	50	10	02/24/22 16:34	
Isobutyl Alcohol	ND U	1000	10	02/24/22 16:34	
Allyl Chloride	ND U	50	10	02/24/22 16:34	
4-Methyl-2-pentanone	ND U	100	10	02/24/22 16:34	
Acetone	ND U	100	10	02/24/22 16:34	
Acetonitrile	ND U	1000	10	02/24/22 16:34	
Acrolein	ND U	1000	10	02/24/22 16:34	
Acrylonitrile	ND U	1000	10	02/24/22 16:34	
Benzene	ND U	50	10	02/24/22 16:34	
Bromodichloromethane	ND U	50	10	02/24/22 16:34	
Bromoform	ND U	50	10	02/24/22 16:34	
Bromomethane	ND U	50	10	02/24/22 16:34	
Carbon Disulfide	ND U	100	10	02/24/22 16:34	
Carbon Tetrachloride	ND U	50	10	02/24/22 16:34	
Chlorobenzene	ND U	50	10	02/24/22 16:34	
Chloroethane	ND U	50	10	02/24/22 16:34	
Chloroform	ND U	50	10	02/24/22 16:34	
Chloromethane	ND U	50	10	02/24/22 16:34	
Dibromochloromethane	ND U	50	10	02/24/22 16:34	
Dibromomethane	ND U	50	10	02/24/22 16:34	
Dichlorodifluoromethane (CFC 12)	ND U	50	10	02/24/22 16:34	
Dichloromethane	ND U	50	10	02/24/22 16:34	
Ethyl Methacrylate	ND U	100	10	02/24/22 16:34	
Ethylbenzene	ND U	50	10	02/24/22 16:34	
Iodomethane	ND U	100	10	02/24/22 16:34	
Methacrylonitrile	ND U	200	10	02/24/22 16:34	
Methyl Methacrylate	ND U	100	10	02/24/22 16:34	
Naphthalene	ND U	50	10	02/24/22 16:34	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090921 10164	**Units:**	ug/L
Lab Code:	R2201213-003	**Basis:**	As Received

TCLP Volatile Organics by GC/MS

Analysis Method:	8260C	**Pre-Prep Method:**	EPA 1311
Prep Method:	EPA 5030C	**Pre-Prep Date:**	2/22/22

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
Propionitrile	ND U	1000	10	02/24/22 16:34	
Tetrachloroethene (PCE)	ND U	50	10	02/24/22 16:34	
Toluene	ND U	50	10	02/24/22 16:34	
Trichloroethene (TCE)	ND U	50	10	02/24/22 16:34	
Trichlorofluoromethane (CFC 11)	ND U	50	10	02/24/22 16:34	
Vinyl Chloride	ND U	50	10	02/24/22 16:34	
cis-1,3-Dichloropropene	ND U	50	10	02/24/22 16:34	
m,p-Xylenes	ND U	50	10	02/24/22 16:34	
o-Xylene	ND U	50	10	02/24/22 16:34	
trans-1,2-Dichloroethene	ND U	50	10	02/24/22 16:34	
trans-1,3-Dichloropropene	ND U	50	10	02/24/22 16:34	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	91	85 - 122	02/24/22 16:34	
Dibromofluoromethane	95	80 - 116	02/24/22 16:34	
Toluene-d8	96	87 - 121	02/24/22 16:34	

Metals

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Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090941 10159	**Basis:**	As Received
Lab Code:	R2201213-004		

Toxicity Characteristics Leachate Procedure (TCLP)

Inorganic Parameters

Pre-Prep Method: EPA 1311

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	6010C	ND U	mg/L	0.060	0.030	1	03/01/22 23:57	02/28/22	
Arsenic	6010C	ND U	mg/L	0.50	0.25	1	02/23/22 23:11	02/22/22	
Barium	6010C	**1.6**	mg/L	1.0	0.5	1	02/23/22 23:11	02/22/22	
Beryllium	6010C	ND U	mg/L	0.0030	0.0025	1	03/01/22 23:57	02/28/22	
Cadmium	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:11	02/22/22	
Chromium	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:11	02/22/22	
Lead	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:11	02/22/22	
Mercury	7470A	ND U	mg/L	0.00030	0.00008	1	02/24/22 13:30	02/23/22	
Nickel	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:11	02/22/22	
Selenium	6010C	ND U	mg/L	0.50	0.25	1	02/23/22 23:11	02/22/22	
Silver	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:11	02/22/22	
Thallium	6010C	**0.024**	mg/L	0.010	0.010	1	03/02/22 12:41	02/28/22	
Vanadium	6010C	ND U	mg/L	0.050	0.025	1	03/01/22 23:57	02/28/22	
Zinc	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:11	02/22/22	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090942 10159	**Basis:**	As Received
Lab Code:	R2201213-005		

Toxicity Characteristics Leachate Procedure (TCLP)

Inorganic Parameters

Pre-Prep Method: EPA 1311

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	6010C	ND U	mg/L	0.060	0.030	1	03/02/22 00:19	02/28/22	
Arsenic	6010C	ND U	mg/L	0.50	0.25	1	02/23/22 23:34	02/22/22	
Barium	6010C	**1.7**	mg/L	1.0	0.5	1	02/23/22 23:34	02/22/22	
Beryllium	6010C	ND U	mg/L	0.0030	0.0025	1	03/02/22 00:19	02/28/22	
Cadmium	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:34	02/22/22	
Chromium	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:34	02/22/22	
Lead	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:34	02/22/22	
Mercury	7470A	ND U	mg/L	0.00030	0.00008	1	02/24/22 13:40	02/23/22	
Nickel	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:34	02/22/22	
Selenium	6010C	ND U	mg/L	0.50	0.25	1	02/23/22 23:34	02/22/22	
Silver	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:34	02/22/22	
Thallium	6010C	**0.024**	mg/L	0.010	0.010	1	03/02/22 13:04	02/28/22	
Vanadium	6010C	ND U	mg/L	0.050	0.025	1	03/02/22 00:19	02/28/22	
Zinc	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:34	02/22/22	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22 08:25
Sample Name:	2202090923 10164	**Basis:**	As Received
Lab Code:	R2201213-006		

Toxicity Characteristics Leachate Procedure (TCLP)

Inorganic Parameters

Pre-Prep Method: EPA 1311

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	6010C	ND U	mg/L	0.060	0.030	1	03/02/22 00:23	02/28/22	
Arsenic	6010C	ND U	mg/L	0.50	0.25	1	02/23/22 23:37	02/22/22	
Barium	6010C	**1.7**	mg/L	1.0	0.5	1	02/23/22 23:37	02/22/22	
Beryllium	6010C	ND U	mg/L	0.0030	0.0025	1	03/02/22 00:23	02/28/22	
Cadmium	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:37	02/22/22	
Chromium	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:37	02/22/22	
Lead	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:37	02/22/22	
Mercury	7470A	ND U	mg/L	0.00030	0.00008	1	02/24/22 13:42	02/23/22	
Nickel	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:37	02/22/22	
Selenium	6010C	ND U	mg/L	0.50	0.25	1	02/23/22 23:37	02/22/22	
Silver	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:37	02/22/22	
Thallium	6010C	**0.018**	mg/L	0.010	0.010	1	03/02/22 13:07	02/28/22	
Vanadium	6010C	ND U	mg/L	0.050	0.025	1	03/02/22 00:23	02/28/22	
Zinc	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:37	02/22/22	

QC Summary Forms

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Volatile Organic Compounds by GC/MS

ALS Environmental—Rochester Laboratory
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Client: NASA/WSTF/Navarro **Service Request:** R2201213
Project: White Sands Test Facility/20EC017B
Sample Matrix: Soil

SURROGATE RECOVERY SUMMARY
TCLP Volatile Organics by GC/MS

Analysis Method: 8260C
Extraction Method: EPA 5030C

Sample Name	Lab Code	4-Bromofluorobenzene 85-122	Dibromofluoromethane 80-116	Toluene-d8 87-121
2202090940 10159	R2201213-001	91	93	94
2202090920 10164	R2201213-002	88	95	92
2202090921 10164	R2201213-003	91	95	96
Method Blank	RQ2201675-01	93	99	97
Method Blank	RQ2201806-08	91	95	95
Lab Control Sample	RQ2201806-07	93	95	95
2202090920 10164 MS	RQ2201806-09	93	99	93
2202090920 10164 DMS	RQ2201806-10	91	95	96

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22
		Date Analyzed:	02/24/22
		Date Extracted:	NA

Duplicate Matrix Spike Summary
TCLP Volatile Organics by GC/MS

Sample Name:	2202090920 10164	**Units:**	ug/L
Lab Code:	R2201213-002	**Basis:**	As Received
Analysis Method:	8260C		
Prep Method:	EPA 5030C		

		Matrix Spike			Duplicate Matrix Spike					
		RQ2201806-09			RQ2201806-10					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
1,1,1,2-Tetrachloroethane	ND U	512	500	102	505	500	101	68-146	1	30
1,1,1-Trichloroethane (TCA)	ND U	470	500	94	501	500	100	74-127	6	30
1,1,2,2-Tetrachloroethane	ND U	490	500	98	478	500	96	72-122	2	30
1,1,2-Trichloroethane	ND U	484	500	97	460	500	92	82-121	5	30
1,1,2-Trichloro-1,2,2-trifluoroethane	ND U	497	500	99	499	500	100	50-147	<1	30
1,1-Dichloroethene (1,1-DCE)	ND U	516	500	103	524	500	105	71-118	2	30
1,2,3-Trichloropropane	ND U	521	500	104	499	500	100	75-122	4	30
1,2-Dibromo-3-chloropropane (DBCP)	ND U	451	500	90	482	500	96	37-150	7	30
1,2-Dibromoethane	ND U	471	500	94	446	500	89	67-127	5	30
1,2-Dichlorobenzene	ND U	472	500	94	480	500	96	77-120	2	30
1,2-Dichloroethane	ND U	462	500	92	443	500	89	68-130	4	30
1,2-Dichloropropane	ND U	483	500	97	465	500	93	79-124	4	30
1,3-Dichlorobenzene	ND U	485	500	97	467	500	93	83-121	4	30
1,4-Dioxane	ND U	9770	10000	98	9620	10000	96	44-154	2	30
2-Butanone (MEK)	ND U	466	500	93	449	500	90	61-137	4	30
2-Chloro-1,3-butadiene	ND U	536	500	107	542	500	108	68-139	1	30
Isobutyl Alcohol	ND U	7080	10000	71	7170	10000	72	51-143	1	30
Allyl Chloride	ND U	467	500	93	449	500	90	49-156	4	30
4-Methyl-2-pentanone	ND U	448	500	90	460	500	92	60-141	3	30
Acetone	ND U	563	500	113	589	500	118	35-183	4	30
Acetonitrile	ND U	2200	2500	88	2670	2500	107	46-154	19	30
Acrolein	ND U	925 J	1000	92	892 J	1000	89	13-165	4	30
Acrylonitrile	ND U	2370	2500	95	2380	2500	95	69-131	<1	30
Benzene	ND U	492	500	98	476	500	95	76-129	3	30
Bromodichloromethane	ND U	483	500	97	473	500	95	78-133	2	30
Bromoform	ND U	497	500	99	492	500	98	58-133	<1	30
Bromomethane	ND U	453	500	91	433	500	87	10-184	4	30
Carbon Disulfide	ND U	461	500	92	469	500	94	59-140	2	30
Carbon Tetrachloride	ND U	456	500	91	482	500	96	65-135	6	30
Chlorobenzene	ND U	486	500	97	472	500	94	76-125	3	30
Chloroethane	ND U	528	500	106	534	500	107	48-146	1	30
Chloroform	ND U	484	500	97	488	500	98	75-130	<1	30
Chloromethane	ND U	602	500	120	642	500	128	55-160	6	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	02/09/22
Sample Matrix:	Soil	**Date Received:**	02/11/22
		Date Analyzed:	02/24/22
		Date Extracted:	NA

