



MERIT ENGINEERING INC.

DATA SUMMARY REPORT

Hannegan Properties LLC
6069 Hannegan Road
Bellingham, Washington 98226



Prepared For:

Jason Reynold
Hannegan Properties LLC
6069 Hannegan Road
Bellingham, Washington 98226

June 11, 2018
Project No. PB0305608

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June 11, 2018
 Project No. PB0305608



Jason Reynold
Jason@AmCan-QSS.net

Subject: Soil Monitoring, Permit ST00007285

Dear Jason:

At your request, we have conducted soil monitoring at the above reference site as is required by State Waste Discharge Permit Number ST00007285.

Samples were collected end of the growing season on April 27, 2018 in the field. Five (5) sampling locations were selected within the spray field, one (1) site in the center of the spray field and four (4) randomly selected. Samples were collected on one-foot soil increments at 6", 15", 30", and 48" depth. Composite of five (5) core samples at the depth increments have been tested.

The facility and Ecology use the soil monitoring data to monitor and evaluate wastewater application rates and to determine if salts and nutrients are flushing beyond the root zone and leaching to the groundwater. The presence and concentration of certain wastewater related parameters in the soils (e.g., nitrate and salts) can indicate over application of wastewater. The facility must follow the analytical methods provided in Soil, Plant and Water Reference Methods for the Western Region (2003). Constituents proposed for monitoring are those that have the highest potential to result in an impact to soil and/or groundwater.

Results are presented below:

Total Nitrogen

Results (mg/kg)	6" depth	48" depth
Total Nitrogen	3065.6	106.5

The potential that the total nitrogen has been flushed through root zone is low.

The 6" depth total nitrogen concentration reduced from 6736.44 mg/Kg to 2247.5 mg/Kg from March 2017 to November 2017, then increased from 2247.5 mg/kg to 3054.5 mg/kg

from November 2017 to April 2018. At 48'' depth, it decreased 486.68 to 375.9 mg/Kg, then to 106.5 mg/kg.

Sodium Adsorption Ratio

Results	6'' depth	48'' depth
Sodium Adsorption Ratio	13.28	1.08

When Sodium Adsorption Ratio (SAR) is greater than 13, the soil is called a sodic soil (Sonon, 2016). Excess sodium in sodic soils causes soil particles to repel each other, preventing the formation of soil aggregates. The 6'' depth SAR slightly exceeds 13. While the 48'' depth SAR is below 13.

Chloride

mg/kg	6'' depth	18'' depth	30'' depth	48'' depth
Chloride	2.8	5.2	12.9	2.2

The chloride concentration at 6'', 18'', and 48'' depth are very low (0-5 mg/kg) to low (5-10 mg/kg). And 30'' has medium chloride (10-20 mg/kg). 0-50 lb potassium chloride fertilizer is recommended (D.A. Horneck, 1996). The Chloride concentration at all 4 depths has decreased about 90% from November 2017.

Sulfate

mg/kg	6'' depth	48'' depth
Sulfate	4.1	ND

The 6'' depth has low soil sulfate concentration, 0-30 lb/acre fertilization is recommended (Laboratories, 2017).

Ammonia – N

mg/kg	6'' depth	48'' depth
Ammonia – N	733	ND

Ammonia- N does not accumulate in the soil, as soil temperature and moisture conditions suitable for plant growth also are ideal for conversion of ammonia-N to nitrate-N. Ammonia-N concentrations at 6'' depth increased from 96 mg/kg to 733 mg/kg from November to April.

pH

	6'' depth	18'' depth	30'' depth	48'' depth
pH	6.71	6.63	7.05	7.05

When pH is within the range of 6.0 to 8.2, crops can grow best. All depths have pH within this range, and pH are neutral. (Laboratories, 2017).

Cation Exchange Capacity

meq/100g	6'' depth	18'' depth	30'' depth	48'' depth
Cation Exchange Capacity	17.4	16.1	12.2	12.3

Cation Exchange Capacity (CEC) is a measure of a soil's capacity to retain and release elements such as K, Ca, Mg, and Na. Soils with high clay and/or organic matter content have high CEC. Sandy, low organic matter soils have low CEC.

Soils with CEC in the range of 12 – 18 mgq/100g are usually loam or clay loam (Laboratories, 2017).

