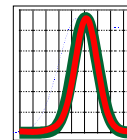




Data Flow, Statistics, Reports,

Report Cards & The Web



PROJECT OBJECTIVE:

Move Data Analysis and Delivery Into the 21st Century

“The International Harmonized Protocol for the Proficiency Testing of Analytical Laboratories”, 2006 (IHP)

MICHAEL THOMPSON, STEPHEN L. R. ELLISON AND ROGER WOOD

- ✓ AMC Supported (Analytical Methods Committee of the RSC)
- ✓ Proficiency testing required for Laboratory Accreditation.
- ✓ Most Recent and Up-to-Date Statistical Approaches.
- ✓ Independent Documentation on How it All Works.
- ✓ ISO Supported (ISO 13528, 2005)
- ✓ IHP uses Robust Statistics
- ✓ ILAC International Lab Accreditation Cooperation.

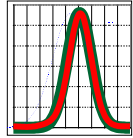
Make full use of Web Based Data Transfer.



RSC | Advancing the
Chemical Sciences



International
Organization for
Standardization



Post Chemistry Analysis Data Flow



Website for Data Reporting

- Collect Analytical Data from Labs
- Deliver Raw Data for Statistical Review

Statistical Review

- Screen and Verify Duplicates
- Perform Robust Statistical Calculations
- QC Review for Consistent & Correct Reporting
- Create and Deliver Reports for Distribution

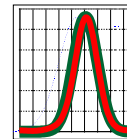
Website for Data Reporting

- Web Distribution of Reports and Report Cards for Lab Access

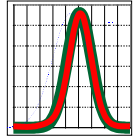


Old Check Sample Calculations

Bias, Accuracy and Precision



**Outliers are handled by an interesting
“Data Trimming” process.**



$$Z_1 = \frac{X_1 - \bar{X}}{SD}$$

$$Bias = \frac{Z_1 + Z_2}{2}$$

$$Z_2 = \frac{X_2 - \bar{X}}{SD}$$

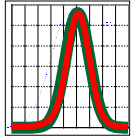
New Z Calculations are Numerically equivalent to Bias

$$\bar{X}_{Lab} = \frac{(X_1 + X_2)}{2}$$

$$Z_{New} = \frac{\bar{X}_{Lab} - \bar{X}}{SD}$$



Current Accuracy Calculations



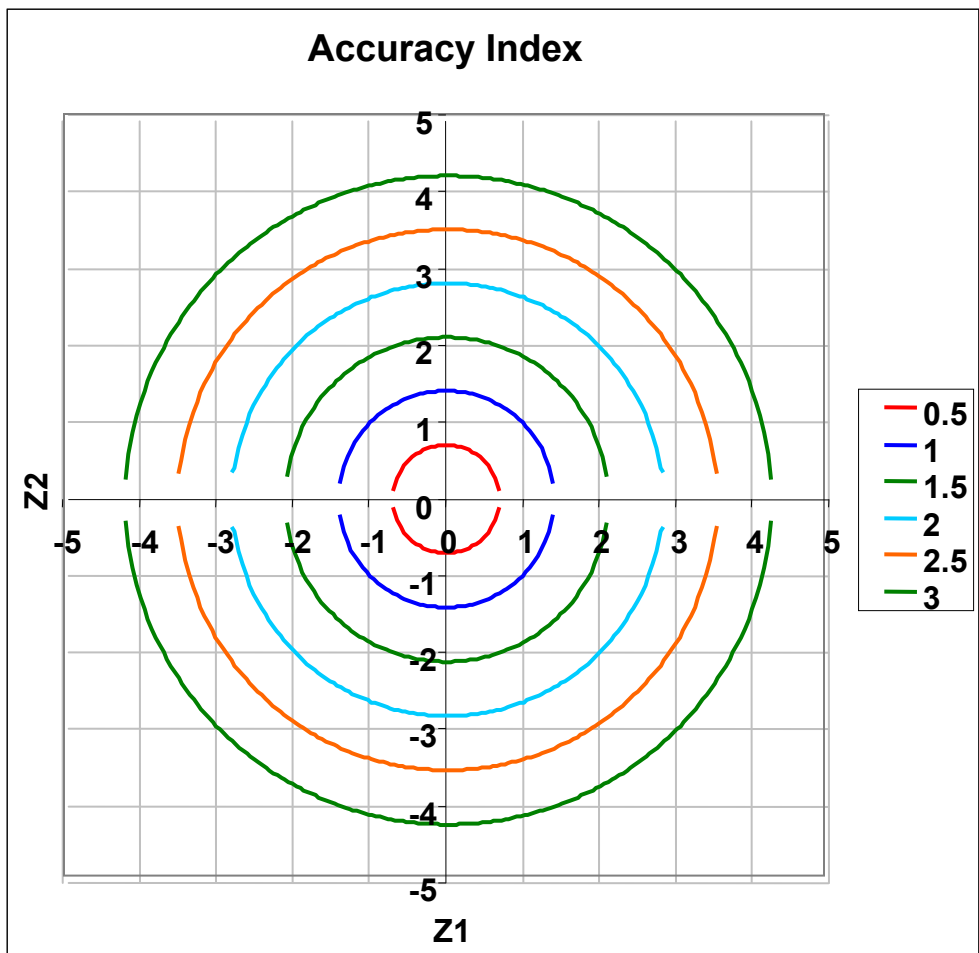
$$Accuracy = \sqrt{\frac{Z_1^2 + Z_2^2}{2}}$$

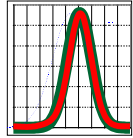
$$Accuracy^2 = \frac{Z_1^2}{2} + \frac{Z_2^2}{2}$$

Circle? $(r^2 = a^2 + b^2)$

$$Accuracy^2 = Bias^2 + Precision^2$$

What do we learn from combining Bias and Precision?





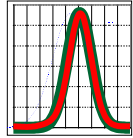
$$\text{Precision} = \sqrt{\text{Accuracy}^2 - \text{Bias}^2}$$

Precision is the “extra” variance attributed to the difference between Z_1 and Z_2 but is it precise and what does it mean?

$$\text{Precision} = \pm \frac{(X_1 - X_2)}{2 \times SD}$$

More easily understood:

$$\text{Range} = |X_1 - X_2|$$



Proficiency Testing

From the IHP, 2006

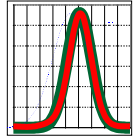
1.1 Rationale for proficiency testing

- For a laboratory to produce consistently reliable data, it must implement an appropriate program of quality-assurance and performance-monitoring procedures. **Proficiency testing is one of these procedures.**

From the IHP, 2006

2.10 Choice of analytical method by participant

- Participants shall **normally use the analytical method of their choice.** In some instances, however, for example, where legislation so requires, participants may be instructed to use a specific documented method.
-



Magruder Proficiency Testing

Magruder Data Analysis

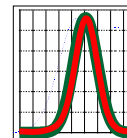
Currently setup like AOAC Collaborative Method Testing

We can use the raw data as follows:

Grouped method data for a single analyte can be used for true **Proficiency Testing**.

Individual methods are still tested and called **Check Sample Testing**. This is Proficiency Testing for Individual Methods.

Individual Method Precision is calculated for each Sample run.



Let's Look At:

- **How Robust Statistics Works**
 - **Z Value Calculations**
 - **Method Precision Calculations**
-

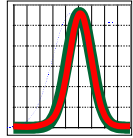


Magruder Check Sample Program

Calculating Robust Statistics

**The International Harmonized Protocol For The Proficiency Testing
Of Analytical Chemistry Laboratories, 2006**

**ISO 13528 Statistical Methods for Use in Proficiency Testing by
Interlaboratory Comparisons, 2005 – Algorithm A**



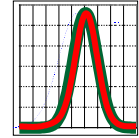
Why Robust Statistics?

- Most “real world” data distributions do not follow the Normal Gaussian Model, they are more like “contaminated” Normals.
- Distributions have “Fat Tails” and Outliers that skew the Mean and inflate the Standard Deviation (Normal estimators are very sensitive!).
- Even Outliers contain information.
- We need a Robust estimate of the Location of the data center.
- We need a Robust estimate of the data Dispersion.
- We need to identify and weight the “Reliable” data.

John Tukey, Peter Huber and Frank Hampel credited with founding the discipline.

All since Tukey’s landmark paper in 1960

Tukey, J. W. (1960). A survey of sampling from contaminated distributions.



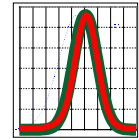
Robust Mean = Median(LAB()) {Median value of All Lab X's}

Robust Std = 1.483 * MAD(LAB()) {MAD of Lab deviations}

Calculating Robust Statistics

The Median is a Robust measure of Location.

The Median Absolute Deviation (MAD) is a Robust measure of Dispersion.



Robust Mean = Median(LAB())

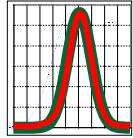
Robust Std = 1.483 * MAD(LAB())

↓

```
For i = 1 To Number of Labs {Huber's H15 Process}  
  If LAB(i) > Robust Mean + 1.5 * Std Then  
    LAB(i) = Robust Mean + 1.5 * Std  
  If LAB(i) < Robust Mean - 1.5 * Std Then  
    LAB(i) = Robust Mean - 1.5 * Std  
Next i      {Now Winsorize all the Lab values}
```

Calculating Robust Statistics

Use Huber's H15 method and **Winsorize** the Data.



Calculating Robust Statistics

Use Huber's H15 method and Winsorize the Data.

Assigned Values
 $X_a = \text{Robust Mean}$
 $\sigma_{rob} = \text{Robust Std}$

Robust Mean = Median(LAB())

Robust Std = 1.483 * MAD(LAB())

Do

For i = 1 To Number of Labs

If LAB(i) > Robust Mean + 1.5 * Std Then

LAB(i) = Robust Mean + 1.5 * Std

If LAB(i) < Robust Mean - 1.5 * Std Then

LAB(i) = Robust Mean - 1.5 * Std

Next i

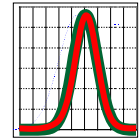
Old Mean = Robust Mean

Robust Mean = Average(LAB())

Robust Std = 1.134 * SD(LAB())

Test = Abs (Old Mean – Robust Mean)

Loop While (Test > 0.0000001) {iterative process}



Calculating Robust Statistics

Use Huber's H15 method and Winsorize the Data.

Assigned Value

$$X_a = \text{Robust Mean}$$

AAFCOCS Std

$$\sigma_{rob} = \text{Robust Std}$$

Uncertainty in X_a

$$U_a = 1.25 \times \frac{\sigma_{rob}}{\sqrt{n}}$$

Robust Mean = Median(LAB())

Robust Std = 1.483 * MAD(LAB())

Do

For i = 1 To Number of Labs

If LAB(i) > Robust Mean + 1.5 * Std Then

LAB(i) = Robust Mean + 1.5 * Std

If LAB(i) < Robust Mean - 1.5 * Std Then

LAB(i) = Robust Mean - 1.5 * Std

Next i

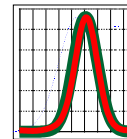
Old Mean = Robust Mean

Robust Mean = Average(LAB())

Robust Std = 1.134 * SD(LAB())

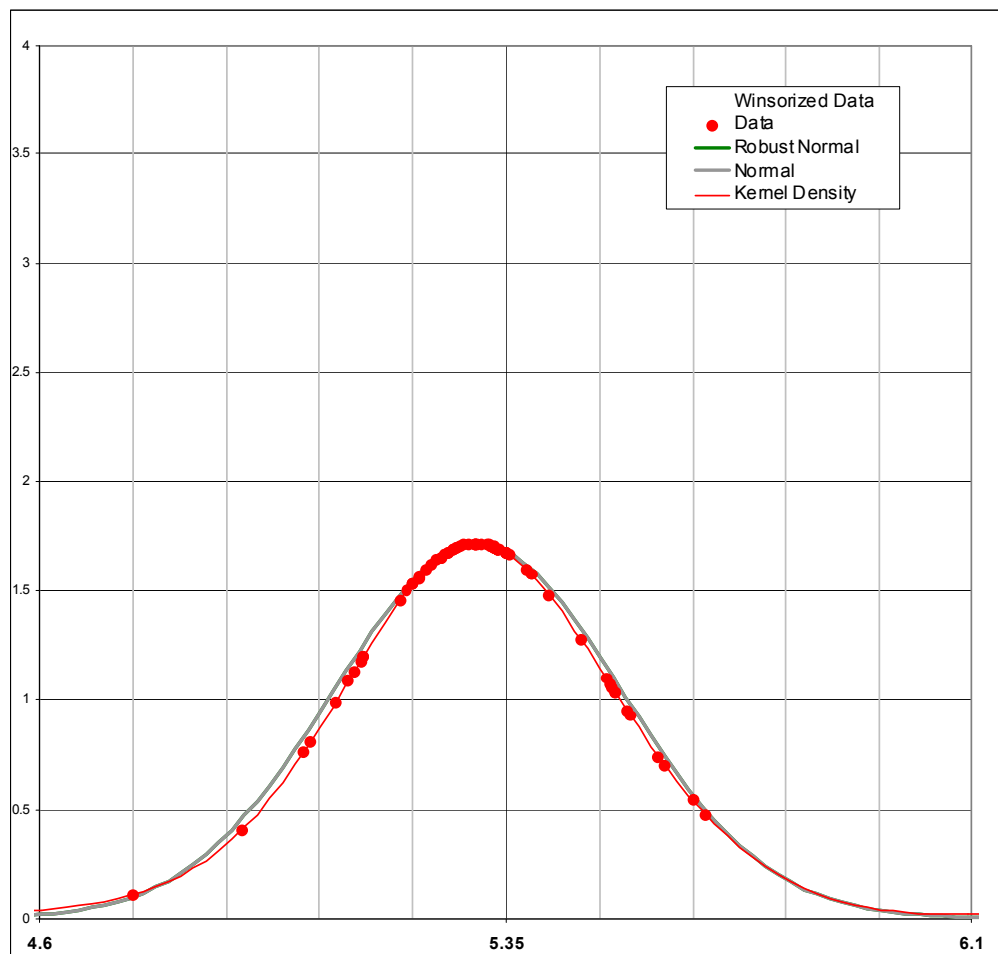
Test = Abs (Old Mean – Robust Mean)

Loop While (Test > 0.0000001)

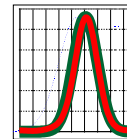


Data (Red) on
Kernel Density
Envelope.