Duplicate Matrix Spike Summary
TCLP Volatile Organics by GC/MS

Sample Name:	2202090920 10164	**Units:**	ug/L
Lab Code:	R2201213-002	**Basis:**	As Received
Analysis Method:	8260C		
Prep Method:	EPA 5030C		

		Matrix Spike			Duplicate Matrix Spike					
		RQ2201806-09			RQ2201806-10					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Dibromochloromethane	ND U	502	500	100	507	500	101	72-128	<1	30
Dibromomethane	ND U	510	500	102	462	500	92	77-119	10	30
Dichlorodifluoromethane (CFC 12)	ND U	499	500	100	500	500	100	49-154	<1	30
Dichloromethane	ND U	524	500	105	543	500	109	73-122	3	30
Ethyl Methacrylate	ND U	400	500	80	411	500	82	63-138	3	30
Ethylbenzene	ND U	511	500	102	501	500	100	72-134	2	30
Iodomethane	ND U	485	500	97	490	500	98	18-160	<1	30
Methacrylonitrile	ND U	476	500	95	476	500	95	67-131	<1	30
Methyl Methacrylate	ND U	471	500	94	474	500	95	64-129	<1	30
Naphthalene	ND U	494	500	99	489	500	98	57-153	<1	30
Propionitrile	ND U	2440	2500	98	2390	2500	96	66-129	2	30
Tetrachloroethene (PCE)	ND U	483	500	97	459	500	92	72-125	5	30
Toluene	ND U	511	500	102	484	500	97	79-119	5	30
Trichloroethene (TCE)	ND U	449	500	90	435	500	87	74-122	3	30
Trichlorofluoromethane (CFC 11)	ND U	533	500	107	501	500	100	71-136	6	30
Vinyl Chloride	ND U	562	500	112	555	500	111	74-159	1	30
cis-1,3-Dichloropropene	ND U	474	500	95	471	500	94	52-134	<1	30
m,p-Xylenes	ND U	1040	1000	104	982	1000	98	80-126	5	30
o-Xylene	ND U	498	500	100	482	500	96	79-123	3	30
trans-1,2-Dichloroethene	ND U	502	500	100	488	500	98	73-118	3	30
trans-1,3-Dichloropropene	ND U	445	500	89	458	500	92	71-133	3	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	RQ2201675-01	**Basis:**	As Received

TCLP Volatile Organics by GC/MS

Analysis Method:	8260C	**Pre-Prep Method:**	EPA 1311
Prep Method:	EPA 5030C	**Pre-Prep Date:**	2/22/22

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1,2-Tetrachloroethane	ND U	5.0	1	02/24/22 15:28	
1,1,1-Trichloroethane (TCA)	ND U	5.0	1	02/24/22 15:28	
1,1,2,2-Tetrachloroethane	ND U	5.0	1	02/24/22 15:28	
1,1,2-Trichloroethane	ND U	5.0	1	02/24/22 15:28	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND U	5.0	1	02/24/22 15:28	
1,1-Dichloroethene (1,1-DCE)	ND U	5.0	1	02/24/22 15:28	
1,2,3-Trichloropropane	ND U	5.0	1	02/24/22 15:28	
1,2-Dibromo-3-chloropropane (DBCP)	ND U	5.0	1	02/24/22 15:28	
1,2-Dibromoethane	ND U	5.0	1	02/24/22 15:28	
1,2-Dichlorobenzene	ND U	5.0	1	02/24/22 15:28	
1,2-Dichloroethane	ND U	5.0	1	02/24/22 15:28	
1,2-Dichloropropane	ND U	5.0	1	02/24/22 15:28	
1,3-Dichlorobenzene	ND U	5.0	1	02/24/22 15:28	
1,4-Dioxane	ND U	100	1	02/24/22 15:28	
2-Butanone (MEK)	ND U	10	1	02/24/22 15:28	
2-Chloro-1,3-butadiene	ND U	5.0	1	02/24/22 15:28	
Isobutyl Alcohol	ND U	100	1	02/24/22 15:28	
Allyl Chloride	ND U	5.0	1	02/24/22 15:28	
4-Methyl-2-pentanone	ND U	10	1	02/24/22 15:28	
Acetone	ND U	10	1	02/24/22 15:28	
Acetonitrile	ND U	100	1	02/24/22 15:28	
Acrolein	ND U	100	1	02/24/22 15:28	
Acrylonitrile	ND U	100	1	02/24/22 15:28	
Benzene	ND U	5.0	1	02/24/22 15:28	
Bromodichloromethane	ND U	5.0	1	02/24/22 15:28	
Bromoform	ND U	5.0	1	02/24/22 15:28	
Bromomethane	ND U	5.0	1	02/24/22 15:28	
Carbon Disulfide	ND U	10	1	02/24/22 15:28	
Carbon Tetrachloride	ND U	5.0	1	02/24/22 15:28	
Chlorobenzene	ND U	5.0	1	02/24/22 15:28	
Chloroethane	ND U	5.0	1	02/24/22 15:28	
Chloroform	ND U	5.0	1	02/24/22 15:28	
Chloromethane	ND U	5.0	1	02/24/22 15:28	
Dibromochloromethane	ND U	5.0	1	02/24/22 15:28	
Dibromomethane	ND U	5.0	1	02/24/22 15:28	
Dichlorodifluoromethane (CFC 12)	ND U	5.0	1	02/24/22 15:28	
Dichloromethane	ND U	5.0	1	02/24/22 15:28	
Ethyl Methacrylate	ND U	10	1	02/24/22 15:28	
Ethylbenzene	ND U	5.0	1	02/24/22 15:28	
Iodomethane	ND U	10	1	02/24/22 15:28	
Methacrylonitrile	ND U	20	1	02/24/22 15:28	
Methyl Methacrylate	ND U	10	1	02/24/22 15:28	
Naphthalene	ND U	5.0	1	02/24/22 15:28	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	RQ2201675-01	**Basis:**	As Received

TCLP Volatile Organics by GC/MS

Analysis Method:	8260C	**Pre-Prep Method:**	EPA 1311
Prep Method:	EPA 5030C	**Pre-Prep Date:**	2/22/22

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
Propionitrile	ND U	100	1	02/24/22 15:28	
Tetrachloroethene (PCE)	ND U	5.0	1	02/24/22 15:28	
Toluene	ND U	5.0	1	02/24/22 15:28	
Trichloroethene (TCE)	ND U	5.0	1	02/24/22 15:28	
Trichlorofluoromethane (CFC 11)	ND U	5.0	1	02/24/22 15:28	
Vinyl Chloride	ND U	5.0	1	02/24/22 15:28	
cis-1,3-Dichloropropene	ND U	5.0	1	02/24/22 15:28	
m,p-Xylenes	ND U	5.0	1	02/24/22 15:28	
o-Xylene	ND U	5.0	1	02/24/22 15:28	
trans-1,2-Dichloroethene	ND U	5.0	1	02/24/22 15:28	
trans-1,3-Dichloropropene	ND U	5.0	1	02/24/22 15:28	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	93	85 - 122	02/24/22 15:28	
Dibromofluoromethane	99	80 - 116	02/24/22 15:28	
Toluene-d8	97	87 - 121	02/24/22 15:28	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	RQ2201806-08	**Basis:**	As Received

TCLP Volatile Organics by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
1,1,1,2-Tetrachloroethane	ND U	5.0	1	02/24/22 12:55	
1,1,1-Trichloroethane (TCA)	ND U	5.0	1	02/24/22 12:55	
1,1,2,2-Tetrachloroethane	ND U	5.0	1	02/24/22 12:55	
1,1,2-Trichloroethane	ND U	5.0	1	02/24/22 12:55	
1,1,2-Trichloro-1,2,2-trifluoroethane	ND U	5.0	1	02/24/22 12:55	
1,1-Dichloroethene (1,1-DCE)	ND U	5.0	1	02/24/22 12:55	
1,2,3-Trichloropropane	ND U	5.0	1	02/24/22 12:55	
1,2-Dibromo-3-chloropropane (DBCP)	ND U	5.0	1	02/24/22 12:55	
1,2-Dibromoethane	ND U	5.0	1	02/24/22 12:55	
1,2-Dichlorobenzene	ND U	5.0	1	02/24/22 12:55	
1,2-Dichloroethane	ND U	5.0	1	02/24/22 12:55	
1,2-Dichloropropane	ND U	5.0	1	02/24/22 12:55	
1,3-Dichlorobenzene	ND U	5.0	1	02/24/22 12:55	
1,4-Dioxane	ND U	100	1	02/24/22 12:55	
2-Butanone (MEK)	ND U	10	1	02/24/22 12:55	
2-Chloro-1,3-butadiene	ND U	5.0	1	02/24/22 12:55	
Isobutyl Alcohol	ND U	100	1	02/24/22 12:55	
Allyl Chloride	ND U	5.0	1	02/24/22 12:55	
4-Methyl-2-pentanone	ND U	10	1	02/24/22 12:55	
Acetone	ND U	10	1	02/24/22 12:55	
Acetonitrile	ND U	100	1	02/24/22 12:55	
Acrolein	ND U	100	1	02/24/22 12:55	
Acrylonitrile	ND U	100	1	02/24/22 12:55	
Benzene	ND U	5.0	1	02/24/22 12:55	
Bromodichloromethane	ND U	5.0	1	02/24/22 12:55	
Bromoform	ND U	5.0	1	02/24/22 12:55	
Bromomethane	ND U	5.0	1	02/24/22 12:55	
Carbon Disulfide	ND U	10	1	02/24/22 12:55	
Carbon Tetrachloride	ND U	5.0	1	02/24/22 12:55	
Chlorobenzene	ND U	5.0	1	02/24/22 12:55	
Chloroethane	ND U	5.0	1	02/24/22 12:55	
Chloroform	ND U	5.0	1	02/24/22 12:55	
Chloromethane	ND U	5.0	1	02/24/22 12:55	
Dibromochloromethane	ND U	5.0	1	02/24/22 12:55	
Dibromomethane	ND U	5.0	1	02/24/22 12:55	
Dichlorodifluoromethane (CFC 12)	ND U	5.0	1	02/24/22 12:55	
Dichloromethane	ND U	5.0	1	02/24/22 12:55	
Ethyl Methacrylate	ND U	10	1	02/24/22 12:55	
Ethylbenzene	ND U	5.0	1	02/24/22 12:55	
Iodomethane	ND U	10	1	02/24/22 12:55	
Methacrylonitrile	ND U	20	1	02/24/22 12:55	
Methyl Methacrylate	ND U	10	1	02/24/22 12:55	
Naphthalene	ND U	5.0	1	02/24/22 12:55	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	RQ2201806-08	**Basis:**	As Received

TCLP Volatile Organics by GC/MS

Analysis Method: 8260C
Prep Method: EPA 5030C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Q
Propionitrile	ND U	100	1	02/24/22 12:55	
Tetrachloroethene (PCE)	ND U	5.0	1	02/24/22 12:55	
Toluene	ND U	5.0	1	02/24/22 12:55	
Trichloroethene (TCE)	ND U	5.0	1	02/24/22 12:55	
Trichlorofluoromethane (CFC 11)	ND U	5.0	1	02/24/22 12:55	
Vinyl Chloride	ND U	5.0	1	02/24/22 12:55	
cis-1,3-Dichloropropene	ND U	5.0	1	02/24/22 12:55	
m,p-Xylenes	ND U	5.0	1	02/24/22 12:55	
o-Xylene	ND U	5.0	1	02/24/22 12:55	
trans-1,2-Dichloroethene	ND U	5.0	1	02/24/22 12:55	
trans-1,3-Dichloropropene	ND U	5.0	1	02/24/22 12:55	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	91	85 - 122	02/24/22 12:55	
Dibromofluoromethane	95	80 - 116	02/24/22 12:55	
Toluene-d8	95	87 - 121	02/24/22 12:55	