Organic Matter

%	6'' depth	48'' depth
Organic Matter	5.2	0.6

Most of our productive agricultural soils have between 3% and 6% organic matter. 48'' depth soil has very low or low organic matter level (Megan F., 2008).

Exchangeable Sodium Percentage

%	6'' depth	48'' depth
Exchangeable Sodium Percentage	1.5	19.2

6'' depth soil has low Exchangeable Sodium Percentage (0-10 %), no adverse effect on soil is likely. While the 48'' depth soil has excessive Exchangeable Sodium Percentage (10+ %), soil dispersion resulting in poor soil physical condition and poor plant growth are likely (Lamond, 1992).

Moisture In Solids

	6'' depth	18'' depth	30'' depth	48'' depth
Moisture In Solids	32.91	22.27	17.00	17.42

This soil was very wet after the rainfall at the time of sample collection, with around 20% of moisture content.

Total Nitrate/Nitrite

mg/Kg	6'' depth	18'' depth	30'' depth	48'' depth
Total Nitrate/Nitrite	9.6	1.7	0.5	1.5

The 6'' total nitrate/nitrite concentrations increased from 3.5 mg/Kg to 9.6 mg/Kg from 2017 to 2018. The results from deeper soil are similar with the results from previous studies. This may be due to recent fertilization.

Electrical Conductivity

uS/cm	6'' depth	18'' depth	30'' depth	48'' depth
Electrical Conductivity	54.93	77.37	30.92	15.97

Electrical conductivity measures the ability of the soil solution to conduct electricity. Increases in soluble salts result in proportional increases in the solution electrical conductivity (Sonon, 2016).

Calcium

mg/Kg	6'' depth	48'' depth
Calcium	5410	5928

Magnesium

mg/Kg	6'' depth	48'' depth
Magnesium	5437	5359

Calcium/Magnesium ratio ranges from 1:1 to 2:1, which can support normal plant growth

(Kelling, 1992).

Sodium

mg/kg	6'' depth	18'' depth	30'' depth	48'' depth
Sodium	805	915	612	478

There is relatively low potential for the sodium to flush beyond the root zone and leach to the groundwater, and result in an impact to soil and/or groundwater.

Soil at depth 18'' has higher sodium concentration, and 48'' has the lowest sodium concentration.

Total Kjeldahl Nitrogen

mg/Kg	6'' depth	48'' depth
Total Kjeldahl Nitrogen	3056	105

There is no requirement for Total Kjeldahl Nitrogen. Total Kjeldahl Nitrogen (TKN) analysis determines both the organic and the inorganic forms of nitrogen.

Based on our review of the soil monitoring data from April 2018, it is our opinion that the soil quality at this time does not raise significant issue or concern.

Thank you for this opportunity to work with you. Please contact us if you have any questions about this report.

Sincerely,



June 12, 2018

Austin X. Huang, Ph.D., P.E., L.G., D.GE., F.ASCE
Principal

F.ASCE: Fellow - American Society of Civil Engineering

D.GE - Diplomate - Academy of GeoProfessionals

D.GEs provide successful projects that benefit their clients.

The D.GE certification recognizes geotechnical engineers who possess specialty education, extensive experience, integrity, and good judgment.

References

Sonon, L. S. (2016, June 13). Retrieved from Soil Salinity Testing, Data Interpretation and Recommendations: <http://extension.uga.edu/publications/detail.cfm?number=C1019>

D.A. Horneck, D. S. (1996). *Soil Test Interpretation Guide*. Corvallis: Oregon State University Extension Service.

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Megan F., C. A. (2008). *Cornell University Cooperative Extension Agronomy Fact Sheet Series, Fact Sheet 41*. Cornell University Cooperative Extension.

Lamond, R. a. (1992). *Management of saline and sodic soils*. Kansas State University, Department of Agronomy MF-1022.

Kelling, K. A. (1992). *Soil and applied calcium*. Madison, WI: University of Wisconsin--Extension.