Normal Curve
(Grey)



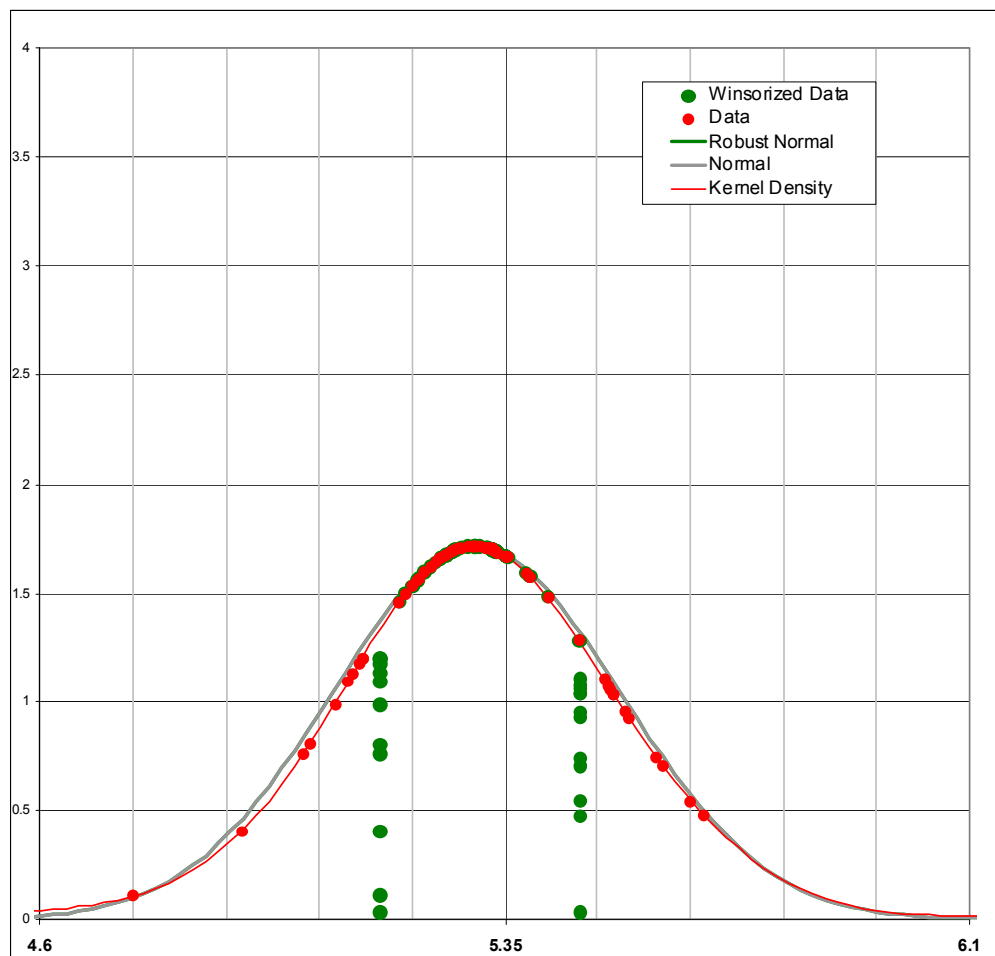
Soluble Potash



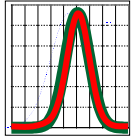
Data (Red) on
Kernel Density
Envelope.

Normal Curve
(Grey)

Winsorizing
Squeezes Some
Data Points In



Soluble Potash

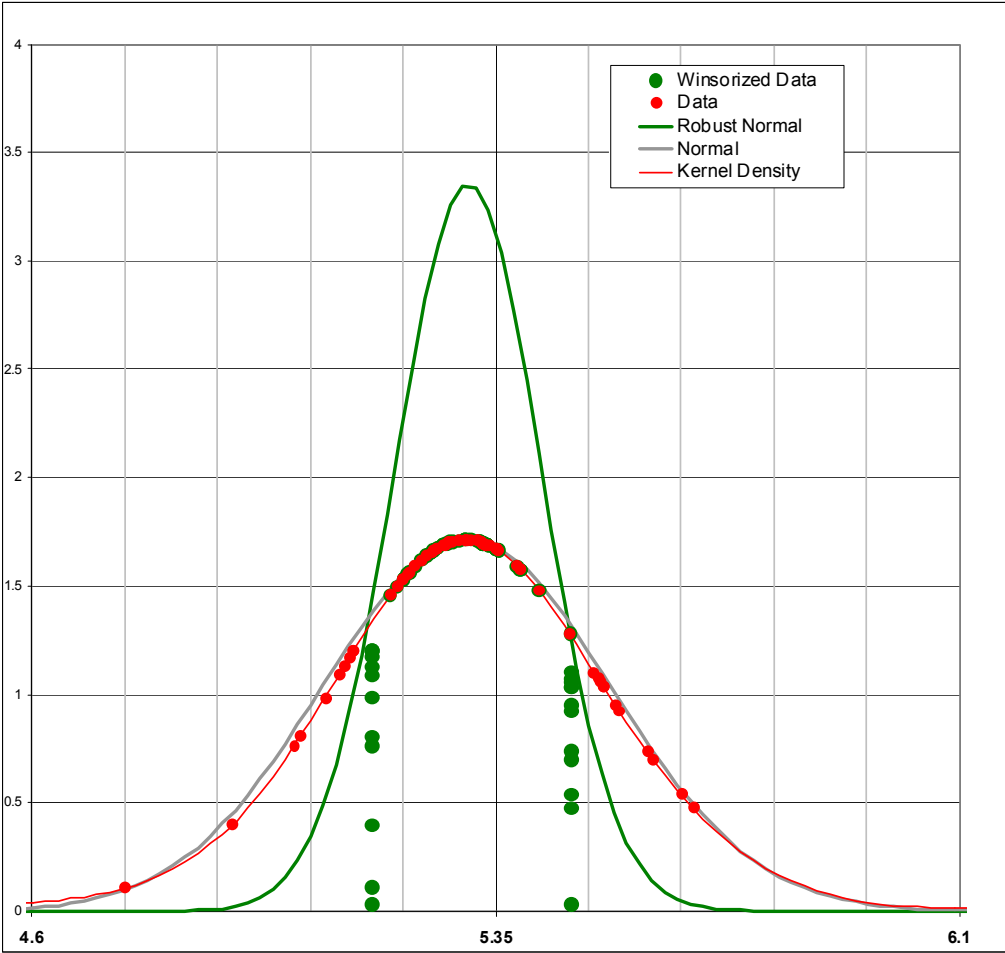


Data (Red) on Kernel Density Envelope.

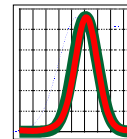
Normal Curve (Grey)

Winsorizing Squeezes Some Data Points In

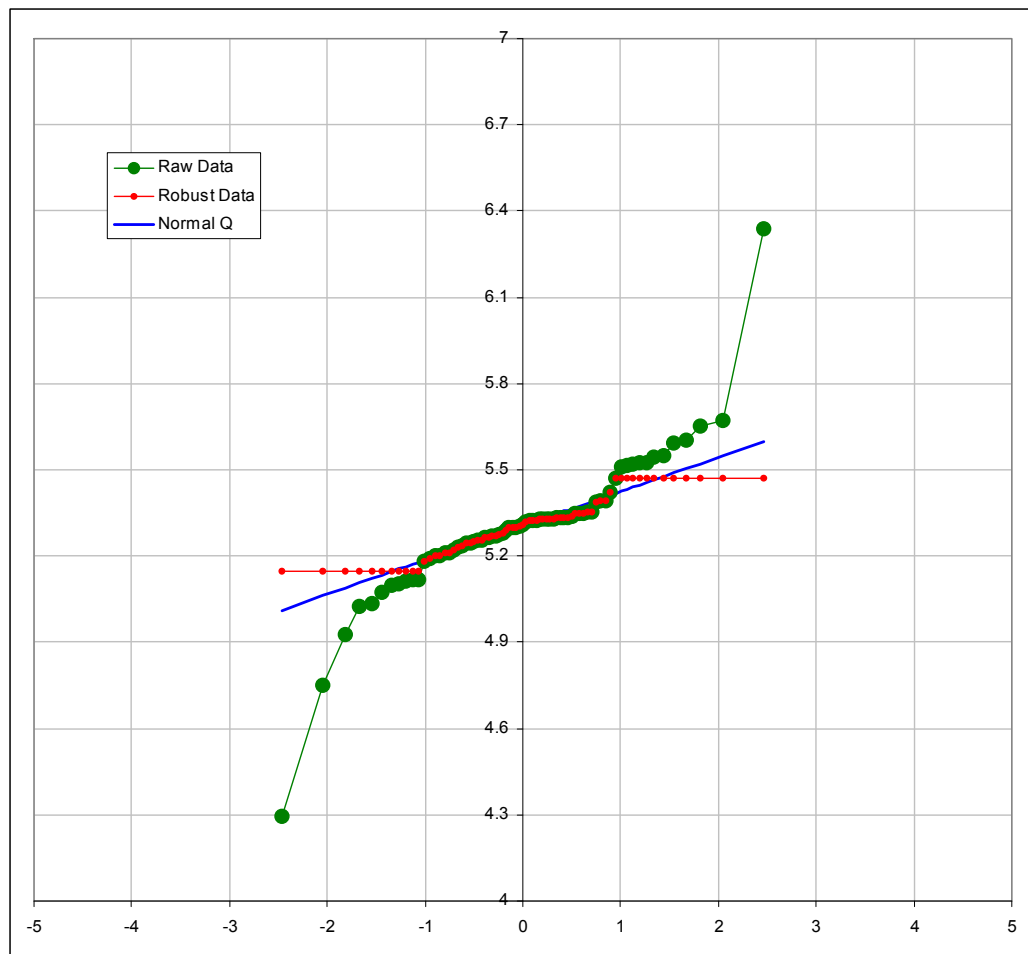
Robust Normal Is Calculated

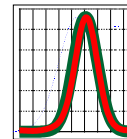


Soluble Potash



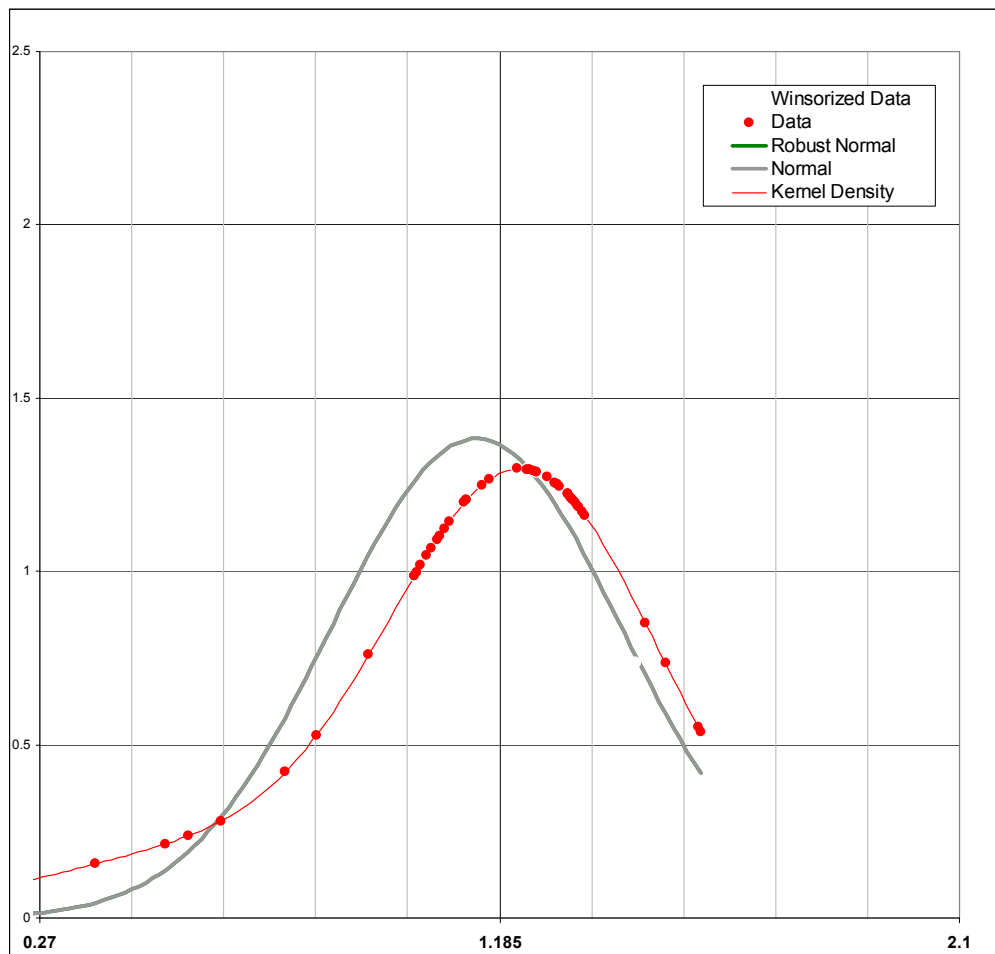
QQ Plot for Soluble Potash



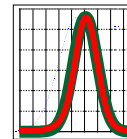


Data (Red) on
Kernel Density
Envelope.

Normal Curve
(Grey)



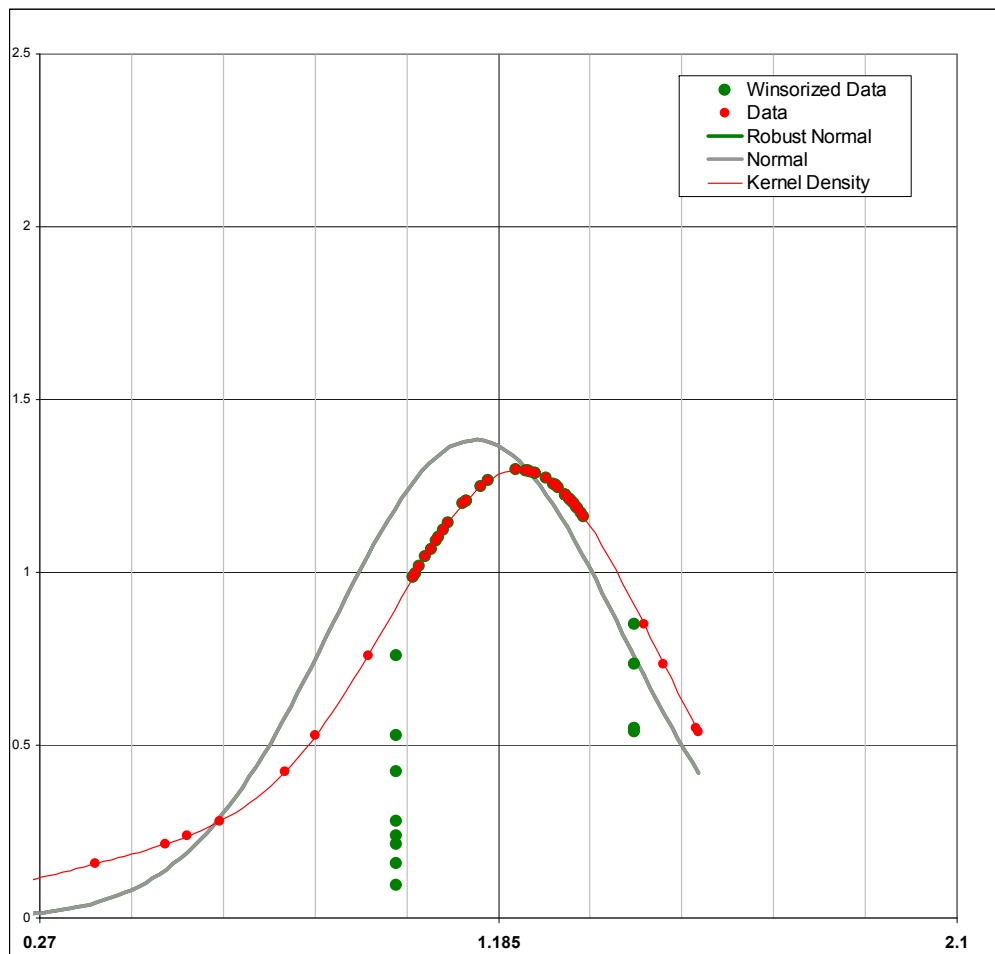
Acid Soluble Iron



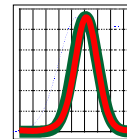
Data (Red) on
Kernel Density
Envelope.