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility/20EC017B
Sample Matrix: Soil

Service Request: R2201213
Date Analyzed: 02/24/22

Lab Control Sample Summary
TCLP Volatile Organics by GC/MS

Units:ug/L
Basis: As Received

Lab Control Sample
RQ2201806-07

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
1,1,1,2-Tetrachloroethane	8260C	21.1	20.0	105	76-129
1,1,1-Trichloroethane (TCA)	8260C	19.6	20.0	98	75-125
1,1,2,2-Tetrachloroethane	8260C	19.6	20.0	98	78-126
1,1,2-Trichloroethane	8260C	19.6	20.0	98	82-121
1,1,2-Trichloro-1,2,2-trifluoroethane	8260C	20.7	20.0	103	67-124
1,1-Dichloroethene (1,1-DCE)	8260C	20.1	20.0	101	71-118
1,2,3-Trichloropropane	8260C	22.2	20.0	111	75-118
1,2-Dibromo-3-chloropropane (DBCP)	8260C	17.7	20.0	88	55-136
1,2-Dibromoethane	8260C	18.0	20.0	90	82-127
1,2-Dichlorobenzene	8260C	20.3	20.0	101	80-119
1,2-Dichloroethane	8260C	18.6	20.0	93	71-127
1,2-Dichloropropane	8260C	19.1	20.0	95	80-119
1,3-Dichlorobenzene	8260C	20.9	20.0	105	83-121
1,4-Dioxane	8260C	339	400	85	44-154
2-Butanone (MEK)	8260C	17.1	20.0	86	61-137
2-Chloro-1,3-butadiene	8260C	22.6	20.0	113	68-139
Isobutyl Alcohol	8260C	220	400	55	51-143
Allyl Chloride	8260C	18.2	20.0	91	61-143
4-Methyl-2-pentanone	8260C	16.9	20.0	85	66-124
Acetone	8260C	16.5	20.0	83	40-161
Acetonitrile	8260C	118	100	118	46-154
Acrolein	8260C	39.4 J	40.0	98	13-165
Acrylonitrile	8260C	90.4 J	100	90	71-130
Benzene	8260C	19.6	20.0	98	79-119
Bromodichloromethane	8260C	18.6	20.0	93	81-123
Bromoform	8260C	21.8	20.0	109	65-146
Bromomethane	8260C	21.1	20.0	105	42-166
Carbon Disulfide	8260C	19.5	20.0	97	66-128
Carbon Tetrachloride	8260C	17.8	20.0	89	70-127
Chlorobenzene	8260C	19.8	20.0	99	80-121
Chloroethane	8260C	21.7	20.0	108	62-131
Chloroform	8260C	19.7	20.0	98	79-120
Chloromethane	8260C	25.6	20.0	128	65-135

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility/20EC017B
Sample Matrix: Soil

Service Request: R2201213
Date Analyzed: 02/24/22

Lab Control Sample Summary
TCLP Volatile Organics by GC/MS

Units:ug/L
Basis: As Received

Lab Control Sample
RQ2201806-07

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Dibromochloromethane	8260C	21.7	20.0	109	72-128
Dibromomethane	8260C	19.2	20.0	96	80-118
Dichlorodifluoromethane (CFC 12)	8260C	20.7	20.0	104	59-155
Dichloromethane	8260C	19.8	20.0	99	73-122
Ethyl Methacrylate	8260C	15.1	20.0	76	68-132
Ethylbenzene	8260C	20.5	20.0	103	76-120
Iodomethane	8260C	18.3	20.0	92	18-160
Methacrylonitrile	8260C	18.2 J	20.0	91	68-123
Methyl Methacrylate	8260C	17.1	20.0	85	68-129
Naphthalene	8260C	20.1	20.0	101	59-140
Propionitrile	8260C	88.9 J	100	89	69-126
Tetrachloroethene (PCE)	8260C	19.1	20.0	95	72-125
Toluene	8260C	19.8	20.0	99	79-119
Trichloroethene (TCE)	8260C	18.6	20.0	93	74-122
Trichlorofluoromethane (CFC 11)	8260C	19.9	20.0	100	71-136
Vinyl Chloride	8260C	22.6	20.0	113	74-159
cis-1,3-Dichloropropene	8260C	19.1	20.0	95	77-122
m,p-Xylenes	8260C	40.3	40.0	101	80-126
o-Xylene	8260C	20.5	20.0	103	79-123
trans-1,2-Dichloroethene	8260C	19.1	20.0	95	73-118
trans-1,3-Dichloropropene	8260C	17.2	20.0	86	71-133

Metals

ALS Environmental—Rochester Laboratory
1565 Jefferson Road, Building 300, Suite 360, Rochester, NY 14623
Phone (585) 288-5380 Fax (585) 288-8475
www.alsglobal.com

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	As Received
Lab Code:	R2201213-MB1		

Toxicity Characteristics Leachate Procedure (TCLP)

Inorganic Parameters

Pre-Prep Method: EPA 1311

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	6010C	ND U	mg/L	0.060	0.030	1	03/01/22 23:41	02/28/22	
Arsenic	6010C	ND U	mg/L	0.50	0.25	1	02/23/22 22:55	02/22/22	
Barium	6010C	ND U	mg/L	1.0	0.5	1	02/23/22 22:55	02/22/22	
Beryllium	6010C	ND U	mg/L	0.0030	0.0025	1	03/01/22 23:41	02/28/22	
Cadmium	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 22:55	02/22/22	
Chromium	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 22:55	02/22/22	
Lead	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 22:55	02/22/22	
Mercury	7470A	ND U	mg/L	0.00030	0.00008	1	02/24/22 14:08	02/23/22	
Nickel	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 22:55	02/22/22	
Selenium	6010C	ND U	mg/L	0.50	0.25	1	02/23/22 22:55	02/22/22	
Silver	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 22:55	02/22/22	
Thallium	6010C	ND U	mg/L	0.010	0.010	1	03/01/22 23:41	02/28/22	
Vanadium	6010C	ND U	mg/L	0.050	0.025	1	03/01/22 23:41	02/28/22	
Zinc	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 22:55	02/22/22	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	As Received
Lab Code:	R2201213-MB2		

Toxicity Characteristics Leachate Procedure (TCLP)

Inorganic Parameters

Pre-Prep Method: EPA 1311

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	6010C	ND U	mg/L	0.060	0.030	1	03/01/22 23:41	02/28/22	
Arsenic	6010C	ND U	mg/L	0.50	0.25	1	02/23/22 22:55	02/22/22	
Barium	6010C	ND U	mg/L	1.0	0.5	1	02/23/22 22:55	02/22/22	
Beryllium	6010C	ND U	mg/L	0.0030	0.0025	1	03/01/22 23:41	02/28/22	
Cadmium	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 22:55	02/22/22	
Chromium	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 22:55	02/22/22	
Lead	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 22:55	02/22/22	
Mercury	7470A	ND U	mg/L	0.00030	0.00008	1	02/24/22 14:08	02/23/22	
Nickel	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 22:55	02/22/22	
Selenium	6010C	ND U	mg/L	0.50	0.25	1	02/23/22 22:55	02/22/22	
Silver	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 22:55	02/22/22	
Thallium	6010C	ND U	mg/L	0.010	0.010	1	03/01/22 23:41	02/28/22	
Vanadium	6010C	ND U	mg/L	0.050	0.025	1	03/01/22 23:41	02/28/22	
Zinc	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 22:55	02/22/22	

Analytical Report

Client:	NASA/WSTF/Navarro	**Service Request:**	R2201213
Project:	White Sands Test Facility/20EC017B	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	As Received
Lab Code:	R2201213-MB3		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Antimony	6010C	ND U	mg/L	0.060	0.030	1	03/01/22 23:47	02/28/22	
Arsenic	6010C	ND U	mg/L	0.50	0.25	1	02/23/22 23:04	02/22/22	
Barium	6010C	ND U	mg/L	1.0	0.5	1	02/23/22 23:04	02/22/22	
Beryllium	6010C	ND U	mg/L	0.0030	0.0025	1	03/01/22 23:47	02/28/22	
Cadmium	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:04	02/22/22	
Chromium	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:04	02/22/22	
Lead	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:04	02/22/22	
Mercury	7470A	ND U	mg/L	0.00030	0.00008	1	02/24/22 13:03	02/23/22	
Nickel	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:04	02/22/22	
Selenium	6010C	ND U	mg/L	0.50	0.25	1	02/23/22 23:04	02/22/22	
Silver	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:04	02/22/22	
Thallium	6010C	ND U	mg/L	0.010	0.010	1	03/01/22 23:47	02/28/22	
Vanadium	6010C	ND U	mg/L	0.050	0.025	1	03/01/22 23:47	02/28/22	
Zinc	6010C	ND U	mg/L	0.10	0.05	1	02/23/22 23:04	02/22/22	

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QA/QC Report

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility/20EC017B
Sample Matrix: Soil

Service Request:R2201213
Date Collected:02/09/22
Date Received:02/11/22
Date Analyzed:02/23/22 - 03/02/22

Duplicate Matrix Spike Summary
Inorganic Parameters

Sample Name: 2202090941 10159
Lab Code: R2201213-004

Units:mg/L
Basis: As Received

			Matrix Spike R2201213-004MS			Duplicate Matrix Spike R2201213-004DMS					
Analyte Name	**Method**	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Antimony	6010C	ND U	0.419	0.500	84	0.442	0.500	88	75-125	5	20
Arsenic	6010C	ND U	1.02	1.00	102	1.01	1.00	101	75-125	1	20
Barium	6010C	1.6	3.6	2.0	102	3.6	2.0	102	75-125	<1	20
Beryllium	6010C	ND U	0.0428	0.0500	86	0.0426	0.0500	85	75-125	<1	20
Cadmium	6010C	ND U	0.45	0.50	91	0.45	0.50	90	75-125	<1	20
Chromium	6010C	ND U	0.48	0.50	96	0.48	0.50	95	75-125	1	20
Lead	6010C	ND U	0.49	0.50	99	0.49	0.50	98	75-125	<1	20
Mercury	7470A	ND U	0.00110	0.00100	110	0.00109	0.00100	109	75-125	2	20
Nickel	6010C	ND U	0.98	1.00	98	0.97	1.00	97	75-125	<1	20
Selenium	6010C	ND U	1.09	1.00	109	1.08	1.00	108	75-125	<1	20
Silver	6010C	ND U	0.27	0.25	110	0.27	0.25	109	75-125	<1	20
Thallium	6010C	0.024	2.27	2.00	112	2.24	2.00	111	75-125	1	20
Vanadium	6010C	ND U	0.473	0.500	95	0.470	0.500	94	75-125	<1	20
Zinc	6010C	ND U	1.00	1.00	100	0.99	1.00	99	75-125	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: NASA/WSTF/Navarro
Project: White Sands Test Facility/20EC017B
Sample Matrix: Soil