Burlington, WA	Corporate Laboratory (a)	1620 S Walnut St	Burlington, WA 98233	800.755.9295 • 360.757.1400
Bellingham, WA	Microbiology (b)	805 Orchard Dr Ste 4	Bellingham, WA 98225	360.715.1212
Portland, OR	Microbiology/Chemistry (c)	9150 SW Pioneer Ct Ste W	Wilsonville, OR 97070	503.682.7802
Corvallis, OR	Microbiology (d)	540 SW Third Street	Corvallis, OR 97333	541.753.4946

May 30, 2018

Page 1 of 1

Amanda Lu
Merit Engineering, Inc.
10129 Main St. Suite 107
Bellingham, WA 98225
RE: 18-14673 - Hannegan Property

Dear Amanda Lu,

Your project: Hannegan Property, was received on Friday April 27, 2018.

All samples were analyzed within the accepted holding times and were appropriately preserved and analyzed according to approved analytical protocols, unless noted in the data or QC reports. The quality control data was within laboratory acceptance limits, unless specified in the data or QC reports.

If you have questions phone us at 800 755-9295.

Respectfully

Lawrence J Henderson, PhD
Director of Laboratories, Vice President

Enclosures: Data Report



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Data Report

Client Name: Merit Engineering, Inc.
10129 Main St. Suite 107
Bellingham, WA 98225

Reference Number: **18-14673**
Project: Hannegan Property

Report Date: 5/30/18

Date Received: 4/27/18

Approved by: bj, fm, hkl, lrs

Authorized by:

Lawrence J Henderson, PhD
Director of Laboratories, Vice President

Sample Description: Comp 6"										Sample Date: 4/27/18 12:00 pm		
Lab Number: 30368		Sample Comment:								Collected By:		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment
NA	TOTAL NITROGEN	3065.6	1	1	mg/Kg	1.0	<SUM>	a	5/30/18	KEB	SOIL_180530	
	SODIUM ADSORPTION RATIO	13.28				1.0	200.7	a	5/8/18	BJ	200.7_180508B	
16887-00-6	CHLORIDE	2.8	1.6		mg/Kg	1.0	300.0	a	5/15/18	HKL	I180514A	
14808-79-8	SULFATE	4.1	3.2		mg/Kg	1.0	300.0	a	5/15/18	HKL	I180514A	
7664-41-7	AMMONIA-N	733	68		mg/Kg	1.0	350.1	a	5/7/18	LRS	350.1_180507BS	
E-10139	HYDROGEN ION (pH)	6.71			pH Units	1.0	9045D	a	5/4/18	BP	9045D_180504	20g:20mL
NA	CATION EXCHANGE CAPACITY	17.4	0.100	0.100	meq/100g	1.0	S-10.10		5/25/18	KEB	SOIL_180525	Analyzed by Soiltest
E-10184	ELECTRICAL CONDUCTIVITY	54.93	10		uS/cm	1.0	S-2.20	a	5/11/18	HKL	S2.20_180511	
NA	ORGANIC MATTER	5.2	0.1	0.1	%	1.0	S-9.10		5/25/18	KEB	SOIL_180525	Analyzed by Soiltest
	Exchangeable Sodium Percentage	1.5	0		%	1.0	SM-	a	5/30/18	KEB	SOIL_180530	Analyzed by Soiltest
	Moisture In Solids	32.91			%	1.0	SM2540 G	a	5/2/18	HKL	TS_180502	
E-10128	TOTAL NITRATE/NITRITE	9.6	0.01	0.1	mg/Kg	1.0	SM4500-NO3 F	a	5/30/18	KEB	SOIL_180530	Analyzed by Soiltest
7440-70-2	CALCIUM	5410	50.4		mg/Kg	1.0	6010B/3051	a	5/11/18	BJ	6010B_180511B	
7439-95-4	MAGNESIUM	5437	50.4		mg/Kg	1.0	6010B/3051	a	5/11/18	BJ	6010B_180511B	
7440-23-5	SODIUM	805	50.4		mg/Kg	1.0	6010B/3051	a	5/11/18	BJ	6010B_180511B	
E-10264	TOTAL KJELDAHL NITROGEN	3056	648		mg/Kg	20.0	351.2/351.2	a	5/7/18	LRS	351.2_180507BS	