Normal Curve
(Grey)

Winsorizing
Squeezes Some
Data Points In



Acid Soluble Iron

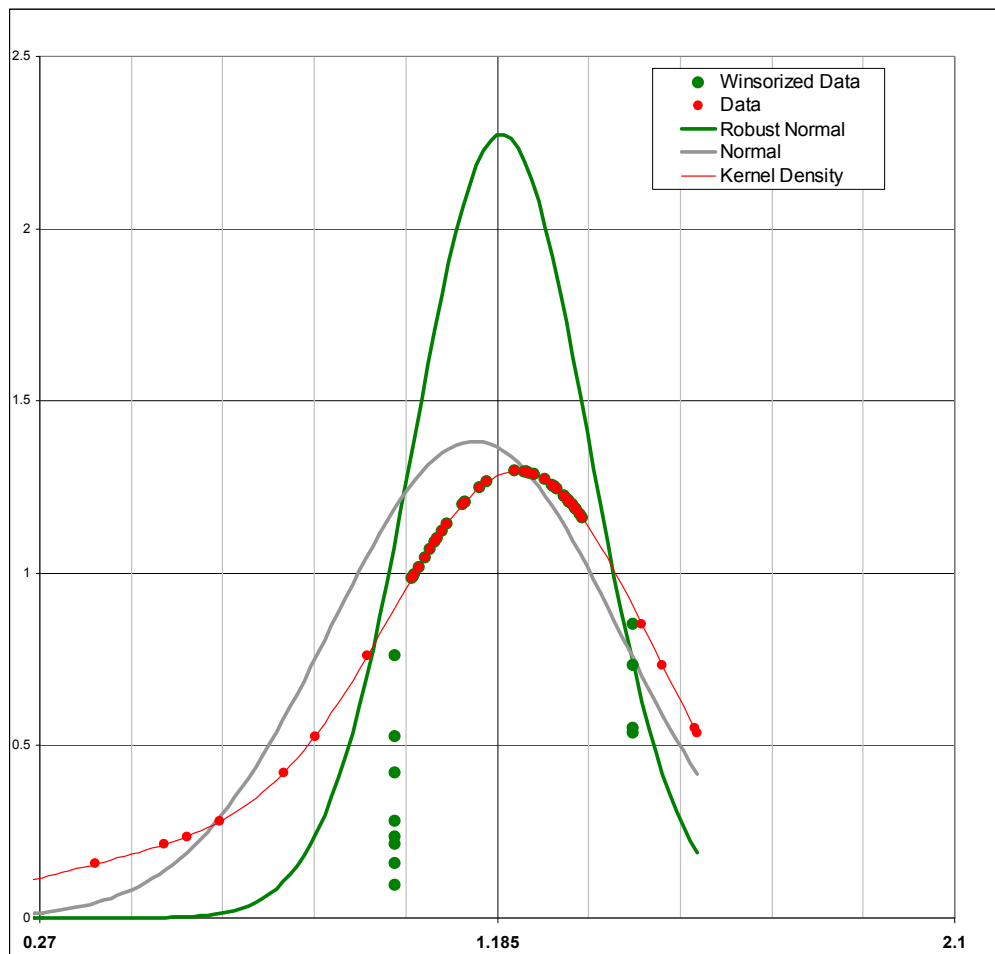


Data (Red) on
Kernel Density
Envelope.

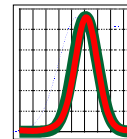
Normal Curve
(Grey)

Winsorizing
Squeezes Some
Data Points In

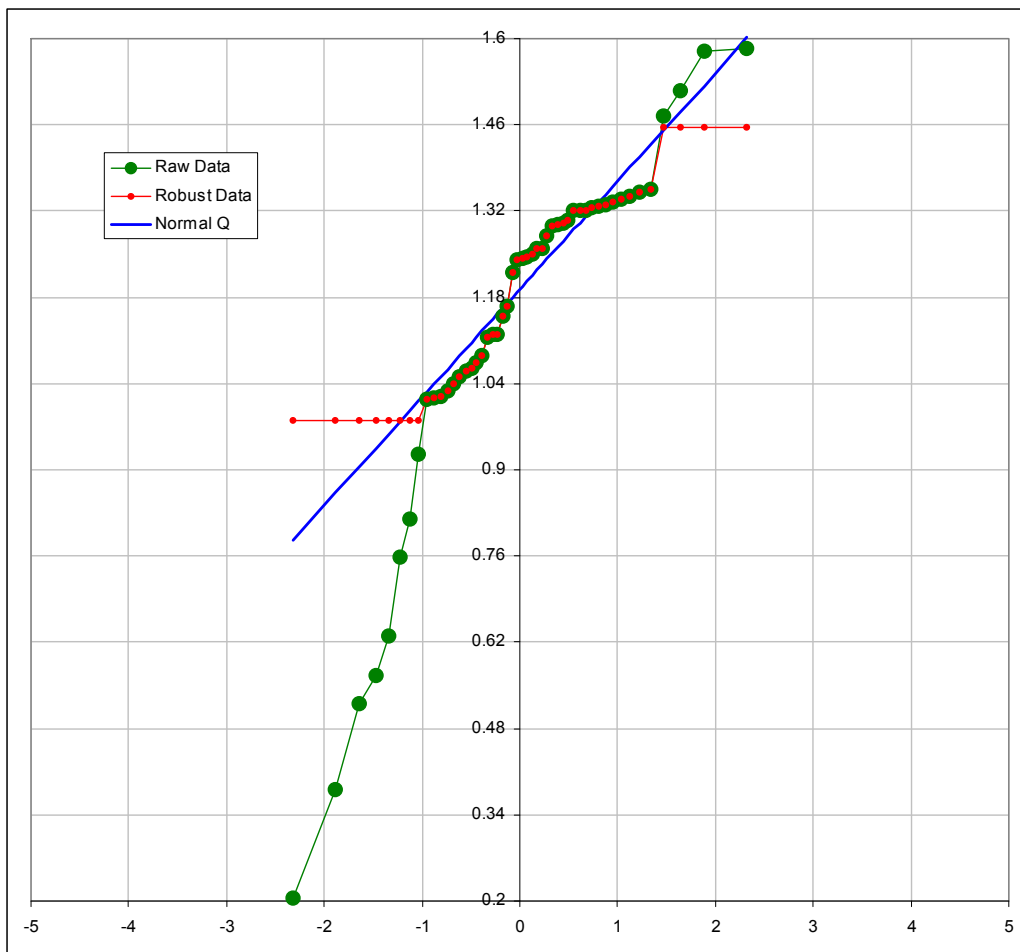
Robust Normal
Is Calculated

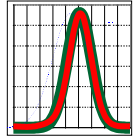


Acid Soluble Iron



QQ Plot for Acid Soluble Iron





In summary:

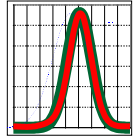
from the Huber H15 Process we now have:

- An Assigned Value X_a (robust measure of location).
 - A “fit for purpose” σ_{rob} standard deviation (robust measure of dispersion).
 - An estimate of uncertainty in the assigned value U_a .
-



Magruder Check Sample Program

Z Statistics & Fitness for Purpose



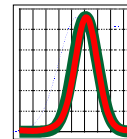
Calculating a Z Score

This is the classical Z score where we expect about 95% of the participants to fall between ± 2 and 99.7% to fall between ± 3 .

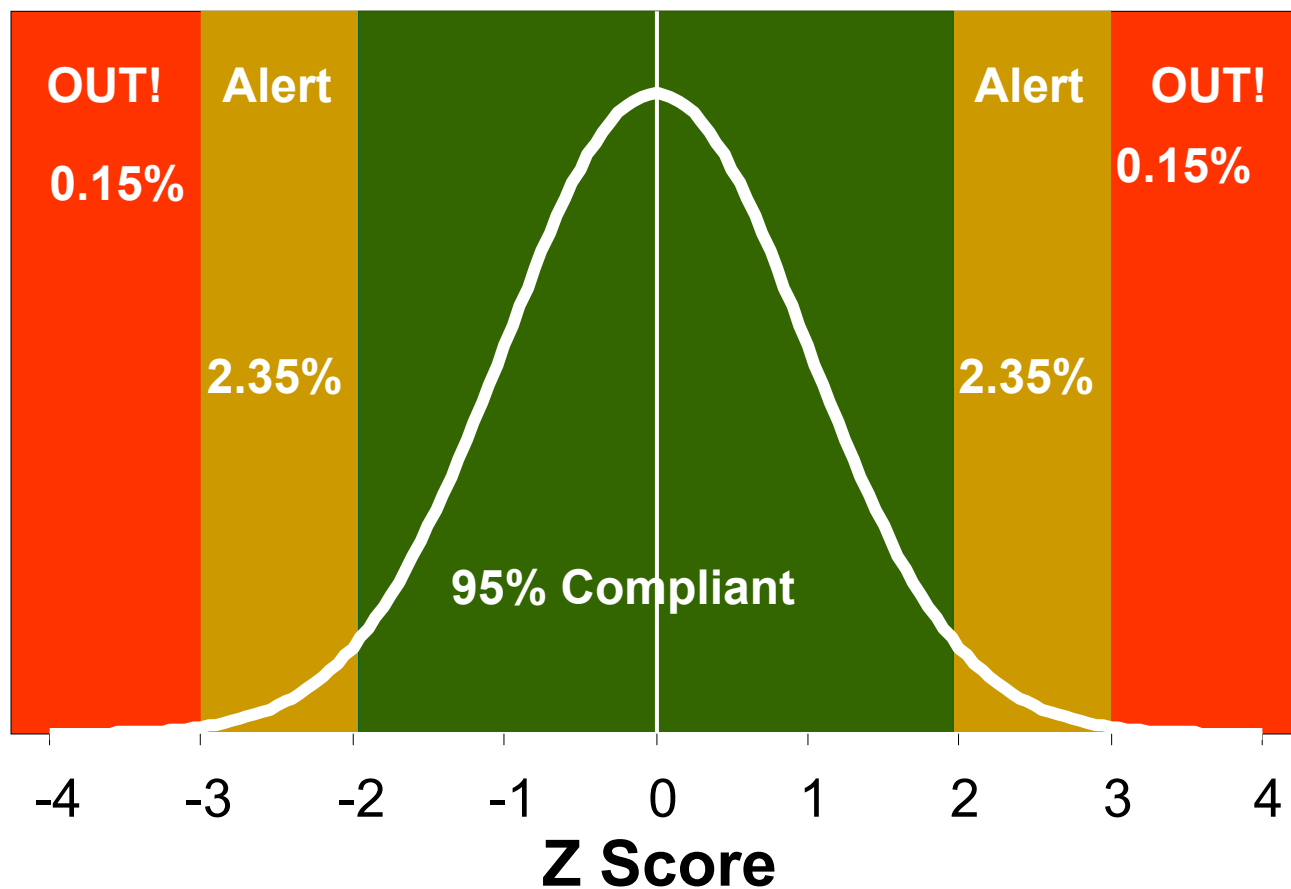
Robust statistics will usually cause slightly fewer labs to fall within accepted limits.

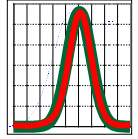
$$Z = \frac{X_{LAB} - X_{rob}}{\sigma_{rob}}$$

This is fine if you want to score yourself against the other participants in that round.



Interpreting Z Scores for Proficiency Testing



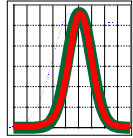


Calculating A Proficiency Z Score Based on % RSD as Fitness For Purpose (σ_{ffp})

It may be more important to your client or to you that you are compliant to a predetermined level.

So we establish a “Fitness for Purpose” sigma to reflect this predetermined level (ie: %RSD).

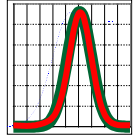
$$\sigma_{ffp} = X_{rob} \times \frac{\%RSD}{100}$$



Calculating A Proficiency Z Score Based on % RSD as Fitness For Purpose (σ_{ffp})

Now we can calculate a Normally distributed 0 centered Z score using the σ_{ffp} based on %RSD rather than σ_{rob} derived from participants in that round.

$$Z = \frac{X_{LAB} - X_{rob}}{\sigma_{ffp}}$$



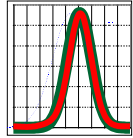
Calculating a Threshold %RSD

$$Z = \frac{X_{LAB} - X_{rob}}{\sigma_{ffp}}$$

Substituting for σ_{ffp}

$$Z = \frac{X_{LAB} - X_{rob}}{\frac{\%RSD}{100} \times X_{rob}}$$

$$\text{Threshold \%RSD}_{Z=2} = \frac{|X_{LAB} - X_{rob}|}{X_{rob}} \times \frac{100}{2}$$



In summary we now have:

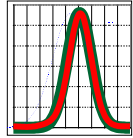
- A Magruder Check Sample Z Score where Red indicates a normally distributed value >3 or <-3 and requires action. An Orange value between 2 and 3 or -2 and -3 provides a warning and a Green value < 2 and >-2 indicates compliance and is within 95% of the other Lab values.
- A Threshold %RSD which provides a personalized operating parameter for your Lab. This parameter is dependant only on your bias from the assigned value and not on the variability of the other labs and is designed to address the “Fitness for Purpose” concerns of the IHP.

For example, if your Threshold %RSD is 3% then you are in compliance with a minimum threshold of 3% RSD at $Z = 2$ (95%).