Service Request: R2201213
Date Analyzed: 02/23/22 - 03/01/22

Lab Control Sample Summary
Inorganic Parameters

Units:mg/L
Basis: As Received

Lab Control Sample
R2201213-LCS

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Antimony	6010C	0.471	0.500	94	80-120
Arsenic	6010C	0.99	1.00	99	80-120
Barium	6010C	2.0	2.0	102	80-120
Beryllium	6010C	0.0484	0.0500	97	80-120
Cadmium	6010C	0.50	0.50	100	80-120
Chromium	6010C	0.52	0.50	103	80-120
Lead	6010C	0.50	0.50	101	80-120
Mercury	7470A	0.00111	0.00100	111	80-120
Nickel	6010C	1.03	1.00	103	80-120
Selenium	6010C	1.03	1.00	103	80-120
Silver	6010C	0.24	0.25	95	80-120
Thallium	6010C	1.86	2.00	93	80-120
Vanadium	6010C	0.502	0.500	100	80-120
Zinc	6010C	0.978	1.00	98	80-120

Enclosure 3b
SwRI Laboratory
Results

SOUTHWEST RESEARCH INSTITUTE®

Test Report (02/17/2022)

SwRI Project #:	26040.06.101
SwRI Task Orders:	220211-5
Batch Number:	HR-779
Dates Received:	02/11/2022
Purchase Order:	21EC035B

Prepared by:

Southwest Research Institute®
Department of Analytical and Environmental Chemistry
6220 Culebra Road
San Antonio, Texas 78238

Prepared for:

Navarro Research and Engineering Inc.
NASA – JSC – White Sands Test Facility
Transportation Officer, Building 120
12600 NASA Road
Las Cruces, NM 88012
Phone: (575) 524-5452
Attn: Ms Carlyn Tufts

Authorized for Release
02/17/2022 04:30 PM
Alice Yau, Project Manager
Alice.Yau@swri.org
210.522.5042

Mike Dammann
Laboratory Director

"I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed within this report. This report shall not be reproduced except in full without the written approval of SwRI."

Results relate only to the items tested and the samples/materials received by the laboratory.

CLIENT:	Navarro Research and Engineering Inc.
SwRI PROJECT #:	26040.06.001
TASK ORDERS:	220211-5
NAVARRO PO #:	21EC035B

NARRATIVE

(HR-779)

Client: Navarro Research and Engineering
Batch: HR-779
SwRI Project Number: 26040.06.001
SwRI Task Order Number: 220211-5

NDMA ANALYSIS

Soil samples were analyzed for N-Nitrosodimethylamine (NDMA) only by SwRI TAP 01-0403-015, *Analysis of N-nitrosodimethylamine / N-nitrodimethylamine by HRGC/HRMS*. The instrument used was a Waters AutoSpec M series high-resolution gas chromatograph/high-resolution mass spectrometer (HRGC / HRMS), operated at a minimum of 6000 resolution power throughout the analysis. The analytical column used was a Restek RTX-1701 (60 m, 0.32 mm ID, 0.25 μm film thickness).

Sample extraction holding time is seven (7) days from CED. Analytical holding time is forty (40) days from extraction. No holding times were violated with this batch of samples.

Soil samples are reported on an as-received basis in the unit of pg/g.

The initial calibration curve met the QC requirement of ≤ 20 % relative standard deviation (RSD) for native and labeled analytes. The verification standard met the QC requirement of ≤ 20 % difference (DEV) for native and labeled analytes.

Each sample, extraction blank, matrix spike (MS), laboratory control sample (LCS), and laboratory-fortified blank (LFB) was spiked with 200 μL of internal standard mixture at the beginning of extraction. The composition of this internal standard mixture was as follows:

N-Nitrosodimethylamine-d6	250 pg/μL

The MS, MSD, and LCS were spiked with 500 μL of the following spiking solution:

N-Nitrosodimethylamine	100 pg/μL

The LFB was spiked with 100 μL of the following spiking solution:

N-Nitrosodimethylamine	100 pg/μL

Client: Navarro Research and Engineering
Batch: HR-779
SwRI Project Number: 26040.06.001
SwRI Task Order Number: 220211-5

Prior to analysis, each sample, blank, MS, LCS, and LFB had a 100 uL aliquot measured out from the initial 1000 uL extract and were spiked with 5.0 µL of recovery standard (1,2-dichlorobenzene-d4 @ 1000 pg/µL).

Several peaks may require manual integration by the analyst to correct the automated integrations in cases where: the monitored mass was not integrated correctly, a compound was not integrated similarly in the sample compared to the standard, a baseline was improperly integrated, or the peak was missed or misidentified. These manual integrations have been flagged with "MM" on the Quantify Sample Report and initialed and dated by the analyst. The SICPs for each sample show the reported integrations with a solid line. If the integration was manual, the original integration is shown as a dashed line on the same SICP. The SICP for a manually added peak that was initially not integrated by the data system will not show a dashed baseline.

Should a manual integration be required for reasons other than those stated above, an abbreviated code will be listed next to the "MM" on the raw data, and any codes used will be defined in this case narrative. There was no manual integration codes used for this SDG.

The detection limit is based on the following parameters:

a. CRQL (derived from CLP's contract required quantitation limits). CRQL was calculated based on the concentration of the lowest point calibration standard, final extract volume, and sample volume.

No compounds were detected in the blank above the CRQL.

The internal standard recovery for N-Nitrosodimethylamine-d6 was within the advisory QC limits of 10-100% for all samples and QC.

Spike recovery for the LFB was within the advisory limit of 70-130% for NDMA.

Spike recovery for the MS, and LCS was within the advisory limit of 70-130% for NDMA.

Possible qualifiers:

U Target compound not detected.
J Target compound found at a concentration below the calibration range. Target compound flagged as estimated value.
E Target compound exceeds the concentration of the upper calibration range.

D Target compound concentration reported based on dilution analysis that brought the area response and or concentration within calibration range.

B Target compound detected in method blank above the PQL.

Sample Calculations:

Positive result (Soil)
(minor differences to the Form I are due to rounding)

UNITS pg/g

Sample ID: LCS22B11CM1

Analyte: N-Nitrosodimethylamine
Response$_{(NAT)}$: 401169.688
Response$_{(IS)}$: 387820.438

Native RRF: 1.207
IS Conc.: 50.0 pg/µL
Sample Wt: 5.08 g
Extract Vol: 1000 µL
Dilution Factor: 1

$$Conc\left(\frac{pg}{\mu L}\right) = \frac{(Area_{Nat})(Conc_{IS})}{(Area_{IS})(RRF_{Nat})} = \frac{(401169.688)(50.0)}{(387820.438)(1.207)} = 42.9\ pg/\mu L$$

$$Conc\ (pg/g) = \frac{\left(Conc_{\frac{pg}{\mu L}}\right)(Vol_{Ext})}{(SampleWt)} = \frac{\left(42.9\frac{pg}{\mu L}\right)(1000\ \mu L)}{5.08g} = 8435\ pg/g$$

Tommy A. Farias

Digitally signed by Tommy A. Farias
Date: 2022.02.16 17:18:08 -06'00'

Prepared by

CLIENT:	Navarro Research and Engineering Inc.
SwRI PROJECT #:	26040.06.001
TASK ORDERS:	220211-5
NAVARRO PO #:	21EC035B

TASK ORDER AND CHAIN OF CUSTODY

(HR-779)

Southwest Research Institute

Laboratory Task Order

TO #: 220211-5 Revision: 2

Project(s): 26040.06.001
Manager(s): Yau, Alice
To Client: 02/18/22

SDG: HR-779

SRR #'s: 67668

Client(s): Navarro Research and Engineering Inc.

Instructions

Note: 689879 is matrix spike sample to 689877.
689882 is matrix spike sample to 689880.

Rev 1: Report NDMA results only. Moisture determination not needed.
Rev 2: Revise SDG to HR-779.

Documents Related to this task order: 339811[COC for SRR 67668], 339812[Paperwork for SRR 67668], 335541[], 336027[], 336273[], 336898[], 337245[]

Deliverables --> Hard Copy: no EDD: -YES- PDF: -YES-

Test: Nitrosamine_S Holding: 14 days from CED

Section: EXTLAB **Extraction by Soxhlet for Nitrosamine compounds by HRGC-HRMS** Cnt: 6

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
689877		1	Soil	2202090948 (10159)	09 Feb 22	23 Feb 22
689878		1	Soil	2202090949 (10159)	09 Feb 22	23 Feb 22
689879	MS	1	Soil	2202090950 (10159)	09 Feb 22	23 Feb 22
689880		1	Soil	2202090928 (10164)	09 Feb 22	23 Feb 22
689881		1	Soil	2202090929 (10164)	09 Feb 22	23 Feb 22
689882	MS	1	Soil	2202090930 (10164)	09 Feb 22	23 Feb 22

Test: NITROSAMINES-HRMS Holding: 40 days from VTSR

Section: DIOXIN **Analysis of Nitrosamine compounds by HRGC-HRMS** Cnt: 6

System ID	Type	Cont	Matrix	Customer ID	VTSR	Method Date
689877		1	Soil	2202090948 (10159)	11 Feb 22	23 Mar 22
689878		1	Soil	2202090949 (10159)	11 Feb 22	23 Mar 22
689879	MS	1	Soil	2202090950 (10159)	11 Feb 22	23 Mar 22
689880		1	Soil	2202090928 (10164)	11 Feb 22	23 Mar 22
689881		1	Soil	2202090929 (10164)	11 Feb 22	23 Mar 22
689882	MS	1	Soil	2202090930 (10164)	11 Feb 22	23 Mar 22

Date: February 10, 2022

Laboratory PO's # 21EC035B (SWRI)

Analytical Requirements

Special Instructions

Please return coolers and reusable packaging materials as soon as possible.

Return Address for Analytical Reports

NASA WSTF Environmental Department
12,600 NASA Road
Las Cruces, NM 88012

Attn: ☒ Brian Barrick ☒
Other_____
(575) 524-5468

Return Address:

NASA WSTF Environmental Department
12600 NASA Road, Bldg. 120
Las Cruces, NM 88012
Attn: Brian Barrick

Sample No.	Sample Location	# of Containers	Sample Type: Soil (S), Aqueous (A)	**(Soil)** NDMA, High resolution GC/MS SIM EPA Method 607M; 7-day TAT; 8/9-oz Amber Jar; Ice	**(Aqueous)** NDMA, High resolution GC/MS SIM EPA Method 607M; 7-day TAT; 1-L Amber Glass; Ice			Comments WSTF Info: CP1.21EEHWMU.0003-505-005
2202090948	10159	1	S	X				
2202090949	10159	1	S	X				
2202090950	10159	1	S	X				Matrix Spike for 2202090948
2202090928	10164	1	S	X				
2202090929	10164	1	S	X				
2202090930	10164	1	S	X				Matrix Spike for 2202090928

Relinquished By:	*Date/Time:*	*Accepted By:*	*Date/Time:*
	10 Feb 22 1049 hrs	SwRI / DRmZ	02/11/22 0850

Client: Navarro SwRI Project # 26040.06.001
SwRI SRR # 67668
VTSR: 02/11/22
Sample(s) received intact. Temp: 0.4°C

WSTF – 381C (02/15)

NASA-WSTF SHIPPING DOCUMENT

SHIPPED FROM:	WSTF ORIGINATOR/MAIL CODE/TELEPHONE NO.			
NASA JSC WHITE SANDS TEST FACILITY	Patricia Melendrez/Purchasing Dept/ 524-5334		Brian Barrick 575-524-5468	
12600 NASA ROAD; BLDG. 120	ORDER OR CONTRACT NUMBER		SHIPMENT CONTROL NO.	
LAS CRUCES, NEW MEXICO 88012	21EC035B		WE-22-044-H	
SHIP TO: (ADDRESS, PHONE#, POINT OF CONTACT)	PROJECT or TASK NUMBER		SHIP VIA	
Southwest Research Institute	HWMU-60 505-005		Navarro Third Party Billing	
6220 Culebra Road	Contain Batteries	NO. PKG.	DATE SHIPPED	AirBill/ PRO #/Bol #
San Antonio, TX 78238	NO		2/10/2022	
Alice Yau	Battery Type-Part #	AUTHORIZED BY:	DEPT.	
210-522-5042				