Sample Description: Comp 18"										Sample Date: 4/27/18 12:00 pm		
Lab Number: 30369		Sample Comment:								Collected By:		
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment
16887-00-6	CHLORIDE	5.2	1.3		mg/Kg	1.0	300.0	a	5/14/18	HKL	I180514A	
E-10139	HYDROGEN ION (pH)	6.63			pH Units	1.0	9045D	a	5/4/18	BP	9045D_180504	20g:20mL
NA	CATION EXCHANGE CAPACITY	16.1	0.100	0.100	meq/100g	1.0	S-10.10		5/25/18	KEB	SOIL_180525	Analyzed by Soiltest

Notes:

ND = Not detected above the listed practical quantitation limit (PQL) or not above the Method Detection Limit (MDL), if requested.
PQL = Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions.
D.F. - Dilution Factor

If you have any questions concerning this report contact us at the above phone number.

Data Report

E-10184	ELECTRICAL CONDUCTIVITY	77.37	10		uS/cm	1.0	S-2.20	a	5/11/18	HKL	S2.20_180511
	Moisture In Solids	22.27			%	1.0	SM2540 G	a	5/2/18	HKL	TS_180502
E-10128	TOTAL NITRATE/NITRITE	1.7	0.01		mg/Kg	1.0	SM4500-NO3 F		5/14/18	KEB	SOIL_180514
7440-23-5	SODIUM	915	51.9		mg/Kg	1.0	6010B/3051	a	5/11/18	BJ	6010B_180511B

Sample Description: Comp 30"										Sample Date: 4/27/18 12:00 pm		
Lab Number: 30370		Sample Comment:						Collected By:				
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment
16887-00-6	CHLORIDE	12.9	1.2		mg/Kg	1.0	300.0	a	5/15/18	HKL	I180514A	
E-10139	HYDROGEN ION (pH)	7.05			pH Units	1.0	9045D	a	5/4/18	BP	9045D_180504	20g:20mL
NA	CATION EXCHANGE CAPACITY	12.2	0.100	0.100	meq/100g	1.0	S-10.10		5/25/18	KEB	SOIL_180525	Analyzed by Soiltest
E-10184	ELECTRICAL CONDUCTIVITY	30.92	10		uS/cm	1.0	S-2.20	a	5/11/18	HKL	S2.20_180511	
	Moisture In Solids	17.00			%	1.0	SM2540 G	a	5/2/18	HKL	TS_180502	
E-10128	TOTAL NITRATE/NITRITE	0.5	0.01		mg/Kg	1.0	SM4500-NO3 F		5/14/18	KEB	SOIL_180514	
7440-23-5	SODIUM	612	35.9		mg/Kg	1.0	6010B/3051	a	5/11/18	BJ	6010B_180511B	

Sample Description: Comp 42"										Sample Date: 4/27/18 12:00 pm		
Lab Number: 30371		Sample Comment:						Collected By:				
CAS ID#	Parameter	Result	PQL	MDL	Units	DF	Method	Lab	Analyzed	Analyst	Batch	Comment
NA	TOTAL NITROGEN	106.5	1	1	mg/Kg	1.0	<SUM>	a	5/30/18	KEB	SOIL_180530	
16887-00-6	CHLORIDE	2.2	1.3		mg/Kg	1.0	300.0	a	5/15/18	HKL	I180514A	
14808-79-8	SULFATE	ND	2.6		mg/Kg	1.0	300.0	a	5/15/18	HKL	I180514A	
7664-41-7	AMMONIA-N	ND	50		mg/Kg	1.0	350.1	a	5/7/18	LRS	350.1_180507BS	
E-10139	HYDROGEN ION (pH)	7.05			pH Units	1.0	9045D	a	5/4/18	BP	9045D_180504	20g:20mL
NA	CATION EXCHANGE CAPACITY	12.3	0.100	0.100	meq/100g	1.0	S-10.10		5/25/18	KEB	SOIL_180525	Analyzed by Soiltest
E-10184	ELECTRICAL CONDUCTIVITY	15.97	10		uS/cm	1.0	S-2.20	a	5/11/18	HKL	S2.20_180511	
NA	ORGANIC MATTER	0.6	0.1	0.1	%	1.0	S-9.10		5/25/18	KEB	SOIL_180525	Analyzed by Soiltest
	Exchangeable Sodium Percentage	19.2	0		%	1.0	SM-	a	5/30/18	KEB	SOIL_180530	Analyzed by Soiltest
	Moisture In Solids	17.42			%	1.0	SM2540 G	a	5/7/18	HKL	TS_180507	
E-10128	TOTAL NITRATE/NITRITE	1.5	0.01	0.1	mg/Kg	1.0	SM4500-NO3 F	a	5/30/18	KEB	SOIL_180530	Analyzed by Soiltest
	SODIUM ADSORPTION RATIO	1.08				1.0	200.7/3051	a	5/11/18	BJ	6010B_180511B	
7440-70-2	CALCIUM	5928	48.9		mg/Kg	1.0	6010B/3051	a	5/11/18	BJ	6010B_180511B	
7439-95-4	MAGNESIUM	5359	48.9		mg/Kg	1.0	6010B/3051	a	5/11/18	BJ	6010B_180511B	
7440-23-5	SODIUM	478	48.9		mg/Kg	1.0	6010B/3051	a	5/11/18	BJ	6010B_180511B	
E-10264	TOTAL KJELDAHL NITROGEN	105	28		mg/Kg	1.0	351.2/351.2	a	5/7/18	LRS	351.2_180507BS	