Method Precision Data from The Magruder Check Sample Program

**ISO 5725-2 Accuracy (Trueness and Precision) of
Measurement Methods and Results, 1994**



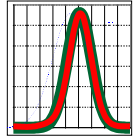
Precision

- The closeness of agreement between independent test results obtained under stipulated conditions.
- Dependent on the distribution of random errors.
- Repeatability and Reproducibility are 2 commonly defined stipulated conditions.
- We quantify precision by measuring:

Between Labs SD (s_L)

Repeatability SD (s_r) \equiv Average Within Labs SD

Reproducibility SD (s_R)

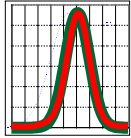


Computational formulas for calculating critical precision variances.

$$s_L = \sqrt{\left[\frac{n \left(\sum_{i=1}^n X_{LAB(i)}^2 \right) - \left(\sum_{i=1}^n X_{LAB(i)} \right)^2}{n(n-1)} \right] - \frac{s_r^2}{2}}$$

$$s_r = \sqrt{\frac{\sum_{i=1}^n (X_{i1} - X_{i2})^2}{2n}}$$

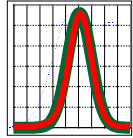
$$s_R = \sqrt{s_L^2 + s_r^2}$$



Acid Soluble Iron (ICP)

Between Labs s_L	0.292
Within Labs s_r	0.047
Reproducibility s_R	0.296

Method Performance Report	
Mean	1.15
SD	0.29
Assigned Value - Robust Mean	1.20
AAFCO CS ffp - Robust sd	0.20
Uncertainty (U_a)	0.024
Robust % RSD	16.50%
Between Labs s_L	0.29
Within Labs s_r	0.047
Reproducibility s_R	0.30
Between Labs %RSD	25.47%
Within Labs %rsd	4.12%
Reproducibility %RSD	25.80%
s_R/s_r	6.26
Average Range	0.051



In summary we now have:

- A measure of the between labs variability (S_L)
 - A measure of the within labs variability (S_r) called repeatability.
 - A combined measure of both variabilities (S_R) called reproducibility.
 - Using these standard deviations and the ordinary (non robust) mean of the dataset we can calculate the corresponding %rsd's which are very useful for comparing variability in samples with different analyte concentrations.
 - If we look at S_R/S_r we create a new parameter which describes the between lab variability in terms of the within lab variability. Large ratios indicate possible lab generated method bias. Small values ~ 3 are indicative of the expected lab bias.
 - The monthly Method report also includes other summary information as well as the average range for duplicates (R-Bar).
 - Demo Magruder Report Cards and Reports Follow.
-

magruder fertilizer

check sample program

STRIVING FOR EXCELLENCE IN ANALYSIS

Report Card for Lab Code 0027

Sample # 201007: Grade 25-0-5

Notes:

Interpreting Z Scores: Red indicates a normally distributed Z value >3 or <-3 (requires action), Orange = Z between 2 and 3 or -2 and -3 (warning) and Green = Z < 2 and >-2 (OK at 95%). Flags indicate data usage: 0 = Used, 1 = Rejected for duplicates too far apart and 2 = Rejected as outlier. Robust statistics are not used if less than 6 labs reporting, Z Scores are then included for information only and are not actionable.

Magruder Scorecard For 17 Individual Methods

Method Code	Analyte, Method (Units)	Data for Lab # 0027		Method Data				Magruder Z Score	Threshold %RSD	Data Flag
		Value	range	Rob Mean	Rob SD	R-bar	# Labs			
001.99	Ammoniacal Nitrogen, Other (Identify) (PCT)	4.3050	0.01000	4.3130	0.29667	0.06710	10	-0.03	0%	0
002.99	Nitrate Nitrogen, Other (Identify) (PCT)	0.00000	0.00000	0.66517	1.1301	0.00033	3	-0.59	50%	0
003.99	Water Insoluble Nitrogen, Other (Identify) (PCT)	3.4200	0.00000	3.5275	0.15203	0.21500	2	-0.71	2%	0
010.60	Total Nitrogen, Combustion (PCT)	25.235	0.15000	25.531	0.25765	0.20098	54	-1.15	1%	0
050.99	Soluble Potash, Other (Identify) (PCT)	5.3300	0.06000	5.2967	0.09925	0.08128	18	0.34	0%	0
101.30	Acid Soluble Calcium, ICP (PCT)	4.9220	0.13400	4.6038	0.24597	0.09749	16	1.29	3%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	1.6790	0.00400	1.6195	0.08587	0.01787	15	0.69	2%	0
131.30	Water Soluble Magnesium, ICP (PCT)	0.06000	0.02000			0.02000	1			
144.99	Sulfur, Other (Identify) (PCT)	5.0650	0.01000	5.1163	0.24602	0.07779	26	-0.21	1%	0
191.30	Total Chromium , ICP (PPM)	169.00	102.00	134.69	26.597	10.392	9	1.29	13%	1
202.30	Acid Soluble Cobalt , ICP (PPM)	10.700	0.00000	21.619	8.3892	1.3309	12	-1.30	25%	0
221.30	Acid Soluble Copper, ICP (PCT)	0.00900	0.00000	0.00908	0.00076	0.00033	18	-0.10	0%	0
241.30	Acid Soluble Iron, ICP (PCT)	1.3255	0.00900	1.2032	0.19851	0.05095	35	0.62	5%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0.01600	0.00000	0.01622	0.00121	0.00061	12	-0.18	1%	0
289.30	Total Molybdenum , ICP (PPM)	11.775	0.15000	13.718	2.1172	0.62714	14	-0.92	7%	0
291.30	Total Nickel , ICP (PPM)	60.000	0.00000	74.167	14.120	2.1192	9	-1.00	10%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0.03950	0.00100	0.04126	0.00454	0.00285	20	-0.39	2%	0

magruder fertilizer

check sample program

STRIVING FOR EXCELLENCE IN ANALYSIS

Report Card for Lab Code 0028

Sample # 201007: Grade 25-0-5

Notes:

Interpreting Z Scores: Red indicates a normally distributed Z value >3 or <-3 (requires action), Orange = Z between 2 and 3 or -2 and -3 (warning) and Green = Z < 2 and >-2 (OK at 95%). Flags indicate data usage: 0 = Used, 1 = Rejected for duplicates too far apart and 2 = Rejected as outlier. Robust statistics are not used if less than 6 labs reporting, Z Scores are then included for information only and are not actionable.

Magruder Scorecard For 5 Individual Methods

Method Code	Analyte, Method (Units)	Data for Lab # 0028		Method Data				Magruder Z Score	Threshold %RSD	Data Flag
		Value	range	Rob Mean	Rob SD	R-bar	# Labs			
010.60	Total Nitrogen, Combustion (PCT)	25.460	0.36000	25.531	0.25765	0.20098	54	-0.28	0%	0
050.61	Soluble Potash, Flame Photometric (Citrate) (PCT)	5.5500	0.10000	5.3325	0.09574	0.11779	9	2.27	2%	0
190.00	Water Soluble Chlorine, Titrimetric (PCT)	4.1850	0.01000	4.0881	0.11209	0.05175	8	0.86	1%	0
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	1.3300	0.08000	1.1673	0.17817	0.04423	13	0.91	7%	0
289.99	Total Molybdenum , Other (Identify) (PPM)	17.250	0.90000	14.907	11.446	3.6667	3	0.20	8%	0

magruder fertilizer

check sample program

STRIVING FOR EXCELLENCE IN ANALYSIS

Report Card for Lab Code 0057

Sample # 201007: Grade 25-0-5

Notes:

Interpreting Z Scores: Red indicates a normally distributed Z value >3 or <-3 (requires action), Orange = Z between 2 and 3 or -2 and -3 (warning) and Green = Z < 2 and >-2 (OK at 95%). Flags indicate data usage: 0 = Used, 1 = Rejected for duplicates too far apart and 2 = Rejected as outlier. Robust statistics are not used if less than 6 labs reporting, Z Scores are then included for information only and are not actionable.

Magruder Scorecard For 14 Individual Methods

Method Code	Analyte, Method (Units)	Data for Lab # 0057		Method Data				Magruder Z Score	Threshold %RSD	Data Flag
		Value	range	Rob Mean	Rob SD	R-bar	# Labs			
003.10	Water Insoluble Nitrogen, Method I (PCT)	3.4750	0.09000	3.4560	0.06560	0.04000	3	0.29	0%	0
010.60	Total Nitrogen, Combustion (PCT)	25.235	0.17000	25.531	0.25765	0.20098	54	-1.15	1%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	5.2900	0.26000	5.3607	0.21489	0.13667	15	-0.33	1%	0
101.30	Acid Soluble Calcium, ICP (PCT)	4.7650	0.21000	4.6038	0.24597	0.09749	16	0.66	2%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	1.6820	0.04600	1.6195	0.08587	0.01787	15	0.73	2%	0
144.01	Sulfur, Gravimetric (PCT)	5.1300	0.06000	5.1177	0.03483	0.03306	16	0.35	0%	0
190.00	Water Soluble Chlorine, Titrimetric (PCT)	4.0800	0.14000	4.0881	0.11209	0.05175	8	-0.07	0%	0
202.30	Acid Soluble Cobalt , ICP (PPM)	28.550	1.7000	21.619	8.3892	1.3309	12	0.83	16%	0
221.30	Acid Soluble Copper, ICP (PCT)	0.00922	0.00075	0.00908	0.00076	0.00033	18	0.18	1%	0
241.30	Acid Soluble Iron, ICP (PCT)	1.3500	0.08000	1.2032	0.19851	0.05095	35	0.74	6%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0.01685	0.00070	0.01622	0.00121	0.00061	12	0.52	2%	0
289.30	Total Molybdenum , ICP (PPM)	15.450	1.1000	13.718	2.1172	0.62714	14	0.82	6%	0
311.99	Sodium, Other (Identify) (PCT)	0.05265	0.01170	0.05104	0.00156	0.00341	7	1.03	2%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0.04325	0.00390	0.04126	0.00454	0.00285	20	0.44	2%	0

magruder fertilizer

check sample program

STRIVING FOR EXCELLENCE IN ANALYSIS

Report Card for Lab Code 0070

Sample # 201007: Grade 25-0-5

Notes:

Interpreting Z Scores: Red indicates a normally distributed Z value >3 or <-3 (requires action), Orange = Z between 2 and 3 or -2 and -3 (warning) and Green = Z < 2 and >-2 (OK at 95%). Flags indicate data usage: 0 = Used, 1 = Rejected for duplicates too far apart and 2 = Rejected as outlier. Robust statistics are not used if less than 6 labs reporting, Z Scores are then included for information only and are not actionable.

Magruder Scorecard For 2 Individual Methods

Method Code	Analyte, Method (Units)	Data for Lab # 0070		Method Data				Magruder Z Score	Threshold %RSD	Data Flag
		Value	range	Rob Mean	Rob SD	R-bar	# Labs			
010.60	Total Nitrogen, Combustion (PCT)	25.585	0.19000	25.531	0.25765	0.20098	54	0.21	0%	0
041.50	Direct Available Phosphate, ICP (PCT)	5.5600	0.04000	1.1232	2.4803	0.01040	5	1.79	198%	0

magruder fertilizer

check sample program

STRIVING FOR EXCELLENCE IN ANALYSIS

Report Card for Lab Code 0232

Sample # 201007: Grade 25-0-5

Notes:

Interpreting Z Scores: Red indicates a normally distributed Z value >3 or <-3 (requires action), Orange = Z between 2 and 3 or -2 and -3 (warning) and Green = Z < 2 and >-2 (OK at 95%). Flags indicate data usage: 0 = Used, 1 = Rejected for duplicates too far apart and 2 = Rejected as outlier. Robust statistics are not used if less than 6 labs reporting, Z Scores are then included for information only and are not actionable.

Magruder Scorecard For 21 Individual Methods

Method Code	Analyte, Method (Units)	Data for Lab # 0232		Method Data				Magruder Z Score	Threshold %RSD	Data Flag
		Value	range	Rob Mean	Rob SD	R-bar	# Labs			
001.10	Ammoniacal Nitrogen, MgO Distillation (PCT)	4.2635	0.00900	4.4392	0.20004	0.02737	8	-0.88	2%	0
002.99	Nitrate Nitrogen, Other (Identify) (PCT)	0.02550	0.00100	0.66517	1.1301	0.00033	3	-0.57	48%	0
005.00	Nitrogen From Urea, Urease (as N) (PCT)	5.6080	0.29400			0.29400	1			
010.60	Total Nitrogen, Combustion (PCT)	25.065	0.11000	25.531	0.25765	0.20098	54	-1.81	1%	0
050.99	Soluble Potash, Other (Identify) (PCT)	5.3350	0.07000	5.2967	0.09925	0.08128	18	0.39	0%	0
101.30	Acid Soluble Calcium, ICP (PCT)	4.4097	0.67480	4.6038	0.24597	0.09749	16	-0.79	2%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	1.5491	0.12150	1.6195	0.08587	0.01787	15	-0.82	2%	1
144.99	Sulfur, Other (Identify) (PCT)	5.0266	0.39620	5.1163	0.24602	0.07779	26	-0.36	1%	1
151.30	Total Arsenic , ICP (PPM)	2.0400	1.1200	1.2220	0.55903	0.63200	5	1.46	33%	0
165.99	Acid Soluble Boron, Other (Identify) (PCT)	0.00120	0.00001	0.00523	0.00445	0.00167	3	-0.91	39%	0
181.30	Total Cadmium , ICP (PPM)	0.51000	0.18000	0.40634	0.31590	0.01471	7	0.33	13%	1
191.30	Total Chromium , ICP (PPM)	120.00	40.400	134.69	26.597	10.392	9	-0.55	5%	0
202.30	Acid Soluble Cobalt , ICP (PPM)	17.300	3.4000	21.619	8.3892	1.3309	12	-0.51	10%	0
221.30	Acid Soluble Copper, ICP (PCT)	0.00940	0.00000	0.00908	0.00076	0.00033	18	0.42	2%	0
241.30	Acid Soluble Iron, ICP (PCT)	1.0655	0.15910	1.2032	0.19851	0.05095	35	-0.69	6%	0
251.30	Total Lead , ICP (PPM)	4.9700	3.5400	5.1682	1.7004	1.0749	7	-0.12	2%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0.01615	0.00010	0.01622	0.00121	0.00061	12	-0.06	0%	0
289.30	Total Molybdenum , ICP (PPM)	14.790	4.1800	13.718	2.1172	0.62714	14	0.51	4%	1
291.30	Total Nickel , ICP (PPM)	69.900	22.400	74.167	14.120	2.1192	9	-0.30	3%	1
311.99	Sodium, Other (Identify) (PCT)	0.05055	0.00150	0.05104	0.00156	0.00341	7	-0.31	0%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0.06410	0.04840	0.04126	0.00454	0.00285	20	5.03	28%	1

magruder fertilizer

check sample program

STRIVING FOR EXCELLENCE IN ANALYSIS

Report Card for Lab Code 0233

Sample # 201007: Grade 25-0-5

Notes:

Interpreting Z Scores: Red indicates a normally distributed Z value >3 or <-3 (requires action), Orange = Z between 2 and 3 or -2 and -3 (warning) and Green = Z < 2 and >-2 (OK at 95%). Flags indicate data usage: 0 = Used, 1 = Rejected for duplicates too far apart and 2 = Rejected as outlier. Robust statistics are not used if less than 6 labs reporting, Z Scores are then included for information only and are not actionable.

Magruder Scorecard For 1 Individual Methods

Method Code	Analyte, Method (Units)	Data for Lab # 0233		Method Data				Magruder Z Score	Threshold %RSD	Data Flag
		Value	range	Rob Mean	Rob SD	R-bar	# Labs			
010.60	Total Nitrogen, Combustion (PCT)	25.725	0.33000	25.531	0.25765	0.20098	54	0.75	0%	0

magruder fertilizer

check sample program

STRIVING FOR EXCELLENCE IN ANALYSIS

Report Card for Lab Code 0402

Sample # 201007: Grade 25-0-5

Notes:

Interpreting Z Scores: Red indicates a normally distributed Z value >3 or <-3 (requires action), Orange = Z between 2 and 3 or -2 and -3 (warning) and Green = Z < 2 and >-2 (OK at 95%). Flags indicate data usage: 0 = Used, 1 = Rejected for duplicates too far apart and 2 = Rejected as outlier. Robust statistics are not used if less than 6 labs reporting, Z Scores are then included for information only and are not actionable.