ITEM NO.	EQUIPMENT CONTROL NO.	MODEL NO./ STOCK NO./ PART NO.	ITEM NAME - MANUFACTURER'S NAME AND SERIAL NO.	UNIT OF ISSUE	QTY.
1			Aqueous sample GC/MS SIM method for NDMA EPA Method 607M 7 day TAT	EA	
2			Soil sample GC/MS SIM method for NDMA EPA Method 607M 7 day TAT	EA	6

JUSTIFICATION FOR SHIPMENT: (MDR #, Return Authorization #'s, Warranty Replacement, Repair, Overage/Shortage, Damage, Recycling)
Samples for analysis

DOT HAZARDOUS MATERIALS INFO; EMERGENCY PHONE NUMBER AND GUIDE NUMBER:

PROPERTY REVIEW: ☐ REMOVE EQUIPMENT TAG ☐ DO NOT REMOVE EQUIPMENT TAG

PACKED BY:

Please check off the applicable labels!	# CONTAINERS	TYPE CONTAINERS	DIMENSIONS	WEIGHT
☑ FRAGILE	6	Glass	8-9 oz Amber Jar	~700 g
☑ GLASS				
☐ DELICATE				
☐ DO NOT XRAY				
☐ REFRIGERATE				
☐ OTHER				
	TOTAL			TOTAL
☑ BUBBLEWRAP	CONTAINERS			WEIGHT
☑ FOAM	6			~700 g

RECEIVED BY: PMartinez 10km2

REPRESENTING: SwRI

SHIPPERS CERTIFICATION: This is to certify that the above named materials are properly classified, described, packaged, marked, labeled, and are in proper condition for transportation according to the regulations of the D.O.T. _____ Date_____

WSTF 196 (1/06)

Client: Navarro SwRI Project # 26040.06.001
SwRI SRR # 67668
VTSR: 02/11/22
Sample(s) received intact. Temp: 0.4°C

CLIENT:	Navarro Research and Engineering Inc.
SwRI PROJECT #:	26040.06.001
TASK ORDERS:	220211-5
NAVARRO PO #:	21EC035B

ANALYTICAL DATA REPORT SHEETS

(HR-779)

Southwest Research Institute

HRGC/HRMS NDMA Analysis Data Sheet

Sample ID
2202090948 (10159)

Client: Navarro Research and Engineering Inc.
Batch: HR-779
Task Order: 220211-5
Matrix: Soil
Sample Wt/Vol: 5.53 g

Project: 26040.06.001
Date Received: 2/11/2022
Date Extracted: 2/11/2022
Date Analyzed: 2/15/2022
Date Reported: 2/16/2022

Lab Sample ID: 689877
Lab File Name: M02152M1_05
Final Extraction Vol: 1000 uL
Dilution Factor: 1
Reporting Unit: pg/g
Method: TAP 01-0403-015

CAS No.	ANALYTE	RESULT	Q
62-75-9	N-Nitrosodimethylamine	156	J

Internal Standard % Recovery

N-Nitrosodimethylamine-d6: 64.9

U - Undetected, indicates not found above the detection limit

J - Estimated value, greater than the MDL but less than the PQL

Southwest Research Institute

HRGC/HRMS NDMA Analysis Data Sheet

Sample ID: 2202090949 (10159)

Client: Navarro Research and Engineering Inc.
Batch: HR-779
Task Order: 220211-5
Matrix: Soil
Sample Wt/Vol: 5.42 g

Project: 26040.06.001
Date Received: 2/11/2022
Date Extracted: 2/11/2022
Date Analyzed: 2/15/2022
Date Reported: 2/16/2022

Lab Sample ID: 689878
Lab File Name: M02152M1_06
Final Extraction Vol: 1000 uL
Dilution Factor: 1
Reporting Unit: pg/g
Method: TAP 01-0403-015

CAS No.	ANALYTE	RESULT	Q
62-75-9	N-Nitrosodimethylamine	81	J

Internal Standard % Recovery

N-Nitrosodimethylamine-d6: 67.5

U - Undetected, indicates not found above the detection limit

J - Estimated value, greater than the MDL but less than the PQL

Southwest Research Institute

HRGC/HRMS NDMA Analysis Data Sheet

Sample ID
2202090928 (10164)

Client: Navarro Research and Engineering Inc.
Batch: HR-779
Task Order: 220211-5
Matrix: Soil
Sample Wt/Vol: 5.12 g

Project: 26040.06.001
Date Received: 2/11/2022
Date Extracted: 2/11/2022
Date Analyzed: 2/15/2022
Date Reported: 2/16/2022

Lab Sample ID: 689880
Lab File Name: M02152M1_08
Final Extraction Vol: 1000 uL
Dilution Factor: 1
Reporting Unit: pg/g
Method: TAP 01-0403-015

CAS No.	ANALYTE	RESULT	Q
62-75-9	N-Nitrosodimethylamine	93	J

Internal Standard % Recovery

N-Nitrosodimethylamine-d6: 68.5

U - Undetected, indicates not found above the detection limit

J - Estimated value, greater than the MDL but less than the PQL

Southwest Research Institute

HRGC/HRMS NDMA Analysis Data Sheet

Sample ID

2202090929 (10164)

Client: Navarro Research and Engineering Inc.
Batch: HR-779
Task Order: 220211-5
Matrix: Soil
Sample Wt/Vol: 5.36 g

Project: 26040.06.001
Date Received: 2/11/2022
Date Extracted: 2/11/2022
Date Analyzed: 2/15/2022
Date Reported: 2/16/2022

Lab Sample ID: 689881
Lab File Name: M02152M1_09
Final Extraction Vol: 1000 uL
Dilution Factor: 1
Reporting Unit: pg/g
Method: TAP 01-0403-015

CAS No.	ANALYTE	RESULT	Q
62-75-9	N-Nitrosodimethylamine	83	J

Internal Standard % Recovery

N-Nitrosodimethylamine-d6: 72.5

U - Undetected, indicates not found above the detection limit

J - Estimated value, greater than the MDL but less than the PQL

CLIENT:	Navarro Research and Engineering Inc.
SwRI PROJECT #:	26040.06.001
TASK ORDERS:	220211-5
NAVARRO PO #:	21EC035B

QA DATA SHEETS

(BLANK, MATRIX SPIKE, SURROGATE, CALIBRATION)

(HR-779)

Southwest Research Institute

HRGC/HRMS NDMA Matrix Spike Recovery Report

Sample ID
2202090950 (10159) MS

Client: Navarro Research and Engineering Inc.
Batch: HR-779
Task Order: 220211-5
Matrix: Soil
Sample Wt/Vol: 5.32 g

Project: 26040.06.001
Date Received: 2/11/2022
Date Extracted: 2/11/2022
Date Analyzed: 2/15/2022
Date Reported: 2/16/2022

Lab Sample ID: 689879
Unspike ID: 689877

ANALYTE	Spike Added pg/g	Sample Conc pg/g	MS Conc pg/g	% Recovery	QC % Recovery Limits
N-Nitrosodimethylamine	9398	156	8235	86	70 - 130

Southwest Research Institute

HRGC/HRMS NDMA Matrix Spike Recovery Report

Sample ID

2202090930 (10164) MS

Client: Navarro Research and Engin
Project: 26040.06.001
Lab Sample ID: 689882

Batch: HR-779
Date Received: 2/11/2022
Unspike ID: 689880

Task Order: 220211-5
Date Extracted: 2/11/2022

Matrix: Soil
Date Analyzed: 2/15/2022

Sample Wt/Vol: 5.45 g
Date Reported: 2/16/2022

ANALYTE	Spike Added pg/g	Sample Conc pg/g	MS Conc pg/g	% Recovery	QC % Recovery Limits
N-Nitrosodimethylamine	9174	93	8669	93	70 - 130

Southwest Research Institute

HRGC/HRMS NDMA Laboratory Fortified Blank Recovery Report

Sample ID: LFB22B11CM1

Client: Navarro Research and Engineering Inc.
Batch: HR-779
Task Order: N/A
Matrix: Soil
Sample Wt/Vol: 5.01 g

Project: 26040.06.001
Date Received: N/A
Date Extracted: 2/11/2022
Date Analyzed: 2/15/2022
Date Reported: 2/16/2022

Lab Sample ID: LFB22B11CM1
Blank ID: PB22B11CM1

ANALYTE	Spike Added pg/g	Blank Conc pg/g	LFB Conc pg/g	% Recovery	QC % Recovery Limits
N-Nitrosodimethylamine	1996	0	1708	86	70 - 130

Southwest Research Institute

HRGC/HRMS NDMA Laboratory Control Spike Recovery Report

Sample ID: LCS22B11CM1

Client: Navarro Research and Engineering Inc.
Batch: HR-779
Task Order: N/A
Matrix: Soil
Sample Wt/Vol: 5.08 g

Project: 26040.06.001
Date Received: N/A
Date Extracted: 2/11/2022
Date Analyzed: 2/15/2022
Date Reported: 2/16/2022

Lab Sample ID: LCS22B11CM1
Blank ID: PB22B11CM1

ANALYTE	Spike Added pg/g	Blank Conc pg/g	LCS Conc pg/g	% Recovery	QC % Recovery Limits
N-Nitrosodimethylamine	9843	0	8437	86	70 - 130

Southwest Research Institute

HRGC/HRMS NDMA Blank Summary

Blank ID: PB22B11CM1
Client: Navarro Research and Engineering Inc.
Matrix: Soil

Project: 26040.06.001
SDG: HR-779

This method blank applies to the following samples, MS, and MSD's

Client Sample ID	Lab Sample ID	Date Acquired	Time Acquired
LFB22B11CM1	LFB22B11CM1	02/15/22	11:54:27
LCS22B11CM1	LCS22B11CM1	02/15/22	12:24:12
2202090948 (10159)	689877	02/15/22	12:54:09
2202090949 (10159)	689878	02/15/22	13:24:01
2202090950 (10159) MS	689879	02/15/22	13:53:58
2202090928 (10164)	689880	02/15/22	14:23:26
2202090929 (10164)	689881	02/15/22	14:53:00
2202090930 (10164) MS	689882	02/15/22	15:22:23

Southwest Research Institute

HRGC/HRMS NDMA Analysis Data Sheet

Sample ID
PB22B11CM1

Client: Navarro Research and Engineering Inc.
Batch: HR-779
Task Order: N/A
Matrix: Soil
Sample Wt/Vol: 5.12 g

Project: 26040.06.001
Date Received: N/A
Date Extracted: 2/11/2022
Date Analyzed: 2/15/2022
Date Reported: 2/16/2022

Lab Sample ID: PB22B11CM1
Lab File Name: M02152M1_02
Final Extraction Vol: 1000 uL
Dilution Factor: 1
Reporting Unit: pg/g
Method: TAP 01-0403-015

CAS No.	ANALYTE	RESULT	Q
62-75-9	N-Nitrosodimethylamine	<977	U

Internal Standard % Recovery

N-Nitrosodimethylamine-d6: 54.1

U - Undetected, indicates not found above the detection limit

J - Estimated value, greater than the MDL but less than the PQL

Southwest Research Institute

HRGC/HRMS NDMA Analysis Data Sheet

Sample ID: LFB22B11CM1

Client: Navarro Research and Engineering Inc.
Batch: HR-779
Task Order: N/A
Matrix: Soil
Sample Wt/Vol: 5.01 g