Notes:

ND = Not detected above the listed practical quantitation limit (PQL) or not above the Method Detection Limit (MDL), if requested.
 PQL = Practical Quantitation Limit is the lowest level that can be achieved within specified limits of precision and accuracy during routine laboratory operating conditions.
 D.F. - Dilution Factor



**SAMPLE INDEPENDENT
QUALITY CONTROL REPORT**

Calibration Check

Reference Number: **18-14673**

Report Date: 05/30/18

Batch	Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
351.2_180507bs	0 TOTAL KJELDAHL NITROGEN	2.54	2.50	mg/L	351.2	102	90-110	CAL		
6010B_180511B	2 CALCIUM	11.3	11	mg/L	6010B	103	90-110	CAL		
	2 MAGNESIUM	11.4	11	mg/L	6010B	104	90-110	CAL		
	2 SODIUM	11	11	mg/L	6010B	100	90-110	CAL		
9045D_180504	0 HYDROGEN ION (pH)	7.97	8.00		9045D	100	85-115	CAL		
	1 HYDROGEN ION (pH)	8.01	8.00		9045D	100	85-115	CAL		
1180514A	0 CHLORIDE	0.9	1	mg/L	300.0	90	90-110	CAL		
	0 SULFATE	2	2	mg/L	300.0	100	90-110	CAL		

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.



**SAMPLE INDEPENDENT
QUALITY CONTROL REPORT**

Laboratory Fortified Blank

Reference Number: **18-14673**

Report Date: 05/30/18

Batch	Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
6010B_180511B	0 CALCIUM	28.5	26	mg/L	6010B	110	85-115	LFB		
	0 MAGNESIUM	27.4	26	mg/L	6010B	105	85-115	LFB		
	0 SODIUM	29	26	mg/L	6010B	112	85-115	LFB		

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.



SAMPLE INDEPENDENT QUALITY CONTROL REPORT

Laboratory Reagent Blank

Reference Number: **18-14673**

Report Date: 05/30/18

Batch	Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
351.2_180507bs	0 TOTAL KJELDAHL NITROGEN	ND		mg/L	351.2		0-0		LRB	
6010B_180511B	0 CALCIUM	ND		mg/L	6010B		0-0		LRB	
	0 MAGNESIUM	ND		mg/L	6010B		0-0		LRB	
	0 SODIUM	ND		mg/L	6010B		0-0		LRB	
1180514A	0 CHLORIDE	ND		mg/L	300.0		0-0		LRB	
	0 SULFATE	ND		mg/L	300.0		0-0		LRB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.



**SAMPLE INDEPENDENT
QUALITY CONTROL REPORT**

Method Blank

Reference Number: **18-14673**

Report Date: 05/30/18

Batch	Analyte	Result	True Value	Units	Method	% Recovery	Limits*	QC Qualifier	QC Type	Comment
350.1_180507bs	0 AMMONIA-N	ND		mg/L	350.1		0-0		MB	
351.2_180507bs	0 TOTAL KJELDAHL NITROGEN	ND		mg/L	351.2		0-0		MB	
6010B_180511B	0 CALCIUM	0.9		mg/L	6010B		0-0		MB	
	0 MAGNESIUM	ND		mg/L	6010B		0-0		MB	
	0 SODIUM	2		mg/L	6010B		0-0		MB	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.