Magruder Scorecard For 5 Individual Methods

Method Code	Analyte, Method (Units)	Data for Lab # 0402		Method Data				Magruder	Threshold	Data
		Value	range	Rob Mean	Rob SD	R-bar	# Labs	Z Score	%RSD	Flag
010.60	Total Nitrogen, Combustion (PCT)	25.190	0.18000	25.531	0.25765	0.20098	54	-1.32	1%	0
050.99	Soluble Potash, Other (Identify) (PCT)	5.1050	0.01000	5.2967	0.09925	0.08128	18	-1.93	2%	0
221.30	Acid Soluble Copper, ICP (PCT)	0.01000	0.00000	0.00908	0.00076	0.00033	18	1.21	5%	0
241.30	Acid Soluble Iron, ICP (PCT)	0.75900	0.08000	1.2032	0.19851	0.05095	35	-2.24	18%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0.04500	0.00000	0.04126	0.00454	0.00285	20	0.82	5%	0

magruder fertilizer

check sample program

STRIVING FOR EXCELLENCE IN ANALYSIS

Report Card for Lab Code 0405

Sample # 201007: Grade 25-0-5

Notes:

Interpreting Z Scores: Red indicates a normally distributed Z value >3 or <-3 (requires action), Orange = Z between 2 and 3 or -2 and -3 (warning) and Green = Z < 2 and >-2 (OK at 95%). Flags indicate data usage: 0 = Used, 1 = Rejected for duplicates too far apart and 2 = Rejected as outlier. Robust statistics are not used if less than 6 labs reporting, Z Scores are then included for information only and are not actionable.

Magruder Scorecard For 2 Individual Methods

Method Code	Analyte, Method (Units)	Data for Lab # 0405		Method Data				Magruder Z Score	Threshold %RSD	Data Flag
		Value	range	Rob Mean	Rob SD	R-bar	# Labs			
001.10	Ammoniacal Nitrogen, MgO Distillation (PCT)	7.3200	0.08000	4.4392	0.20004	0.02737	8	14.40	32%	0
010.60	Total Nitrogen, Combustion (PCT)	25.870	0.10000	25.531	0.25765	0.20098	54	1.31	1%	0

magruder fertilizer

check sample program

STRIVING FOR EXCELLENCE IN ANALYSIS

Report Card for Lab Code 0415

Sample # 201007: Grade 25-0-5

Notes:

Interpreting Z Scores: Red indicates a normally distributed Z value >3 or <-3 (requires action), Orange = Z between 2 and 3 or -2 and -3 (warning) and Green = Z < 2 and >-2 (OK at 95%). Flags indicate data usage: 0 = Used, 1 = Rejected for duplicates too far apart and 2 = Rejected as outlier. Robust statistics are not used if less than 6 labs reporting, Z Scores are then included for information only and are not actionable.

Magruder Scorecard For 3 Individual Methods

Method Code	Analyte, Method (Units)	Data for Lab # 0415		Method Data				Magruder Z Score	Threshold %RSD	Data Flag
		Value	range	Rob Mean	Rob SD	R-bar	# Labs			
001.10	Ammoniacal Nitrogen, MgO Distillation (PCT)	4.5570	0.00000	4.4392	0.20004	0.02737	8	0.59	1%	0
010.12	Total Nitrogen, Salicylic (PCT)	25.105	0.04700	25.256	0.14133	0.16675	4	-1.07	0%	0
050.60	Soluble Potash, Flame Photometric (Oxalate) (PCT)	5.3290	0.03600	5.2913	0.07050	0.06200	3	0.53	0%	0

magruder fertilizer

check sample program

STRIVING FOR EXCELLENCE IN ANALYSIS

Report Card for Lab Code 0419

Sample # 201007: Grade 25-0-5

Notes:

Interpreting Z Scores: Red indicates a normally distributed Z value >3 or <-3 (requires action), Orange = Z between 2 and 3 or -2 and -3 (warning) and Green = Z < 2 and >-2 (OK at 95%). Flags indicate data usage: 0 = Used, 1 = Rejected for duplicates too far apart and 2 = Rejected as outlier. Robust statistics are not used if less than 6 labs reporting, Z Scores are then included for information only and are not actionable.

Magruder Scorecard For 13 Individual Methods

Method Code	Analyte, Method (Units)	Data for Lab # 0419		Method Data				Magruder Z Score	Threshold %RSD	Data Flag
		Value	range	Rob Mean	Rob SD	R-bar	# Labs			
001.99	Ammoniacal Nitrogen, Other (Identify) (PCT)	3.6950	0.07000	4.3130	0.29667	0.06710	10	-2.08	7%	0
050.50	Soluble Potash, ICP (Oxalate) (PCT)	5.0250	0.11000	5.2751	0.05800	0.10464	11	-4.31	2%	0
144.99	Sulfur, Other (Identify) (PCT)	4.8250	0.15000	5.1163	0.24602	0.07779	26	-1.18	3%	0
181.30	Total Cadmium , ICP (PPM)	1.0350	0.01000	0.40634	0.31590	0.01471	7	1.99	77%	0
191.30	Total Chromium , ICP (PPM)	112.00	2.0000	134.69	26.597	10.392	9	-0.85	8%	0
202.30	Acid Soluble Cobalt , ICP (PPM)	16.000	1.4000	21.619	8.3892	1.3309	12	-0.67	13%	0
221.30	Acid Soluble Copper, ICP (PCT)	0.00014	0.00002	0.00908	0.00076	0.00033	18	-11.77	49%	0
241.30	Acid Soluble Iron, ICP (PCT)	1.1200	0.08000	1.2032	0.19851	0.05095	35	-0.42	3%	0
251.30	Total Lead , ICP (PPM)	7.0500	0.88000	5.1682	1.7004	1.0749	7	1.11	18%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0.00016	0.00002	0.01622	0.00121	0.00061	12	-13.27	49%	0
289.30	Total Molybdenum , ICP (PPM)	11.550	0.10000	13.718	2.1172	0.62714	14	-1.02	8%	0
291.30	Total Nickel , ICP (PPM)	66.250	2.7000	74.167	14.120	2.1192	9	-0.56	5%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0.04630	0.00000	0.04126	0.00454	0.00285	20	1.11	6%	0

magruder fertilizer check sample program

STRIVING FOR EXCELLENCE IN ANALYSIS

Report Card for Lab Code 0422

Sample # 201007: Grade 25-0-5

Notes:

Interpreting Z Scores: Red indicates a normally distributed Z value >3 or <-3 (requires action), Orange = Z between 2 and 3 or -2 and -3 (warning) and Green = Z < 2 and >-2 (OK at 95%). Flags indicate data usage: 0 = Used, 1 = Rejected for duplicates too far apart and 2 = Rejected as outlier. Robust statistics are not used if less than 6 labs reporting, Z Scores are then included for information only and are not actionable.

Magruder Scorecard For 14 Individual Methods

Method Code	Analyte, Method (Units)	Data for Lab # 0422		Method Data				Magruder Z Score	Threshold %RSD	Data Flag
		Value	range	Rob Mean	Rob SD	R-bar	# Labs			
010.60	Total Nitrogen, Combustion (PCT)	25.010	0.08000	25.531	0.25765	0.20098	54	-2.02	1%	0
020.50	Total Phosphate, ICP (PCT)	0.03000	0.00000	0.03250	0.00354	0.00000	2	-0.71	4%	0
050.50	Soluble Potash, ICP (Oxalate) (PCT)	5.0750	0.05000	5.2751	0.05800	0.10464	11	-3.45	2%	0
101.30	Acid Soluble Calcium, ICP (PCT)	5.2900	0.04000	4.6038	0.24597	0.09749	16	2.79	7%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	1.8550	0.03000	1.6195	0.08587	0.01787	15	2.74	7%	0
144.99	Sulfur, Other (Identify) (PCT)	5.3550	0.11000	5.1163	0.24602	0.07779	26	0.97	2%	0
190.00	Water Soluble Chlorine, Titrimetric (PCT)	8.1000	0.04000	4.0881	0.11209	0.05175	8	35.79	49%	0
202.30	Acid Soluble Cobalt , ICP (PPM)	0.03000	0.00000	21.619	8.3892	1.3309	12	-2.57	50%	0
221.30	Acid Soluble Copper, ICP (PCT)	0.00861	0.00005	0.00908	0.00076	0.00033	18	-0.62	3%	0
241.30	Acid Soluble Iron, ICP (PCT)	1.2450	0.05000	1.2032	0.19851	0.05095	35	0.21	2%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0.01500	0.01000	0.01622	0.00121	0.00061	12	-1.01	4%	1
289.99	Total Molybdenum , Other (Identify) (PPM)	25.000	10.000	14.907	11.446	3.6667	3	0.88	34%	0
311.99	Sodium, Other (Identify) (PCT)	0.16500	0.03000	0.05104	0.00156	0.00341	7	72.96	112%	1
321.30	Acid Soluble Zinc, ICP (PCT)	0.03500	0.01000	0.04126	0.00454	0.00285	20	-1.38	8%	0

magruder fertilizer

check sample program

STRIVING FOR EXCELLENCE IN ANALYSIS

Report Card for Lab Code 0474

Sample # 201007: Grade 25-0-5

Notes:

Interpreting Z Scores: Red indicates a normally distributed Z value >3 or <-3 (requires action), Orange = Z between 2 and 3 or -2 and -3 (warning) and Green = Z < 2 and >-2 (OK at 95%). Flags indicate data usage: 0 = Used, 1 = Rejected for duplicates too far apart and 2 = Rejected as outlier. Robust statistics are not used if less than 6 labs reporting, Z Scores are then included for information only and are not actionable.

Magruder Scorecard For 21 Individual Methods

Method Code	Analyte, Method (Units)	Data for Lab # 0474		Method Data				Magruder Z Score	Threshold %RSD	Data Flag
		Value	range	Rob Mean	Rob SD	R-bar	# Labs			
010.11	Total Nitrogen, Modified Comprehensive (PCT)	25.245	0.25000	25.184	0.24825	0.15091	11	0.24	0%	0
020.20	Total Phosphate, Spectrometric (PCT)	0.05000	0.00000	0.15000	0.14142	0.01000	2	-0.71	33%	0
030.20	Insoluble Phosphate, Spectrometric (PCT)	0.03500	0.00600			0.00600	1			
040.20	Indirect Available Phosphate, Spectrometric (PCT)	0.01500	0.01000			0.01000	1			
048.20	Water Soluble Phosphate, Spectrometric (PCT)	0.01000	0.00000			0.00000	1			
060.00	Free Water, Vacuum Oven (PCT)	0.62000	1.0800	1.1926	0.38245	0.28400	5	-1.50	24%	0
101.30	Acid Soluble Calcium, ICP (PCT)	4.5000	0.00000	4.6038	0.24597	0.09749	16	-0.42	1%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	1.5250	0.01000	1.6195	0.08587	0.01787	15	-1.10	3%	0
144.70	Sulfur, Spectrometric (PCT)	5.7450	0.23000			0.23000	1			
151.30	Total Arsenic , ICP (PPM)	1.0000	0.00000	1.2220	0.55903	0.63200	5	-0.40	9%	0
181.30	Total Cadmium , ICP (PPM)	0.50000	0.00000	0.40634	0.31590	0.01471	7	0.30	12%	0
191.30	Total Chromium , ICP (PPM)	9.5000	1.0000	134.69	26.597	10.392	9	-4.71	46%	0
202.00	Acid Soluble Cobalt , Atomic Absorption (PPM)	4.0000	0.00000			0.00000	1			
221.00	Acid Soluble Copper, Atomic Absorption (PCT)	0.00840	0.00020	0.00880	0.00035	0.00020	3	-1.14	2%	0
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	0.20500	0.01000	1.1673	0.17817	0.04423	13	-5.40	41%	0
251.30	Total Lead , ICP (PPM)	3.0000	0.00000	5.1682	1.7004	1.0749	7	-1.28	21%	0
261.99	Acid Soluble Manganese, Other (Identify) (PCT)	0.01140	0.00020	0.01245	0.00148	0.00060	2	-0.71	4%	0
289.30	Total Molybdenum , ICP (PPM)	9.5000	1.0000	13.718	2.1172	0.62714	14	-1.99	15%	0
291.30	Total Nickel , ICP (PPM)	2.5000	1.0000	74.167	14.120	2.1192	9	-5.08	48%	0
311.99	Sodium, Other (Identify) (PCT)	0.05150	0.00040	0.05104	0.00156	0.00341	7	0.30	0%	0
321.99	Acid Soluble Zinc, Other (Identify) (PCT)	0.04035	0.00030	0.04012	0.00301	0.00077	3	0.08	0%	0