Project: 26040.06.001
Date Received: N/A
Date Extracted: 2/11/2022
Date Analyzed: 2/15/2022
Date Reported: 2/16/2022

Lab Sample ID: LFB22B11CM1
Lab File Name: M02152M1_03
Final Extraction Vol: 1000 uL
Dilution Factor: 1
Reporting Unit: pg/g
Method: TAP 01-0403-015

CAS No.	ANALYTE	RESULT	Q
62-75-9	N-Nitrosodimethylamine	1708	

Internal Standard % Recovery

N-Nitrosodimethylamine-d6: 64.3

U - Undetected, indicates not found above the detection limit

J - Estimated value, greater than the MDL but less than the PQL

Southwest Research Institute

HRGC/HRMS NDMA Analysis Data Sheet

Sample ID
LCS22B11CM1

Client: Navarro Research and Engineering Inc.
Batch: HR-779
Task Order: N/A
Matrix: Soil
Sample Wt/Vol: 5.08 g

Project: 26040.06.001
Date Received: N/A
Date Extracted: 2/11/2022
Date Analyzed: 2/15/2022
Date Reported: 2/16/2022

Lab Sample ID: LCS22B11CM1
Lab File Name: M02152M1_04
Final Extraction Vol: 1000 uL
Dilution Factor: 1
Reporting Unit: pg/g
Method: TAP 01-0403-015

CAS No.	ANALYTE	RESULT	Q
62-75-9	N-Nitrosodimethylamine	8437	

Internal Standard % Recovery

N-Nitrosodimethylamine-d6: 55.5

U - Undetected, indicates not found above the detection limit

J - Estimated value, greater than the MDL but less than the PQL

Southwest Research Institute

HRGC/HRMS NDMA Analysis Data Sheet

Sample ID: 2202090950 (10159) MS

Client: Navarro Research and Engineering Inc.
Batch: HR-779
Task Order: 220211-5
Matrix: Soil
Sample Wt/Vol: 5.32 g

Project: 26040.06.001
Date Received: 2/11/2022
Date Extracted: 2/11/2022
Date Analyzed: 2/15/2022
Date Reported: 2/16/2022

Lab Sample ID: 689879
Lab File Name: M02152M1_07
Final Extraction Vol: 1000 uL
Dilution Factor: 1
Reporting Unit: pg/g
Method: TAP 01-0403-015

CAS No.	ANALYTE	RESULT	Q
62-75-9	N-Nitrosodimethylamine	8235	

Internal Standard % Recovery

N-Nitrosodimethylamine-d6: 71.8

U - Undetected, indicates not found above the detection limit

J - Estimated value, greater than the MDL but less than the PQL

Southwest Research Institute

HRGC/HRMS NDMA Analysis Data Sheet

Sample ID: 2202090930 (10164) MS

Client: Navarro Research and Engineering Inc.
Batch: HR-779
Task Order: 220211-5
Matrix: Soil
Sample Wt/Vol: 5.45 g

Project: 26040.06.001
Date Received: 2/11/2022
Date Extracted: 2/11/2022
Date Analyzed: 2/15/2022
Date Reported: 2/16/2022

Lab Sample ID: 689882
Lab File Name: M02152M1_10
Final Extraction Vol: 1000 uL
Dilution Factor: 1
Reporting Unit: pg/g
Method: TAP 01-0403-015

CAS No.	ANALYTE	RESULT	Q
62-75-9	N-Nitrosodimethylamine	8669	

Internal Standard % Recovery

N-Nitrosodimethylamine-d6: 71.2

U - Undetected, indicates not found above the detection limit

J - Estimated value, greater than the MDL but less than the PQL

CLIENT:	Navarro Research and Engineering Inc.
SwRI PROJECT #:	26040.06.001
TASK ORDERS:	220211-5
NAVARRO PO #:	21EC035B

EXTRACTION AND INJECTION LOG

(HR-779)

Preparation Log

Semi-volatiles

A28898

Southwest Research Institute
San Antonio, Texas 78238

Batch: 20220211-P001 (Ver. 2)
Status: APPROVED

Client(s): Navarro Research and Engineering Inc.
Task Order(s): 220211-5
SDG(s): 689877
Project(s): 26040.06.001
Method(s): 3540C (TAP: 01-0402-152)
Matrix(s): Soil
Reagent(s): Sodium Sulfate ID:04-0402-004 P36I, DCM Optima Fisher CIMS#192195
Balance(s): #61
Pipette(s): 0.5mL 613538
Wiretrol(s): 100-200uL 181780
Reference Book(s): 22-0402-002 P026
Time In: 02/11/2022 16:37:31 Time Out: 02/12/2022 11:37:32

Sample Identification	Client Identification	Matrix	Solv Vol DCM	Sample WT (g)	FEV DCM (uL)	FV DCM (uL)
PB22B11CM1 ①	NA	Sodium Sulfate	200	5.12	1000	1000
LCS22B11CM1 ②	NA	Sodium Sulfate	200	5.08	1000	1000
LFB22B11CM1 ③	NA	Sodium Sulfate	200	5.01	1000	1000
689877 ①	2202090948 (10159)	Soil	200	5.53	1000	1000
689878 ①	2202090949 (10159)	Soil	200	5.42	1000	1000
689879MS ④	2202090950 (10159)	Soil	200	5.32	1000	1000
689880 ①	2202090928 (10164)	Soil	200	5.12	1000	1000
689881 ①	2202090929 (10164)	Soil	200	5.36	1000	1000
689882MS ④	2202090930 (10164)	Soil	200	5.45	1000	1000

① spiked 200 µL of CI# 201920 Nitrosamines IS spike @ 250ng/mL (Lot# W-193, SDDE-018, SDGC-032, 050520, 031920, 090420, Source: CDN Isotopes, Exp: 08/31/2022)

② spiked 200 µL of CI# 201920 Nitrosamines IS spike @ 250ng/mL (Lot# W-193, SDDE-018, SDGC-032, 050520, 031920, 090420, Source: CDN Isotopes, Exp: 08/31/2022) and
0.500 mL of CI# 203529 Nitrosamines MS Spike (Lot# SDGI-021, 218051300-01, Source: AccuStandard, Exp: 09/01/2022)

③ spiked 200 µL of CI# 201920 Nitrosamines IS spike @ 250ng/mL (Lot# W-193, SDDE-018, SDGC-032, 050520, 031920, 090420, Source: CDN Isotopes, Exp: 08/31/2022) and
0.100 mL of CI# 203529 Nitrosamines MS Spike (Lot# SDGI-021, 218051300-01, Source: AccuStandard, Exp: 09/01/2022)

④ spiked 200 µL of CI# 201920 Nitrosamines IS spike @ 250ng/mL (Lot# W-193, SDDE-018, SDGC-032, 050520, 031920, 090420, Source: CDN Isotopes, Exp: 08/31/2022) and
0.500 mL of CI# 203529 Nitrosamines MS Spike (Lot# SDGI-021, 218051300-01, Source: AccuStandard, Exp: 09/01/2022)

TF 2/18/22 (RE)

Comments:
Hamed Edrisi: Set up, Spike
Christina Menn: Blow Down, Final Volume
Marina Lebron: Set Up, Spike witness Concentrate, Qualitative Transfer
Blas Lozano: Concentrate, Qualitative Transfer

Prepared by: MENN, CHRISTINA Date: 02/11/2022

Reviewed by: YAU, ALICE Date: 02/14/2022

Disposal Int/Date/Loc: _____

Preparation Log

Semi-volatiles

A28898

Southwest Research Institute
San Antonio, Texas 78238

Batch: 20220211-P001 (Ver. 2)
Status: APPROVED

Client(s): Navarro Research and Engineering Inc.
Task Order(s): 220211-5
SDG(s): 689877
Project(s): 26040.06.001
Method(s): 3540C (TAP: 01-0402-152)
Matrix(s): Soil
Reagent(s): Sodium Sulfate ID:04-0402-004 P36I, DCM Optima Fisher CIMS#192195
Balance(s): #61
Pipette(s): 0.5mL 613538
Wiretrol(s): 100-200uL 181780
Reference Book(s): 22-0402-002 P026
Time In: 02/11/2022 16:37:31 Time Out: 02/12/2022 11:37:32

All Samples:

X(g) ——>16 hours soxhlet Extraction ——>Concentrated ——>FV 1000uL DCM for analysis

Prepared by: MENN, CHRISTINA Date: 02/11/2022

Reviewed by: YAU, ALICE Date: 02/14/2022

Disposal Int/Date/Loc:

Work continued from Page

SWRI

Tommy 2/3/22

INSTRUMENT ID: AutoSpec M		Client: Navarro	TO: 220105-2, 220106-1
Method: Nitrosamines by HRMS			
COLUMN: RTX-1701 60mX0.32mm id 0.25 film		COLUMN FLOW RATE: 1.0 ML/MIN	
TEMP-1: 37 deg C	TIME-2: - 0 min	RATE-3 : - deg/min	SOURCE TEMP : 250 deg C
TIME-1: 4.0 min	RATE-2: - 25 deg/min	TEMP-4 : - deg C	INTERFACE TEMP : 250 deg C
RATE-1: 10deg/min	TEMP-3: - 280 deg C	TIME-4 : - min	ELECTRON ENERGY: 70eV
TEMP-2: 160 deg C	TIME-3: - 1.0 min	INJ TEMP: 235 deg C	SPLIT VALVE ON : 1.00 min

Analyst: T. Farias

M02012C1 : INITIAL 6K RESOLVING POWER CHECK AT 5% BASELINE DEFINITION

FILENAME	Date	Time	SAMPLE TEXT
M02012M1_S1	1-Feb-22	17:23	ICAL: Nitrosamine CS7 500 pg/uL (CI# 193185)
M02012M1_S2	1-Feb-22	17:52	ICAL: Nitrosamine CS6 250 pg/uL (CI# 193186)
M02012M1_S3	1-Feb-22	18:21	ICAL: Nitrosamine CS5 100 pg/uL (CI# 193187)
M02012M1_S4	1-Feb-22	18:51	ICAL: Nitrosamine CS4 50.0 pg/uL (CI# 193188)
M02012M1_S5	1-Feb-22	19:20	ICAL: Nitrosamine CS3 20.0 pg/uL (CI# 193189)
M02012M1_S6	1-Feb-22	19:50	ICAL: Nitrosamine CS2 10.0 pg/uL (CI# 193190)
M02012M1_S7	1-Feb-22	20:19	ICAL: Nitrosamine CS1 5.00 pg/uL (CI# 193192)
M02012M1_S8	1-Feb-22	20:48	ICV: Nitrosamine CS4 50.0 pg/uL (CI# 193181)
M02012M1_01	1-Feb-22	21:18	INST BLK_31JAN22
M02012M1_02	1-Feb-22	21:48	PB22A06HE1
M02012M1_03	1-Feb-22	22:18	LFB22A06HE1
M02012M1_04	1-Feb-22	22:47	LCS22A06HE1
M02012M1_05	1-Feb-22	23:16	NRE: 2201030831A (BLM-10-517) SN:688976
M02012M1_06	1-Feb-22	23:46	NRE: 2201031048A (BLM-10-517) SN:688977
M02012M1_07	2-Feb-22	0:16	NRE: 2201031049A (BLM-10-517) SN:688978
M02012M1_08	2-Feb-22	0:45	NRE: 2201031514B (ST-7-453) SN:688979
M02012M1_09	2-Feb-22	1:15	NRE: 2201031515B (ST-7-453) SN:688980
M02012M1_10	2-Feb-22	1:44	NRE: 2201031524B (ST-7-544) SN:688981
M02012M1_11	2-Feb-22	2:14	NRE: 2201031525B (ST-7-544) SN:688982
M02012M1_12	2-Feb-22	2:44	NRE: 2201031526B (ST-7-544) SN:688983
M02012M1_13	2-Feb-22	3:14	NRE: 2201040700B (ST-7-779) SN:688989
M02012M1_14	2-Feb-22	3:43	NRE: 2201040847 (WELL M) SN:688990
M02012M1_15	2-Feb-22	4:12	NRE: 2201040848 (WELL M) SN:688991
M02012M1_16	2-Feb-22	4:41	NRE: 2201040932A (JP-1-424) SN:688992
M02012M1_17	2-Feb-22	5:11	NRE: 2201040933A (JP-1-424) SN:688993
M02012M1_18	2-Feb-22	8:01	NRE: 2201041445B (ST-7-779) SN:688994
M02012M1_19	2-Feb-22	8:33	NRE: 2201041446B (ST-7-779) SN:688995
M02012M1_20	2-Feb-22	9:02	NRE: 2201041502A (JP-2-447) SN:688996
M02012M1_21	2-Feb-22	9:31	NRE: 2201041503A (JP-2-447) SN:688997
M02012M1_22	2-Feb-22	10:01	NRE: 2201041505B (ST-7-970) SN:688998
M02012M1_23	2-Feb-22	10:31	NRE: 2201041506B (ST-7-970) SN:688999