**SAMPLE INDEPENDENT
QUALITY CONTROL REPORT**

Quality Control Sample

Reference Number: **18-14673**

Report Date: 05/30/18

Batch	Analyte	Result	True Value	Units	Method	% Recovery	QC Limits*	QC Qualifier Type	QC Comment
351.2_180507bs	0 TOTAL KJELDAHL NITROGEN	3.07	2.84	mg/L	351.2	108	85-115	QCS	
6010B_180511B	1 CALCIUM	19.9	20	mg/L	6010B	100	90-110	QCS	
	1 MAGNESIUM	20.5	20	mg/L	6010B	103	90-110	QCS	
	1 SODIUM	20.6	20	mg/L	6010B	103	90-110	QCS	
1180514A	0 CHLORIDE	5.7	6	mg/L	300.0	95	90-110	QCS	
	0 SULFATE	29.8	30	mg/L	300.0	99	90-110	QCS	

*Notation:

% Recovery = (Result of Analysis)/(True Value) * 100

NA = Indicates % Recovery could not be calculated.

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.



**SAMPLE DEPENDENT
QUALITY CONTROL REPORT**
Duplicate, Matrix Spike/Matrix Spike Duplicate and Confirmation Result Report

Batch	Sample	Analyte	Result	Duplicate		Units	%RPD	Limits	QC		Comments
				Result					Qualifier	Type	
Duplicate											
351.2_180507BS											
	30261	TOTAL KJELDAHL NITROGEN	81116	91361		mg/Kg	11.9	0-20	INH		DUP
9045D_180504											
	30370	HYDROGEN ION (pH)	7.05	7.13		pH Units	1.1	0-20			DUP
1180514A											
	34356	CHLORIDE	9.1	9.0		mg/L	1.1	0-20			DUP
	34496	CHLORIDE	0.6	0.60		mg/L	0.0	0-20			DUP
TS_180502											
	30261	TOTAL SOLIDS FOR CALCULATION	17.42	17.49		%	0.4	0-20			DUP
	30269	TOTAL SOLIDS FOR CALCULATION	99.39	99.77		%	0.4	0-20			DUP

%RPD = Relative Percent Difference

NA = Indicates %RPD could not be calculated

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) analyses are used to determine the accuracy (MS) and precision (MSD) of an analytical method in a given sample matrix. Therefore, the usefulness of this report is limited to samples of similar matrices analyzed in the same analytical batch.

Only Duplicate sample with detections are listed in this report

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.

FORM: QC Dependent.rpt

Batch	Sample	Analyte	Result	Duplicate		Spike Conc	Units	Percent Recovery		Limits*	%RPD	Limits*	QC Qualifier	Type	Comments
				Spike Result	Spike Result			MS	MSD						
Laboratory Fortified Matrix (MS)															
351.2_180507BS															
	30261	TOTAL KJELDAHL NITROGEN	81116	80999		1148	mg/Kg	-10		70-130	NA	0-20	IS	LFM	
I180514A															
	34356	CHLORIDE	9.1	9.7		1	mg/L	60		90-110	NA	0-20	IS	LFM	
	34496	CHLORIDE	0.6	1.5		1	mg/L	90		90-110	NA	0-20		LFM	

%RPD = Relative Percent Difference

NA = Indicates %RPD could not be calculated

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) analyses are used to determine the accuracy (MS) and precision (MSD) of an analytical method in a given sample matrix. Therefore, the usefulness of this report is limited to samples of similar matrices analyzed in the same analytical batch.

Only Duplicate sample with detections are listed in this report

Limits are intended for water matrices only. These criteria are for guidance only when reported with soils/solids.

FORM: QC Dependent.rpt

Qualifier Definitions

Reference Number: 18-14673

Report Date: 05/30/18

Qualifier	Definition
INH	The sample was non-homogeneous
IS	The ratio of the spike concentration to sample background was too low to meet performance criteria

Note: Some qualifier definitions found on this page may pertain to results or QC data which are not printed with this report.