magruder fertilizer check sample program



STRIVING FOR EXCELLENCE IN ANALYSIS

Magruder Check Sample For Individual Methods

All Labs and All Methods Report

Sample # 201007

Sort by Method

Grade 25-0-5

Method Code	Analyte Name, Method	Lab Code	Lab Data		Method Data				Magruder Z Score	Threshold %RSD	Flag
			Value	range	Rob Mean	Rob SD	R-bar	# Labs			
001.10	Ammoniacal Nitrogen, MgO Distillation (PCT)	0444	4.2300	0.04000	4.4392	0.20004	0.02737	8	-1.05	2%	0
001.10	Ammoniacal Nitrogen, MgO Distillation (PCT)	0232	4.2635	0.00900	4.4392	0.20004	0.02737	8	-0.88	2%	0
001.10	Ammoniacal Nitrogen, MgO Distillation (PCT)	0291	4.3500	0.02000	4.4392	0.20004	0.02737	8	-0.45	1%	0
001.10	Ammoniacal Nitrogen, MgO Distillation (PCT)	0456	4.3500	0.04000	4.4392	0.20004	0.02737	8	-0.45	1%	0
001.10	Ammoniacal Nitrogen, MgO Distillation (PCT)	0309	4.4100	0.02000	4.4392	0.20004	0.02737	8	-0.15	0%	0
001.10	Ammoniacal Nitrogen, MgO Distillation (PCT)	0415	4.5570	0.00000	4.4392	0.20004	0.02737	8	0.59	1%	0
001.10	Ammoniacal Nitrogen, MgO Distillation (PCT)	0258	5.2050	0.01000	4.4392	0.20004	0.02737	8	3.83	9%	0
001.10	Ammoniacal Nitrogen, MgO Distillation (PCT)	0405	7.3200	0.08000	4.4392	0.20004	0.02737	8	14.40	32%	0
001.99	Ammoniacal Nitrogen, Other (Identify) (PCT)	0419	3.6950	0.07000	4.3130	0.29667	0.06710	10	-2.08	7%	0
001.99	Ammoniacal Nitrogen, Other (Identify) (PCT)	0368	3.9700	0.08000	4.3130	0.29667	0.06710	10	-1.16	4%	0
001.99	Ammoniacal Nitrogen, Other (Identify) (PCT)	0475	4.0350	0.15000	4.3130	0.29667	0.06710	10	-0.94	3%	0
001.99	Ammoniacal Nitrogen, Other (Identify) (PCT)	0420	4.2550	0.03000	4.3130	0.29667	0.06710	10	-0.20	1%	0
001.99	Ammoniacal Nitrogen, Other (Identify) (PCT)	0027	4.3050	0.01000	4.3130	0.29667	0.06710	10	-0.03	0%	0
001.99	Ammoniacal Nitrogen, Other (Identify) (PCT)	0476	4.3750	0.01000	4.3130	0.29667	0.06710	10	0.21	1%	0
001.99	Ammoniacal Nitrogen, Other (Identify) (PCT)	0096	4.4800	0.02000	4.3130	0.29667	0.06710	10	0.56	2%	0
001.99	Ammoniacal Nitrogen, Other (Identify) (PCT)	0397	4.4950	0.07000	4.3130	0.29667	0.06710	10	0.61	2%	0
001.99	Ammoniacal Nitrogen, Other (Identify) (PCT)	0255	4.5345	0.10100	4.3130	0.29667	0.06710	10	0.75	3%	0
001.99	Ammoniacal Nitrogen, Other (Identify) (PCT)	0471	5.8650	0.13000	4.3130	0.29667	0.06710	10	5.23	18%	0
002.99	Nitrate Nitrogen, Other (Identify) (PCT)	0027	0.00000	0.00000	0.66517	1.1301	0.00033	3	-0.59	50%	0
002.99	Nitrate Nitrogen, Other (Identify) (PCT)	0232	0.02550	0.00100	0.66517	1.1301	0.00033	3	-0.57	48%	0
002.99	Nitrate Nitrogen, Other (Identify) (PCT)	0275	1.9700	0.00000	0.66517	1.1301	0.00033	3	1.15	98%	0
003.10	Water Insoluble Nitrogen, Method I (PCT)	0029	3.3830	0.01000	3.4560	0.06560	0.04000	3	-1.11	1%	0
003.10	Water Insoluble Nitrogen, Method I (PCT)	0057	3.4750	0.09000	3.4560	0.06560	0.04000	3	0.29	0%	0
003.10	Water Insoluble Nitrogen, Method I (PCT)	0090	3.5100	0.02000	3.4560	0.06560	0.04000	3	0.82	1%	0
003.99	Water Insoluble Nitrogen, Other (Identify) (PCT)	0027	3.4200	0.00000	3.5275	0.15203	0.21500	2	-0.71	2%	0
003.99	Water Insoluble Nitrogen, Other (Identify) (PCT)	0475	3.6350	0.43000	3.5275	0.15203	0.21500	2	0.71	2%	0
005.00	Nitrogen From Urea, Urease (as N) (PCT)	0232	5.6080	0.29400			0.29400	1			
005.99	Nitrogen From Urea, Other (Identify) (PCT)	0029	13.325	0.45000	15.683	3.3340	0.24500	2	-0.71	8%	0
005.99	Nitrogen From Urea, Other (Identify) (PCT)	0309	18.040	0.04000	15.683	3.3340	0.24500	2	0.71	8%	0
009.10	Ammon & Nitrate N, Devarda (PCT)	0257	5.1000	0.10000			0.10000	1			
010.11	Total Nitrogen, Modified Comprehensive (PCT)	0309	23.800	0.00000	25.184	0.24825	0.15091	11	-5.58	3%	0
010.11	Total Nitrogen, Modified Comprehensive (PCT)	0211	24.220	0.36000	25.184	0.24825	0.15091	11	-3.88	2%	0

Method Code	Analyte Name, Method	Lab Code	Lab Data		Method Data				Magruder Z Score	Threshold %RSD	Flag
			Value	range	Rob Mean	Rob SD	R-bar	# Labs			
010.11	Total Nitrogen, Modified Comprehensive (PCT)	0470	24.790	0.02000	25.184	0.24825	0.15091	11	-1.59	1%	0
010.11	Total Nitrogen, Modified Comprehensive (PCT)	0260	25.129	0.04000	25.184	0.24825	0.15091	11	-0.22	0%	0
010.11	Total Nitrogen, Modified Comprehensive (PCT)	0473	25.180	0.16000	25.184	0.24825	0.15091	11	-0.02	0%	0
010.11	Total Nitrogen, Modified Comprehensive (PCT)	0090	25.210	0.12000	25.184	0.24825	0.15091	11	0.10	0%	0
010.11	Total Nitrogen, Modified Comprehensive (PCT)	0105	25.220	0.36000	25.184	0.24825	0.15091	11	0.14	0%	0
010.11	Total Nitrogen, Modified Comprehensive (PCT)	0474	25.245	0.25000	25.184	0.24825	0.15091	11	0.24	0%	0
010.11	Total Nitrogen, Modified Comprehensive (PCT)	0460	25.350	0.10000	25.184	0.24825	0.15091	11	0.67	0%	0
010.11	Total Nitrogen, Modified Comprehensive (PCT)	0456	25.475	0.23000	25.184	0.24825	0.15091	11	1.17	1%	0
010.11	Total Nitrogen, Modified Comprehensive (PCT)	0114	25.620	0.02000	25.184	0.24825	0.15091	11	1.76	1%	0
010.12	Total Nitrogen, Salicylic (PCT)	0415	25.105	0.04700	25.256	0.14133	0.16675	4	-1.07	0%	0
010.12	Total Nitrogen, Salicylic (PCT)	0185	25.170	0.12000	25.256	0.14133	0.16675	4	-0.61	0%	0
010.12	Total Nitrogen, Salicylic (PCT)	0455	25.350	0.10000	25.256	0.14133	0.16675	4	0.66	0%	0
010.12	Total Nitrogen, Salicylic (PCT)	0397	25.400	0.40000	25.256	0.14133	0.16675	4	1.02	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0422	25.010	0.08000	25.531	0.25765	0.20098	54	-2.02	1%	0
010.60	Total Nitrogen, Combustion (PCT)	0073	25.065	0.03000	25.531	0.25765	0.20098	54	-1.81	1%	0
010.60	Total Nitrogen, Combustion (PCT)	0232	25.065	0.11000	25.531	0.25765	0.20098	54	-1.81	1%	0
010.60	Total Nitrogen, Combustion (PCT)	0426	25.075	0.35000	25.531	0.25765	0.20098	54	-1.77	1%	0
010.60	Total Nitrogen, Combustion (PCT)	0095	25.135	0.05000	25.531	0.25765	0.20098	54	-1.54	1%	0
010.60	Total Nitrogen, Combustion (PCT)	0402	25.190	0.18000	25.531	0.25765	0.20098	54	-1.32	1%	0
010.60	Total Nitrogen, Combustion (PCT)	0389	25.200	0.00000	25.531	0.25765	0.20098	54	-1.29	1%	0
010.60	Total Nitrogen, Combustion (PCT)	0027	25.235	0.15000	25.531	0.25765	0.20098	54	-1.15	1%	0
010.60	Total Nitrogen, Combustion (PCT)	0057	25.235	0.17000	25.531	0.25765	0.20098	54	-1.15	1%	0
010.60	Total Nitrogen, Combustion (PCT)	0393	25.280	0.04000	25.531	0.25765	0.20098	54	-0.98	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0360	25.290	0.18000	25.531	0.25765	0.20098	54	-0.94	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0096	25.295	0.01000	25.531	0.25765	0.20098	54	-0.92	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0041	25.300	0.12000	25.531	0.25765	0.20098	54	-0.90	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0275	25.335	0.13000	25.531	0.25765	0.20098	54	-0.76	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0042	25.340	0.40000	25.531	0.25765	0.20098	54	-0.74	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0307	25.400	0.26000	25.531	0.25765	0.20098	54	-0.51	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0034	25.425	0.19000	25.531	0.25765	0.20098	54	-0.41	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0354	25.430	0.04400	25.531	0.25765	0.20098	54	-0.39	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0377	25.445	0.07000	25.531	0.25765	0.20098	54	-0.34	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0028	25.460	0.36000	25.531	0.25765	0.20098	54	-0.28	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0009	25.475	0.21000	25.531	0.25765	0.20098	54	-0.22	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0390	25.490	0.22000	25.531	0.25765	0.20098	54	-0.16	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0231	25.495	0.01000	25.531	0.25765	0.20098	54	-0.14	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0157	25.500	0.20000	25.531	0.25765	0.20098	54	-0.12	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0325	25.500	0.20000	25.531	0.25765	0.20098	54	-0.12	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0043	25.550	0.44000	25.531	0.25765	0.20098	54	0.07	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0040	25.550	0.10000	25.531	0.25765	0.20098	54	0.07	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0291	25.550	0.04000	25.531	0.25765	0.20098	54	0.07	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0070	25.585	0.19000	25.531	0.25765	0.20098	54	0.21	0%	0

Method Code	Analyte Name, Method	Lab Code	Lab Data		Method Data				Magruder Z Score	Threshold %RSD	Flag
			Value	range	Rob Mean	Rob SD	R-bar	# Labs			
010.60	Total Nitrogen, Combustion (PCT)	0475	25.585	0.73000	25.531	0.25765	0.20098	54	0.21	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0035	25.615	0.15000	25.531	0.25765	0.20098	54	0.32	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0102	25.620	0.10000	25.531	0.25765	0.20098	54	0.34	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0024	25.640	0.34000	25.531	0.25765	0.20098	54	0.42	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0247	25.645	0.17000	25.531	0.25765	0.20098	54	0.44	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0450	25.650	0.10000	25.531	0.25765	0.20098	54	0.46	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0086	25.657	0.17000	25.531	0.25765	0.20098	54	0.49	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0177	25.680	0.08000	25.531	0.25765	0.20098	54	0.58	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0049	25.695	0.11000	25.531	0.25765	0.20098	54	0.64	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0007	25.700	0.00000	25.531	0.25765	0.20098	54	0.65	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0324	25.700	0.20000	25.531	0.25765	0.20098	54	0.65	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0296	25.705	0.17000	25.531	0.25765	0.20098	54	0.67	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0233	25.725	0.33000	25.531	0.25765	0.20098	54	0.75	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0131	25.730	0.16000	25.531	0.25765	0.20098	54	0.77	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0292	25.730	0.02000	25.531	0.25765	0.20098	54	0.77	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0106	25.735	0.05000	25.531	0.25765	0.20098	54	0.79	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0136	25.735	0.03000	25.531	0.25765	0.20098	54	0.79	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0368	25.773	0.24900	25.531	0.25765	0.20098	54	0.94	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0029	25.785	1.0500	25.531	0.25765	0.20098	54	0.98	0%	0
010.60	Total Nitrogen, Combustion (PCT)	0055	25.805	0.25000	25.531	0.25765	0.20098	54	1.06	1%	0
010.60	Total Nitrogen, Combustion (PCT)	0023	25.830	0.26000	25.531	0.25765	0.20098	54	1.16	1%	0
010.60	Total Nitrogen, Combustion (PCT)	0405	25.870	0.10000	25.531	0.25765	0.20098	54	1.31	1%	0
010.60	Total Nitrogen, Combustion (PCT)	0255	26.065	0.15000	25.531	0.25765	0.20098	54	2.07	1%	0
010.60	Total Nitrogen, Combustion (PCT)	0444	26.085	0.05000	25.531	0.25765	0.20098	54	2.15	1%	0
010.60	Total Nitrogen, Combustion (PCT)	0428	26.850	1.3000	25.531	0.25765	0.20098	54	5.12	3%	0
010.60	Total Nitrogen, Combustion (PCT)	0117	51.650	7.3800	25.531	0.25765	0.20098	54	101.37	51%	2
010.99	Total Nitrogen, Other (Identify) (PCT)	0030	24.500	0.14000	25.025	0.40659	0.14000	4	-1.29	1%	0
010.99	Total Nitrogen, Other (Identify) (PCT)	0420	25.000	0.14000	25.025	0.40659	0.14000	4	-0.06	0%	0
010.99	Total Nitrogen, Other (Identify) (PCT)	0476	25.115	0.01000	25.025	0.40659	0.14000	4	0.22	0%	0
010.99	Total Nitrogen, Other (Identify) (PCT)	0371	25.485	0.27000	25.025	0.40659	0.14000	4	1.13	1%	0
020.20	Total Phosphate, Spectrometric (PCT)	0474	0.05000	0.00000	0.15000	0.14142	0.01000	2	-0.71	33%	0
020.20	Total Phosphate, Spectrometric (PCT)	0420	0.25000	0.02000	0.15000	0.14142	0.01000	2	0.71	33%	0
020.50	Total Phosphate, ICP (PCT)	0422	0.03000	0.00000	0.03250	0.00354	0.00000	2	-0.71	4%	0
020.50	Total Phosphate, ICP (PCT)	0389	0.03500	0.00000	0.03250	0.00354	0.00000	2	0.71	4%	0
030.20	Insoluble Phosphate, Spectrometric (PCT)	0474	0.03500	0.00600			0.00600	1			
040.20	Indirect Available Phosphate, Spectrometric (PCT)	0474	0.01500	0.01000			0.01000	1			
040.99	Indirect Available Phosphate, Other (Identify) (PCT)	0455	4.8250	0.05000			0.05000	1			
041.10	Direct Available Phosphate, Gravimetric Quimica	0022	0.10000	0.00000	0.10500	0.00707	0.00000	2	-0.71	2%	0
041.10	Direct Available Phosphate, Gravimetric Quimica	0185	0.11000	0.00000	0.10500	0.00707	0.00000	2	0.71	2%	0
041.50	Direct Available Phosphate, ICP (PCT)	0325	0.00000	0.00000	1.1232	2.4803	0.01040	5	-0.45	50%	0
041.50	Direct Available Phosphate, ICP (PCT)	0377	0.00000	0.00000	1.1232	2.4803	0.01040	5	-0.45	50%	0
041.50	Direct Available Phosphate, ICP (PCT)	0393	0.02300	0.00200	1.1232	2.4803	0.01040	5	-0.44	49%	0