M02012C2 : FINAL 6K RESOLVING POWER CHECK AT 5% BASELINE DEFINITION

SAVED AS M02012M1_NDMA_ICAL] -INC.\MASS/YNX \ NITROSAMINES_2022.PRO
M02012M1_NDMA_SAMPS] WRKST #3

2/3/22 T.F.

Work continued to Page

SIGNATURE Tommy A Farias DATE 2/1/22

DISCLOSED TO AND UNDERSTOOD BY [signature] DATE 2/3/22

WITNESS DATE

SWRI

Work continued from Page

2/15/22

INSTRUMENT ID: AutoSpec M
Method: Nitrosamines by HRMS
COLUMN: RTX-1701 60mX0.32mm id 0.25 film

Client: Navarro TO: 220211-5

COLUMN FLOW RATE: 1.0 ML/MIN

TEMP-1: 37 deg C	TIME-2: - 0 min	RATE-3 : - deg/min	SOURCE TEMP : 250 deg C
TIME-1: 4.0 min	RATE-2: - 25 deg/min	TEMP-4 : - deg C	INTERFACE TEMP : 250 deg C
RATE-1: 10deg/min	TEMP-3: - 280 deg C	TIME-4 : - min	ELECTRON ENERGY: 70eV
TEMP-2: 160 deg C	TIME-3: - 1.0 min	INJ TEMP: 235 deg C	SPLIT VALVE ON : 1.00 min

Analyst: T. Farias

M02152C1 : INITIAL 6K RESOLVING POWER CHECK AT 5% BASELINE DEFINITION

FILENAME	Date	Time	SAMPLE TEXT
M02152M1_S1	15-Feb-22	10:28	VER: Nitrosamine CS4 50.0 pg/uL (CI# 193188)
M02152M1_01	15-Feb-22	10:55	INST BLK_15FEB22
M02152M1_02	15-Feb-22	11:24	PB22B11CM1
M02152M1_03	15-Feb-22	11:54	LFB22B11CM1
M02152M1_04	15-Feb-22	12:24	LCS22B11CM1
M02152M1_05	15-Feb-22	12:54	NRE: 2202090948 (10159) SN:689877
M02152M1_06	15-Feb-22	13:24	NRE: 2202090949 (10159) SN:689878
M02152M1_07	15-Feb-22	13:53	NRE: 2202090950 (10159) MS SN:689879
M02152M1_08	15-Feb-22	14:23	NRE: 2202090928 (10164) SN:689880
M02152M1_09	15-Feb-22	14:53	NRE: 2202090929 (10164) SN:689881
M02152M1_10	15-Feb-22	15:22	NRE: 2202090930 (10164) MS SN:689882

SAVED AS M02152M1_NDMA_VER] IN C:\MASSLYNX\NITROSAMINES_2022.PRO
M02152ML NDMA_SAMPS

WKST#3

2/15/22

M02152C2 : FINAL 6K RESOLVING POWER CHECK AT 5% BASELINE DEFINITION

T.F.

Work continued to Page

SIGNATURE Tommy A Farias DATE 2/15/22

DISCLOSED TO AND UNDERSTOOD BY [signature] DATE 2/15/22 WITNESS DATE

WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Work Orders:	2B11021	**Report Date:**	3/14/2022
		Received Date:	02/11/2022
Project:	HWMU - 600GW Invest 505-005	**Turnaround Time:**	Normal
		Phones:	(575) 524-5534
		Fax:	
Attn:	Brian Barrick	**P.O. #:**	21EC034B
Client:	Navarro Research and Engineering, Inc. - NM 12600 NASA Road Las Cruces, NM 88012	**Billing Code:**	

ELAP-CA #1132 • EPA-UCMR #CA00211 • Guam-EPA #17-008R • LACSD #10143 • NJ-DEP #CA015 • NV-DEP #NAC 445A • SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

Dear Patricia Melendrez,

Enclosed are the results of analyses for samples received 2/11/22 with the Chain-of-Custody document. The samples were received in good condition, at 3.9 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Reviewed by:

Kim G. Tu
Project Manager

14859 Clark Avenue,City of Industry CA, 91745 | Phone: (626) 336-2139 | Fax: (626) 336-2634

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Navarro Research and Engineering, Inc. - NM
12600 NASA Road
Las Cruces, NM 88012

Project Number: HWMU - 600GW Invest 505-005

Project Manager: Patricia Melendrez

Reported: 03/14/2022 15:23

Sample Summary

Sample Name	Sampled By	Lab ID	Matrix	Sampled	Qualifiers
2202090951, Alias: 10159	Brian Barrick	2B11021-01	Solid	02/09/22 09:51	
2202090952, Alias: 10159	Brian Barrick	2B11021-02	Solid	02/09/22 09:52	
2202090953, Alias: 10159	Brian Barrick	2B11021-03	Solid	02/09/22 09:53	
2202090931, Alias: 10164	Brian Barrick	2B11021-04	Solid	02/09/22 09:31	
2202090932, Alias: 10164	Brian Barrick	2B11021-05	Solid	02/09/22 09:32	
2202090933, Alias: 10164	Brian Barrick	2B11021-06	Solid	02/09/22 09:33	
2202090807, Alias: 1452	Brian Barrick	2B11021-07	Water	02/09/22 08:07	
2202090808, Alias: 1452	Brian Barrick	2B11021-08	Water	02/09/22 08:08	
2202090809, Alias: 1452	Brian Barrick	2B11021-09	Water	02/09/22 08:09	
2202090842, Alias: 1451	Brian Barrick	2B11021-10	Water	02/09/22 08:42	
2202090843, Alias: 1451	Brian Barrick	2B11021-11	Water	02/09/22 08:43	
2202090844, Alias: 1451	Brian Barrick	2B11021-12	Water	02/09/22 08:44	

Analyses Accreditation Summary

Analyte	CAS #	Not By NELAP	ANAB ISO 17025
EPA 8315M in Solid			
Hydrazine, water leachable	302-01-2	✓	
Monomethylhydrazine (MMH), water leachable	60-34-4	✓	
1,1-Dimethylhydrazine, water leachable	57-14-7	✓	
EPA 8315M in Water			
Hydrazine	302-01-2	✓	
Monomethylhydrazine (MMH)	60-34-4	✓	
1,1-Dimethylhydrazine	57-14-7	✓	

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12600 NASA Road
Las Cruces, NM 88012

Project Number: HWMU - 600GW Invest 505-005

Project Manager: Patricia Melendrez

Reported: 03/14/2022 15:23

Sample Results

Sample: 2202090951, Alias: 10159
2B11021-01RE1 (Solid)

Sampled: 02/09/22 9:51 by Brian Barrick

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Hydrazine by LCMS							
Method: EPA 8315M			**Instr:** LCMS03				
Batch ID: W2C0718 **Preparation:** Microextraction			**Prepared:** 03/09/22 14:54				**Analyst:** PJS
1,1-Dimethylhydrazine, water leachable	ND	20	20	mg/kg	1	03/09/22	
Hydrazine, water leachable	ND	7.7	10	mg/kg	1	03/09/22	
Monomethylhydrazine (MMH), water leachable	ND	20	20	mg/kg	1	03/09/22	

Sample Results

Sample: 2202090952, Alias: 10159
2B11021-02RE1 (Solid)

Sampled: 02/09/22 9:52 by Brian Barrick

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Hydrazine by LCMS							
Method: EPA 8315M			**Instr:** LCMS03				
Batch ID: W2C0718 **Preparation:** Microextraction			**Prepared:** 03/09/22 14:54				**Analyst:** PJS
1,1-Dimethylhydrazine, water leachable	ND	20	20	mg/kg	1	03/09/22	
Hydrazine, water leachable	ND	7.7	10	mg/kg	1	03/09/22	
Monomethylhydrazine (MMH), water leachable	ND	20	20	mg/kg	1	03/09/22	

Sample Results

Sample: 2202090953, Alias: 10159
2B11021-03RE1 (Solid)

Sampled: 02/09/22 9:53 by Brian Barrick

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Hydrazine by LCMS							
Method: EPA 8315M			**Instr:** LCMS03				
Batch ID: W2C0718 **Preparation:** Microextraction			**Prepared:** 03/09/22 14:54				**Analyst:** PJS
1,1-Dimethylhydrazine, water leachable	ND	20	20	mg/kg	1	03/09/22	
Hydrazine, water leachable	ND	7.7	10	mg/kg	1	03/09/22	
Monomethylhydrazine (MMH), water leachable	ND	20	20	mg/kg	1	03/09/22	

Sample Results

Sample: 2202090931, Alias: 10164
2B11021-04RE1 (Solid)

Sampled: 02/09/22 9:31 by Brian Barrick

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Hydrazine by LCMS							
Method: EPA 8315M			**Instr:** LCMS03				
Batch ID: W2C0718 **Preparation:** Microextraction			**Prepared:** 03/09/22 14:54				**Analyst:** PJS
1,1-Dimethylhydrazine, water leachable	ND	20	20	mg/kg	1	03/09/22	
Hydrazine, water leachable	ND	7.7	10	mg/kg	1	03/09/22	
Monomethylhydrazine (MMH), water leachable	ND	20	20	mg/kg	1	03/09/22	

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Navarro Research and Engineering, Inc. - NM
12600 NASA Road
Las Cruces, NM 88012

Project Number: HWMU - 600GW Invest 505-005

Project Manager: Patricia Melendrez

Reported: 03/14/2022 15:23

Sample Results (Continued)

Sample: 2202090932, Alias: 10164
2B11021-05RE1 (Solid)
Sampled: 02/09/22 9:32 by Brian Barrick

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Hydrazine by LCMS							
Method: EPA 8315M			**Instr:** LCMS03				
Batch ID: W2C0718 **Preparation:** Microextraction			**Prepared:** 03/09/22 14:54				**Analyst:** PJS
1,1-Dimethylhydrazine, water leachable	ND	20	20	mg/kg	1	03/09/22	
Hydrazine, water leachable	ND	7.7	10	mg/kg	1	03/09/22	
Monomethylhydrazine (MMH), water leachable	ND	20	20	mg/kg	1	03/09/22	

Sample Results (Continued)

Sample: 2202090933, Alias: 10164
2B11021-06RE1 (Solid)
Sampled: 02/09/22 9:33 by Brian Barrick

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Hydrazine by LCMS							
Method: EPA 8315M			**Instr:** LCMS03				
Batch ID: W2C0718 **Preparation:** Microextraction			**Prepared:** 03/09/22 14:54				**Analyst:** PJS
1,1-Dimethylhydrazine, water leachable	ND	20	20	mg/kg	1	03/09/22	
Hydrazine, water leachable	ND	7.7	10	mg/kg	1	03/09/22	
Monomethylhydrazine (MMH), water leachable	ND	20	20	mg/kg	1	03/09/22	

Sample Results (Continued)

Sample: 2202090807, Alias: 1452
2B11021-07 (Water)
Sampled: 02/09/22 8:07 by Brian Barrick

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Hydrazine by LCMS							
Method: EPA 8315M			**Instr:** LCMS03				
Batch ID: W2C0311 **Preparation:** Microextraction			**Prepared:** 03/03/22 15:18				**Analyst:** PJS
1,1-Dimethylhydrazine	ND	0.27	2.0	ug/l	1	03/04/22	
Hydrazine	ND	0.40	1.0	ug/l	1	03/04/22	
Monomethylhydrazine (MMH)	ND	0.31	2.0	ug/l	1	03/04/22	

Sample Results (Continued)

Sample: 2202090808, Alias: 1452
2B11021-08 (Water)
Sampled: 02/09/22 8:08 by Brian Barrick

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Hydrazine by LCMS							
Method: EPA 8315M			**Instr:** LCMS03				
Batch ID: W2C0311 **Preparation:** Microextraction			**Prepared:** 03/03/22 15:18				**Analyst:** PJS
1,1-Dimethylhydrazine	ND	0.27	2.0	ug/l	1	03/04/22	
Hydrazine	ND	0.40	1.0	ug/l	1	03/04/22	
Monomethylhydrazine (MMH)	ND	0.31	2.0	ug/l	1	03/04/22	

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Navarro Research and Engineering, Inc. - NM
12600 NASA Road
Las Cruces, NM 88012

Project Number: HWMU - 600GW Invest 505-005

Project Manager: Patricia Melendrez

Reported: 03/14/2022 15:23

Sample Results (Continued)

Sample: 2202090809, Alias: 1452
2B11021-09 (Water)
Sampled: 02/09/22 8:09 by Brian Barrick

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Hydrazine by LCMS							
Method: EPA 8315M			**Instr:** LCMS03				
Batch ID: W2C0311 **Preparation:** Microextraction			**Prepared:** 03/03/22 15:18				**Analyst:** PJS
1,1-Dimethylhydrazine	ND	0.27	2.0	ug/l	1	03/04/22	
Hydrazine	ND	0.40	1.0	ug/l	1	03/04/22	
Monomethylhydrazine (MMH)	ND	0.31	2.0	ug/l	1	03/04/22	

Sample Results (Continued)

Sample: 2202090842, Alias: 1451
2B11021-10 (Water)
Sampled: 02/09/22 8:42 by Brian Barrick

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Hydrazine by LCMS							
Method: EPA 8315M			**Instr:** LCMS03				
Batch ID: W2C0311 **Preparation:** Microextraction			**Prepared:** 03/03/22 15:18				**Analyst:** PJS
1,1-Dimethylhydrazine	ND	0.27	2.0	ug/l	1	03/04/22	
Hydrazine	ND	0.40	1.0	ug/l	1	03/04/22	
Monomethylhydrazine (MMH)	ND	0.31	2.0	ug/l	1	03/04/22	

Sample Results (Continued)

Sample: 2202090843, Alias: 1451
2B11021-11 (Water)
Sampled: 02/09/22 8:43 by Brian Barrick

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Hydrazine by LCMS							
Method: EPA 8315M			**Instr:** LCMS03				
Batch ID: W2C0311 **Preparation:** Microextraction			**Prepared:** 03/03/22 15:18				**Analyst:** PJS
1,1-Dimethylhydrazine	ND	0.27	2.0	ug/l	1	03/04/22	
Hydrazine	ND	0.40	1.0	ug/l	1	03/04/22	
Monomethylhydrazine (MMH)	ND	0.31	2.0	ug/l	1	03/04/22	

Sample Results (Continued)

Sample: 2202090844, Alias: 1451
2B11021-12 (Water)
Sampled: 02/09/22 8:44 by Brian Barrick

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Hydrazine by LCMS							
Method: EPA 8315M			**Instr:** LCMS03				
Batch ID: W2C0311 **Preparation:** Microextraction			**Prepared:** 03/03/22 15:18				**Analyst:** PJS
1,1-Dimethylhydrazine	ND	0.27	2.0	ug/l	1	03/04/22	
Hydrazine	ND	0.40	1.0	ug/l	1	03/04/22	
Monomethylhydrazine (MMH)	ND	0.31	2.0	ug/l	1	03/04/22	

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12600 NASA Road
Las Cruces, NM 88012

Project Number: HWMU - 600GW Invest 505-005

Project Manager: Patricia Melendrez

Reported: 03/14/2022 15:23

Quality Control Results

Hydrazine by LCMS

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2C0311 - EPA 8315M											
Blank (W2C0311-BLK1)					**Prepared: 03/03/22 Analyzed: 03/04/22**						
1,1-Dimethylhydrazine	ND	0.27	2.0	ug/l							
Hydrazine	ND	0.40	1.0	ug/l							
Monomethylhydrazine (MMH)	ND	0.31	2.0	ug/l							
LCS (W2C0311-BS1)					**Prepared: 03/03/22 Analyzed: 03/04/22**						
1,1-Dimethylhydrazine	22.6	0.27	2.0	ug/l	20.0		113	50-150			
Hydrazine	24.3	0.40	1.0	ug/l	20.0		122	50-150			
Monomethylhydrazine (MMH)	25.2	0.31	2.0	ug/l	20.0		126	50-150			
Matrix Spike (W2C0311-MS1)	**Source: 2B11021-09**				**Prepared: 03/03/22 Analyzed: 03/04/22**						
1,1-Dimethylhydrazine	16.6	0.27	2.0	ug/l	20.0	ND	83	50-150			
Hydrazine	19.4	0.40	1.0	ug/l	20.0	ND	97	50-150			
Monomethylhydrazine (MMH)	17.6	0.31	2.0	ug/l	20.0	ND	88	50-150			
Matrix Spike (W2C0311-MS2)	**Source: 2B11021-12**				**Prepared: 03/03/22 Analyzed: 03/04/22**						
1,1-Dimethylhydrazine	20.2	0.27	2.0	ug/l	20.0	ND	101	50-150			
Hydrazine	21.4	0.40	1.0	ug/l	20.0	ND	107	50-150			
Monomethylhydrazine (MMH)	21.1	0.31	2.0	ug/l	20.0	ND	105	50-150			
Matrix Spike Dup (W2C0311-MSD1)	**Source: 2B11021-09**				**Prepared: 03/03/22 Analyzed: 03/04/22**						
1,1-Dimethylhydrazine	21.3	0.27	2.0	ug/l	20.0	ND	107	50-150	25	30	
Hydrazine	24.2	0.40	1.0	ug/l	20.0	ND	121	50-150	22	30	
Monomethylhydrazine (MMH)	22.2	0.31	2.0	ug/l	20.0	ND	111	50-150	23	30	
Matrix Spike Dup (W2C0311-MSD2)	**Source: 2B11021-12**				**Prepared: 03/03/22 Analyzed: 03/04/22**						
1,1-Dimethylhydrazine	20.3	0.27	2.0	ug/l	20.0	ND	102	50-150	0.5	30	
Hydrazine	19.6	0.40	1.0	ug/l	20.0	ND	98	50-150	9	30	
Monomethylhydrazine (MMH)	20.1	0.31	2.0	ug/l	20.0	ND	101	50-150	4	30	
Batch: W2C0718 - EPA 8315M											
Blank (W2C0718-BLK1)					**Prepared & Analyzed: 03/09/22**						
1,1-Dimethylhydrazine, water leachable	ND	20	20	mg/kg							
Hydrazine, water leachable	ND	7.7	10	mg/kg							
Monomethylhydrazine (MMH), water leachable	ND	20	20	mg/kg							
LCS (W2C0718-BS1)					**Prepared & Analyzed: 03/09/22**						
1,1-Dimethylhydrazine, water leachable	0.179		20	mg/kg	0.200		90	50-150			J
Hydrazine, water leachable	0.146		10	mg/kg	0.200		73	50-150			J
Monomethylhydrazine (MMH), water leachable	0.219		20	mg/kg	0.200		110	50-150			J
Matrix Spike (W2C0718-MS1)	**Source: 2B11021-03RE1**				**Prepared & Analyzed: 03/09/22**						
1,1-Dimethylhydrazine, water leachable	0.121		20	mg/kg	0.204	0.0000313	59	50-150			J
Hydrazine, water leachable	0.00534		10	mg/kg	0.204	0.00421	0.6	50-150			J, MS-01
Monomethylhydrazine (MMH), water leachable	0.0295		20	mg/kg	0.204	0.00204	13	50-150			MS-01, J
Matrix Spike (W2C0718-MS2)	**Source: 2B11021-06RE1**				**Prepared & Analyzed: 03/09/22**						
1,1-Dimethylhydrazine, water leachable	0.0877		20	mg/kg	0.200	0.00000746	44	50-150			MS-01, J

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Project Number: HWMU - 600GW Invest 505-005

Project Manager: Patricia Melendrez

Reported:
03/14/2022 15:23

Quality Control Results

(Continued)

Hydrazine by LCMS (Continued)

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W2C0718 - EPA 8315M (Continued)											
Matrix Spike (W2C0718-MS2)	**Source: 2B11021-06RE1**				**Prepared & Analyzed: 03/09/22**						
Hydrazine, water leachable	0.00622		10	mg/kg	0.200	0.00289	2	50-150			MS-01, J
Monomethylhydrazine (MMH), water leachable	0.0291		20	mg/kg	0.200	0.00204	14	50-150			MS-01, J
Matrix Spike Dup (W2C0718-MSD1)	**Source: 2B11021-03RE1**				**Prepared & Analyzed: 03/09/22**						
1,1-Dimethylhydrazine, water leachable	0.105		20	mg/kg	0.202	0.0000313	52	50-150	200	30	R-02, J
Hydrazine, water leachable	0.00553		10	mg/kg	0.202	0.00421	0.7	50-150	200	30	MS-05, J
Monomethylhydrazine (MMH), water leachable	0.0336		20	mg/kg	0.202	0.00204	16	50-150	200	30	MS-05, J
Matrix Spike Dup (W2C0718-MSD2)	**Source: 2B11021-06RE1**				**Prepared & Analyzed: 03/09/22**						
1,1-Dimethylhydrazine, water leachable	0.0880		20	mg/kg	0.202	0.00000746	44	50-150	200	30	MS-05, J
Hydrazine, water leachable	0.00856		10	mg/kg	0.202	0.00289	3	50-150	200	30	MS-05, J
Monomethylhydrazine (MMH), water leachable	0.0352		20	mg/kg	0.202	0.00204	16	50-150	200	30	MS-05, J

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Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
MS-01	The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.
MS-05	The spike recovery and/or RPD were outside acceptance limits for the MS and/or MSD due to possible matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
R-02	The RPD was outside of QC acceptance limits due to possible matrix interference.
%REC	Percent Recovery
Dil	Dilution
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ)
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
RPD	Relative Percent Difference
Source	Sample that was matrix spiked or duplicated.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

All results are expressed on wet weight basis unless otherwise specified.

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

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