Method Code	Analyte Name, Method	Lab Code	Lab Data		Method Data				Magruder Z Score	Threshold %RSD	Flag
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041.50	Direct Available Phosphate, ICP (PCT)	0354	0.03300	0.01000	1.1232	2.4803	0.01040	5	-0.44	49%	0
041.50	Direct Available Phosphate, ICP (PCT)	0070	5.5600	0.04000	1.1232	2.4803	0.01040	5	1.79	198%	0
041.60	Direct Available Phosphate, EDTA Extract (PCT)	0024	0.09000	0.04000			0.04000	1			
048.20	Water Soluble Phosphate, Spectrometric (PCT)	0474	0.01000	0.00000			0.00000	1			
050.00	Soluble Potash, STPB Oxalate (PCT)	0257	4.2950	0.07000	5.3607	0.21489	0.13667	15	-4.96	10%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	0258	5.0350	0.27000	5.3607	0.21489	0.13667	15	-1.52	3%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	0296	5.2450	0.07000	5.3607	0.21489	0.13667	15	-0.54	1%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	0397	5.2500	0.10000	5.3607	0.21489	0.13667	15	-0.52	1%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	0049	5.2550	0.07000	5.3607	0.21489	0.13667	15	-0.49	1%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	0057	5.2900	0.26000	5.3607	0.21489	0.13667	15	-0.33	1%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	0102	5.3000	0.22000	5.3607	0.21489	0.13667	15	-0.28	1%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	0231	5.3200	0.10000	5.3607	0.21489	0.13667	15	-0.19	0%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	0090	5.3300	0.12000	5.3607	0.21489	0.13667	15	-0.14	0%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	0470	5.5100	0.02000	5.3607	0.21489	0.13667	15	0.69	1%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	0211	5.5200	0.00000	5.3607	0.21489	0.13667	15	0.74	1%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	0055	5.5250	0.09000	5.3607	0.21489	0.13667	15	0.76	2%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	0009	5.5440	0.07000	5.3607	0.21489	0.13667	15	0.85	2%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	0114	5.5950	0.29000	5.3607	0.21489	0.13667	15	1.09	2%	0
050.00	Soluble Potash, STPB Oxalate (PCT)	0022	5.6500	0.30000	5.3607	0.21489	0.13667	15	1.35	3%	0
050.10	Soluble Potash, STPB Citrate (PCT)	0117	5.5250	0.05000			0.05000	1			
050.30	Soluble Potash, Atomic Absorption (Oxalate) (I)	0231	5.1200	0.06000	5.2990	0.10514	0.09400	5	-1.70	2%	0
050.30	Soluble Potash, Atomic Absorption (Oxalate) (I)	0040	5.3000	0.00000	5.2990	0.10514	0.09400	5	0.01	0%	0
050.30	Soluble Potash, Atomic Absorption (Oxalate) (I)	0043	5.3350	0.09000	5.2990	0.10514	0.09400	5	0.34	0%	0
050.30	Soluble Potash, Atomic Absorption (Oxalate) (I)	0185	5.3500	0.30000	5.2990	0.10514	0.09400	5	0.49	0%	0
050.30	Soluble Potash, Atomic Absorption (Oxalate) (I)	0073	5.3900	0.02000	5.2990	0.10514	0.09400	5	0.87	1%	0
050.31	Soluble Potash, Atomic Absorption (Citrate) (P)	0030	4.9250	0.11000			0.11000	1			
050.50	Soluble Potash, ICP (Oxalate) (PCT)	0419	5.0250	0.11000	5.2751	0.05800	0.10464	11	-4.31	2%	0
050.50	Soluble Potash, ICP (Oxalate) (PCT)	0422	5.0750	0.05000	5.2751	0.05800	0.10464	11	-3.45	2%	0
050.50	Soluble Potash, ICP (Oxalate) (PCT)	0426	5.2375	0.27100	5.2751	0.05800	0.10464	11	-0.65	0%	0
050.50	Soluble Potash, ICP (Oxalate) (PCT)	0292	5.2650	0.01000	5.2751	0.05800	0.10464	11	-0.17	0%	0
050.50	Soluble Potash, ICP (Oxalate) (PCT)	0444	5.2650	0.05000	5.2751	0.05800	0.10464	11	-0.17	0%	0
050.50	Soluble Potash, ICP (Oxalate) (PCT)	0354	5.2690	0.09000	5.2751	0.05800	0.10464	11	-0.11	0%	0
050.50	Soluble Potash, ICP (Oxalate) (PCT)	0106	5.2750	0.09000	5.2751	0.05800	0.10464	11	0.00	0%	0
050.50	Soluble Potash, ICP (Oxalate) (PCT)	0390	5.3000	0.10000	5.2751	0.05800	0.10464	11	0.43	0%	0
050.50	Soluble Potash, ICP (Oxalate) (PCT)	0324	5.3400	0.36000	5.2751	0.05800	0.10464	11	1.12	1%	0
050.50	Soluble Potash, ICP (Oxalate) (PCT)	0055	5.3500	0.00000	5.2751	0.05800	0.10464	11	1.29	1%	0
050.50	Soluble Potash, ICP (Oxalate) (PCT)	0420	5.6700	0.02000	5.2751	0.05800	0.10464	11	6.81	4%	0
050.51	Soluble Potash, ICP (Citrate) (PCT)	0291	5.1200	0.02000	5.2653	0.10417	0.04700	10	-1.39	1%	0
050.51	Soluble Potash, ICP (Citrate) (PCT)	0377	5.1900	0.04000	5.2653	0.10417	0.04700	10	-0.72	1%	0
050.51	Soluble Potash, ICP (Citrate) (PCT)	0393	5.2000	0.04000	5.2653	0.10417	0.04700	10	-0.63	1%	0
050.51	Soluble Potash, ICP (Citrate) (PCT)	0389	5.2000	0.00000	5.2653	0.10417	0.04700	10	-0.63	1%	0
050.51	Soluble Potash, ICP (Citrate) (PCT)	0009	5.2450	0.01000	5.2653	0.10417	0.04700	10	-0.19	0%	0

Method Code	Analyte Name, Method	Lab Code	Lab Data		Method Data				Magruder Z Score	Threshold %RSD	Flag
			Value	range	Rob Mean	Rob SD	R-bar	# Labs			
050.51	Soluble Potash, ICP (Citrate) (PCT)	0475	5.2700	0.00000	5.2653	0.10417	0.04700	10	0.05	0%	0
050.51	Soluble Potash, ICP (Citrate) (PCT)	0007	5.3050	0.05000	5.2653	0.10417	0.04700	10	0.38	0%	0
050.51	Soluble Potash, ICP (Citrate) (PCT)	0043	5.3300	0.08000	5.2653	0.10417	0.04700	10	0.62	1%	0
050.51	Soluble Potash, ICP (Citrate) (PCT)	0023	5.6050	0.17000	5.2653	0.10417	0.04700	10	3.26	3%	0
050.51	Soluble Potash, ICP (Citrate) (PCT)	0432	6.3400	0.06000	5.2653	0.10417	0.04700	10	10.32	10%	0
050.60	Soluble Potash, Flame Photometric (Oxalate) (	0309	5.2100	0.06000	5.2913	0.07050	0.06200	3	-1.15	1%	0
050.60	Soluble Potash, Flame Photometric (Oxalate) (	0415	5.3290	0.03600	5.2913	0.07050	0.06200	3	0.53	0%	0
050.60	Soluble Potash, Flame Photometric (Oxalate) (	0105	5.3350	0.09000	5.2913	0.07050	0.06200	3	0.62	0%	0
050.61	Soluble Potash, Flame Photometric (Citrate) (F	0041	5.1150	0.07000	5.3325	0.09574	0.11779	9	-2.27	2%	0
050.61	Soluble Potash, Flame Photometric (Citrate) (F	0034	5.1792	0.06010	5.3325	0.09574	0.11779	9	-1.60	1%	0
050.61	Soluble Potash, Flame Photometric (Citrate) (F	0105	5.3100	0.10000	5.3325	0.09574	0.11779	9	-0.24	0%	0
050.61	Soluble Potash, Flame Photometric (Citrate) (F	0035	5.3250	0.23000	5.3325	0.09574	0.11779	9	-0.08	0%	0
050.61	Soluble Potash, Flame Photometric (Citrate) (F	0024	5.3300	0.02000	5.3325	0.09574	0.11779	9	-0.03	0%	0
050.61	Soluble Potash, Flame Photometric (Citrate) (F	0131	5.3550	0.01000	5.3325	0.09574	0.11779	9	0.23	0%	0
050.61	Soluble Potash, Flame Photometric (Citrate) (F	0456	5.3850	0.19000	5.3325	0.09574	0.11779	9	0.55	0%	0
050.61	Soluble Potash, Flame Photometric (Citrate) (F	0029	5.4200	0.28000	5.3325	0.09574	0.11779	9	0.91	1%	0
050.61	Soluble Potash, Flame Photometric (Citrate) (F	0028	5.5500	0.10000	5.3325	0.09574	0.11779	9	2.27	2%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0460	4.7500	0.10000	5.2967	0.09925	0.08128	18	-5.51	5%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0260	5.0970	0.21800	5.2967	0.09925	0.08128	18	-2.01	2%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0402	5.1050	0.01000	5.2967	0.09925	0.08128	18	-1.93	2%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0368	5.2087	0.09870	5.2967	0.09925	0.08128	18	-0.89	1%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0131	5.2200	0.02000	5.2967	0.09925	0.08128	18	-0.77	1%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0450	5.2300	0.22000	5.2967	0.09925	0.08128	18	-0.67	1%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0476	5.2550	0.05000	5.2967	0.09925	0.08128	18	-0.42	0%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0042	5.2800	0.12000	5.2967	0.09925	0.08128	18	-0.17	0%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0255	5.3215	0.05900	5.2967	0.09925	0.08128	18	0.25	0%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0275	5.3250	0.07000	5.2967	0.09925	0.08128	18	0.28	0%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0027	5.3300	0.06000	5.2967	0.09925	0.08128	18	0.34	0%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0232	5.3350	0.07000	5.2967	0.09925	0.08128	18	0.39	0%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0247	5.3350	0.05000	5.2967	0.09925	0.08128	18	0.39	0%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0325	5.3500	0.10000	5.2967	0.09925	0.08128	18	0.54	1%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0177	5.3508	0.03040	5.2967	0.09925	0.08128	18	0.54	1%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0360	5.3900	0.02000	5.2967	0.09925	0.08128	18	0.94	1%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0471	5.4700	0.16000	5.2967	0.09925	0.08128	18	1.75	2%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0322	5.5165	0.00700	5.2967	0.09925	0.08128	18	2.21	2%	0
050.99	Soluble Potash, Other (Identify) (PCT)	0307	4.8650	0.47000	5.2967	0.09925	0.08128	18	-4.35	4%	1
060.00	Free Water, Vacuum Oven (PCT)	0474	0.62000	1.0800	1.1926	0.38245	0.28400	5	-1.50	24%	0
060.00	Free Water, Vacuum Oven (PCT)	0456	1.0550	0.05000	1.1926	0.38245	0.28400	5	-0.36	6%	0
060.00	Free Water, Vacuum Oven (PCT)	0363	1.3080	0.19000	1.1926	0.38245	0.28400	5	0.30	5%	0
060.00	Free Water, Vacuum Oven (PCT)	0007	1.3350	0.09000	1.1926	0.38245	0.28400	5	0.37	6%	0
060.00	Free Water, Vacuum Oven (PCT)	0096	1.6450	0.01000	1.1926	0.38245	0.28400	5	1.18	19%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0393	4.1550	0.01000	4.6038	0.24597	0.09749	16	-1.82	5%	0

Method Code	Analyte Name, Method	Lab Code	Lab Data		Method Data				Magruder Z Score	Threshold %RSD	Flag
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101.30	Acid Soluble Calcium, ICP (PCT)	0307	4.3650	0.05000	4.6038	0.24597	0.09749	16	-0.97	3%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0035	4.3750	0.07000	4.6038	0.24597	0.09749	16	-0.93	2%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0232	4.4097	0.67480	4.6038	0.24597	0.09749	16	-0.79	2%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0389	4.5000	0.00000	4.6038	0.24597	0.09749	16	-0.42	1%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0474	4.5000	0.00000	4.6038	0.24597	0.09749	16	-0.42	1%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0102	4.5045	0.01900	4.6038	0.24597	0.09749	16	-0.40	1%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0291	4.5600	0.04000	4.6038	0.24597	0.09749	16	-0.18	0%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0390	4.6050	0.03000	4.6038	0.24597	0.09749	16	0.00	0%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0131	4.6150	0.13000	4.6038	0.24597	0.09749	16	0.05	0%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0363	4.6650	0.03000	4.6038	0.24597	0.09749	16	0.25	1%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0420	4.7400	0.08000	4.6038	0.24597	0.09749	16	0.55	1%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0057	4.7650	0.21000	4.6038	0.24597	0.09749	16	0.66	2%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0027	4.9220	0.13400	4.6038	0.24597	0.09749	16	1.29	3%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0422	5.2900	0.04000	4.6038	0.24597	0.09749	16	2.79	7%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0354	5.3460	0.04200	4.6038	0.24597	0.09749	16	3.02	8%	0
101.30	Acid Soluble Calcium, ICP (PCT)	0009	5.1810	0.71400	4.6038	0.24597	0.09749	16	2.35	6%	1
121.00	Acid Soluble Magnesium, Atomic Absorption (P	0043	1.5900	0.02000			0.02000	1			
121.30	Acid Soluble Magnesium, ICP (PCT)	0102	1.5015	0.00100	1.6195	0.08587	0.01787	15	-1.37	4%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0474	1.5250	0.01000	1.6195	0.08587	0.01787	15	-1.10	3%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0307	1.5300	0.00000	1.6195	0.08587	0.01787	15	-1.04	3%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0389	1.5350	0.01000	1.6195	0.08587	0.01787	15	-0.98	3%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0035	1.5400	0.02000	1.6195	0.08587	0.01787	15	-0.93	2%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0291	1.5950	0.01000	1.6195	0.08587	0.01787	15	-0.28	1%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0390	1.6200	0.04000	1.6195	0.08587	0.01787	15	0.01	0%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0009	1.6330	0.01800	1.6195	0.08587	0.01787	15	0.16	0%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0420	1.6450	0.01000	1.6195	0.08587	0.01787	15	0.30	1%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0131	1.6500	0.00000	1.6195	0.08587	0.01787	15	0.36	1%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0363	1.6500	0.06000	1.6195	0.08587	0.01787	15	0.36	1%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0027	1.6790	0.00400	1.6195	0.08587	0.01787	15	0.69	2%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0057	1.6820	0.04600	1.6195	0.08587	0.01787	15	0.73	2%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0354	1.7905	0.00900	1.6195	0.08587	0.01787	15	1.99	5%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0422	1.8550	0.03000	1.6195	0.08587	0.01787	15	2.74	7%	0
121.30	Acid Soluble Magnesium, ICP (PCT)	0232	1.5491	0.12150	1.6195	0.08587	0.01787	15	-0.82	2%	1
131.30	Water Soluble Magnesium, ICP (PCT)	0027	0.06000	0.02000			0.02000	1			
144.01	Sulfur, Gravimetric (PCT)	0444	4.9100	0.02000	5.1177	0.03483	0.03306	16	-5.96	2%	0
144.01	Sulfur, Gravimetric (PCT)	0114	5.0400	0.06000	5.1177	0.03483	0.03306	16	-2.23	1%	0
144.01	Sulfur, Gravimetric (PCT)	0371	5.0600	0.02000	5.1177	0.03483	0.03306	16	-1.66	1%	0
144.01	Sulfur, Gravimetric (PCT)	0095	5.0650	0.01000	5.1177	0.03483	0.03306	16	-1.51	1%	0
144.01	Sulfur, Gravimetric (PCT)	0397	5.0700	0.04000	5.1177	0.03483	0.03306	16	-1.37	0%	0
144.01	Sulfur, Gravimetric (PCT)	0040	5.1000	0.00000	5.1177	0.03483	0.03306	16	-0.51	0%	0
144.01	Sulfur, Gravimetric (PCT)	0105	5.1100	0.02000	5.1177	0.03483	0.03306	16	-0.22	0%	0
144.01	Sulfur, Gravimetric (PCT)	0057	5.1300	0.06000	5.1177	0.03483	0.03306	16	0.35	0%	0

Method Code	Analyte Name, Method	Lab Code	Lab Data		Method Data				Magruder Z Score	Threshold %RSD	Flag
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144.01	Sulfur, Gravimetric (PCT)	0470	5.1300	0.02000	5.1177	0.03483	0.03306	16	0.35	0%	0
144.01	Sulfur, Gravimetric (PCT)	0296	5.1300	0.04000	5.1177	0.03483	0.03306	16	0.35	0%	0
144.01	Sulfur, Gravimetric (PCT)	0029	5.1350	0.01000	5.1177	0.03483	0.03306	16	0.50	0%	0
144.01	Sulfur, Gravimetric (PCT)	0055	5.1350	0.07000	5.1177	0.03483	0.03306	16	0.50	0%	0
144.01	Sulfur, Gravimetric (PCT)	0102	5.1385	0.00900	5.1177	0.03483	0.03306	16	0.60	0%	0
144.01	Sulfur, Gravimetric (PCT)	0073	5.1500	0.10000	5.1177	0.03483	0.03306	16	0.93	0%	0
144.01	Sulfur, Gravimetric (PCT)	0043	5.1550	0.01000	5.1177	0.03483	0.03306	16	1.07	0%	0
144.01	Sulfur, Gravimetric (PCT)	0324	5.1800	0.04000	5.1177	0.03483	0.03306	16	1.79	1%	0
144.70	Sulfur, Spectrometric (PCT)	0474	5.7450	0.23000			0.23000	1			
144.99	Sulfur, Other (Identify) (PCT)	0393	4.6350	0.13000	5.1163	0.24602	0.07779	26	-1.96	5%	0
144.99	Sulfur, Other (Identify) (PCT)	0292	4.8200	0.04000	5.1163	0.24602	0.07779	26	-1.20	3%	0
144.99	Sulfur, Other (Identify) (PCT)	0419	4.8250	0.15000	5.1163	0.24602	0.07779	26	-1.18	3%	0
144.99	Sulfur, Other (Identify) (PCT)	0450	4.8650	0.07000	5.1163	0.24602	0.07779	26	-1.02	2%	0
144.99	Sulfur, Other (Identify) (PCT)	0390	4.9100	0.16000	5.1163	0.24602	0.07779	26	-0.84	2%	0
144.99	Sulfur, Other (Identify) (PCT)	0307	4.9150	0.17000	5.1163	0.24602	0.07779	26	-0.82	2%	0
144.99	Sulfur, Other (Identify) (PCT)	0231	4.9350	0.05000	5.1163	0.24602	0.07779	26	-0.74	2%	0
144.99	Sulfur, Other (Identify) (PCT)	0255	4.9935	0.02300	5.1163	0.24602	0.07779	26	-0.50	1%	0
144.99	Sulfur, Other (Identify) (PCT)	0368	5.0049	0.35650	5.1163	0.24602	0.07779	26	-0.45	1%	0
144.99	Sulfur, Other (Identify) (PCT)	0037	5.0300	0.08000	5.1163	0.24602	0.07779	26	-0.35	1%	0
144.99	Sulfur, Other (Identify) (PCT)	0247	5.0350	0.03000	5.1163	0.24602	0.07779	26	-0.33	1%	0
144.99	Sulfur, Other (Identify) (PCT)	0291	5.0450	0.03000	5.1163	0.24602	0.07779	26	-0.29	1%	0
144.99	Sulfur, Other (Identify) (PCT)	0023	5.0495	0.04300	5.1163	0.24602	0.07779	26	-0.27	1%	0
144.99	Sulfur, Other (Identify) (PCT)	0027	5.0650	0.01000	5.1163	0.24602	0.07779	26	-0.21	1%	0
144.99	Sulfur, Other (Identify) (PCT)	0177	5.0736	0.08310	5.1163	0.24602	0.07779	26	-0.17	0%	0
144.99	Sulfur, Other (Identify) (PCT)	0475	5.1850	0.03000	5.1163	0.24602	0.07779	26	0.28	1%	0
144.99	Sulfur, Other (Identify) (PCT)	0363	5.2055	0.01900	5.1163	0.24602	0.07779	26	0.36	1%	0
144.99	Sulfur, Other (Identify) (PCT)	0275	5.2300	0.06000	5.1163	0.24602	0.07779	26	0.46	1%	0
144.99	Sulfur, Other (Identify) (PCT)	0389	5.2500	0.10000	5.1163	0.24602	0.07779	26	0.54	1%	0
144.99	Sulfur, Other (Identify) (PCT)	0422	5.3550	0.11000	5.1163	0.24602	0.07779	26	0.97	2%	0
144.99	Sulfur, Other (Identify) (PCT)	0360	5.4150	0.03000	5.1163	0.24602	0.07779	26	1.21	3%	0
144.99	Sulfur, Other (Identify) (PCT)	0117	5.4200	0.04000	5.1163	0.24602	0.07779	26	1.23	3%	0
144.99	Sulfur, Other (Identify) (PCT)	0157	5.4750	0.05000	5.1163	0.24602	0.07779	26	1.46	4%	0
144.99	Sulfur, Other (Identify) (PCT)	0009	5.5940	0.08000	5.1163	0.24602	0.07779	26	1.94	5%	0
144.99	Sulfur, Other (Identify) (PCT)	0354	5.6550	0.01800	5.1163	0.24602	0.07779	26	2.19	5%	0
144.99	Sulfur, Other (Identify) (PCT)	0035	6.6400	0.06000	5.1163	0.24602	0.07779	26	6.19	15%	0
144.99	Sulfur, Other (Identify) (PCT)	0232	5.0266	0.39620	5.1163	0.24602	0.07779	26	-0.36	1%	1
144.99	Sulfur, Other (Identify) (PCT)	0473	16.005	0.07000	5.1163	0.24602	0.07779	26	44.26	106%	2
151.30	Total Arsenic , ICP (PPM)	0450	0.50000	1.0000	1.2220	0.55903	0.63200	5	-1.29	30%	0
151.30	Total Arsenic , ICP (PPM)	0474	1.0000	0.00000	1.2220	0.55903	0.63200	5	-0.40	9%	0
151.30	Total Arsenic , ICP (PPM)	0368	1.2500	0.90000	1.2220	0.55903	0.63200	5	0.05	1%	0
151.30	Total Arsenic , ICP (PPM)	0390	1.3200	0.14000	1.2220	0.55903	0.63200	5	0.18	4%	0
151.30	Total Arsenic , ICP (PPM)	0232	2.0400	1.1200	1.2220	0.55903	0.63200	5	1.46	33%	0

Method Code	Analyte Name, Method	Lab Code	Lab Data		Method Data				Magruder Z Score	Threshold %RSD	Flag
			Value	range	Rob Mean	Rob SD	R-bar	# Labs			
151.99	Total Arsenic , Other (Identify) (PPM)	0231	0.98000	0.02000			0.02000	1			
165.99	Acid Soluble Boron, Other (Identify) (PCT)	0232	0.00120	0.00001	0.00523	0.00445	0.00167	3	-0.91	39%	0
165.99	Acid Soluble Boron, Other (Identify) (PCT)	0363	0.00450	0.00100	0.00523	0.00445	0.00167	3	-0.16	7%	0
165.99	Acid Soluble Boron, Other (Identify) (PCT)	0354	0.01000	0.00400	0.00523	0.00445	0.00167	3	1.07	46%	0
181.30	Total Cadmium , ICP (PPM)	0450	0.00000	0.00000	0.40634	0.31590	0.01471	7	-1.29	50%	0
181.30	Total Cadmium , ICP (PPM)	0102	0.20900	0.01000	0.40634	0.31590	0.01471	7	-0.62	24%	0
181.30	Total Cadmium , ICP (PPM)	0390	0.26450	0.01300	0.40634	0.31590	0.01471	7	-0.45	17%	0
181.30	Total Cadmium , ICP (PPM)	0368	0.40000	0.00000	0.40634	0.31590	0.01471	7	-0.02	1%	0
181.30	Total Cadmium , ICP (PPM)	0474	0.50000	0.00000	0.40634	0.31590	0.01471	7	0.30	12%	0
181.30	Total Cadmium , ICP (PPM)	0009	0.64600	0.07000	0.40634	0.31590	0.01471	7	0.76	29%	0
181.30	Total Cadmium , ICP (PPM)	0419	1.0350	0.01000	0.40634	0.31590	0.01471	7	1.99	77%	0
181.30	Total Cadmium , ICP (PPM)	0232	0.51000	0.18000	0.40634	0.31590	0.01471	7	0.33	13%	1
181.99	Total Cadmium , Other (Identify) (PPM)	0231	0.20500	0.03000			0.03000	1			
190.00	Water Soluble Chlorine, Titrimetric (PCT)	0055	3.8500	0.20000	4.0881	0.11209	0.05175	8	-2.12	3%	0
190.00	Water Soluble Chlorine, Titrimetric (PCT)	0102	4.0200	0.00400	4.0881	0.11209	0.05175	8	-0.61	1%	0
190.00	Water Soluble Chlorine, Titrimetric (PCT)	0296	4.0200	0.00000	4.0881	0.11209	0.05175	8	-0.61	1%	0
190.00	Water Soluble Chlorine, Titrimetric (PCT)	0057	4.0800	0.14000	4.0881	0.11209	0.05175	8	-0.07	0%	0
190.00	Water Soluble Chlorine, Titrimetric (PCT)	0029	4.1000	0.00000	4.0881	0.11209	0.05175	8	0.11	0%	0
190.00	Water Soluble Chlorine, Titrimetric (PCT)	0043	4.1200	0.02000	4.0881	0.11209	0.05175	8	0.28	0%	0
190.00	Water Soluble Chlorine, Titrimetric (PCT)	0028	4.1850	0.01000	4.0881	0.11209	0.05175	8	0.86	1%	0
190.00	Water Soluble Chlorine, Titrimetric (PCT)	0422	8.1000	0.04000	4.0881	0.11209	0.05175	8	35.79	49%	0
190.00	Water Soluble Chlorine, Titrimetric (PCT)	0444	3.7350	0.39000	4.0881	0.11209	0.05175	8	-3.15	4%	1
190.99	Water Soluble Chlorine, Other (Identify) (PCT)	0460	2.8500	0.10000	3.7661	0.43194	0.07310	7	-2.12	12%	0
190.99	Water Soluble Chlorine, Other (Identify) (PCT)	0368	3.0200	0.18000	3.7661	0.43194	0.07310	7	-1.73	10%	0
190.99	Water Soluble Chlorine, Other (Identify) (PCT)	0455	3.1500	0.10000	3.7661	0.43194	0.07310	7	-1.43	8%	0
190.99	Water Soluble Chlorine, Other (Identify) (PCT)	0471	3.9700	0.10000	3.7661	0.43194	0.07310	7	0.47	3%	0
190.99	Water Soluble Chlorine, Other (Identify) (PCT)	0300	4.0000	0.00000	3.7661	0.43194	0.07310	7	0.54	3%	0
190.99	Water Soluble Chlorine, Other (Identify) (PCT)	0009	4.0445	0.01170	3.7661	0.43194	0.07310	7	0.64	4%	0
190.99	Water Soluble Chlorine, Other (Identify) (PCT)	0275	4.2400	0.02000	3.7661	0.43194	0.07310	7	1.10	6%	0
191.30	Total Chromium , ICP (PPM)	0474	9.5000	1.0000	134.69	26.597	10.392	9	-4.71	46%	0
191.30	Total Chromium , ICP (PPM)	0419	112.00	2.0000	134.69	26.597	10.392	9	-0.85	8%	0
191.30	Total Chromium , ICP (PPM)	0232	120.00	40.400	134.69	26.597	10.392	9	-0.55	5%	0
191.30	Total Chromium , ICP (PPM)	0037	128.22	12.180	134.69	26.597	10.392	9	-0.24	2%	0
191.30	Total Chromium , ICP (PPM)	0102	132.88	1.6510	134.69	26.597	10.392	9	-0.07	1%	0
191.30	Total Chromium , ICP (PPM)	0035	146.00	4.0000	134.69	26.597	10.392	9	0.43	4%	0
191.30	Total Chromium , ICP (PPM)	0368	149.50	5.0000	134.69	26.597	10.392	9	0.56	5%	0
191.30	Total Chromium , ICP (PPM)	0009	157.85	3.3000	134.69	26.597	10.392	9	0.87	9%	0
191.30	Total Chromium , ICP (PPM)	0450	192.00	24.000	134.69	26.597	10.392	9	2.15	21%	0
191.30	Total Chromium , ICP (PPM)	0027	169.00	102.00	134.69	26.597	10.392	9	1.29	13%	1
191.99	Total Chromium , Other (Identify) (PPM)	0231	14.875	0.47000			0.47000	1			
202.00	Acid Soluble Cobalt , Atomic Absorption (PPM)	0474	4.0000	0.00000			0.00000	1			
202.30	Acid Soluble Cobalt , ICP (PPM)	0422	0.03000	0.00000	21.619	8.3892	1.3309	12	-2.57	50%	0

Method Code	Analyte Name, Method	Lab Code	Lab Data		Method Data				Magruder Z Score	Threshold %RSD	Flag
			Value	range	Rob Mean	Rob SD	R-bar	# Labs			
202.30	Acid Soluble Cobalt , ICP (PPM)	0027	10.700	0.00000	21.619	8.3892	1.3309	12	-1.30	25%	0
202.30	Acid Soluble Cobalt , ICP (PPM)	0102	14.991	2.6610	21.619	8.3892	1.3309	12	-0.79	15%	0
202.30	Acid Soluble Cobalt , ICP (PPM)	0419	16.000	1.4000	21.619	8.3892	1.3309	12	-0.67	13%	0
202.30	Acid Soluble Cobalt , ICP (PPM)	0232	17.300	3.4000	21.619	8.3892	1.3309	12	-0.51	10%	0
202.30	Acid Soluble Cobalt , ICP (PPM)	0390	21.550	1.7000	21.619	8.3892	1.3309	12	-0.01	0%	0
202.30	Acid Soluble Cobalt , ICP (PPM)	0368	26.400	0.20000	21.619	8.3892	1.3309	12	0.57	11%	0
202.30	Acid Soluble Cobalt , ICP (PPM)	0037	26.420	1.3400	21.619	8.3892	1.3309	12	0.57	11%	0
202.30	Acid Soluble Cobalt , ICP (PPM)	0035	26.950	0.10000	21.619	8.3892	1.3309	12	0.64	12%	0
202.30	Acid Soluble Cobalt , ICP (PPM)	0057	28.550	1.7000	21.619	8.3892	1.3309	12	0.83	16%	0
202.30	Acid Soluble Cobalt , ICP (PPM)	0009	29.475	0.87000	21.619	8.3892	1.3309	12	0.94	18%	0
202.30	Acid Soluble Cobalt , ICP (PPM)	0450	30.600	2.6000	21.619	8.3892	1.3309	12	1.07	21%	0
202.99	Acid Soluble Cobalt , Other (Identify) (PPM)	0231	5.4050	0.31000			0.31000	1			
221.00	Acid Soluble Copper, Atomic Absorption (PCT)	0474	0.00840	0.00020	0.00880	0.00035	0.00020	3	-1.14	2%	0
221.00	Acid Soluble Copper, Atomic Absorption (PCT)	0095	0.00895	0.00010	0.00880	0.00035	0.00020	3	0.43	1%	0
221.00	Acid Soluble Copper, Atomic Absorption (PCT)	0043	0.00905	0.00030	0.00880	0.00035	0.00020	3	0.71	1%	0
221.30	Acid Soluble Copper, ICP (PCT)	0419	0.00014	0.00002	0.00908	0.00076	0.00033	18	-11.77	49%	0
221.30	Acid Soluble Copper, ICP (PCT)	0035	0.00830	0.00020	0.00908	0.00076	0.00033	18	-1.02	4%	0
221.30	Acid Soluble Copper, ICP (PCT)	0363	0.00830	0.00000	0.00908	0.00076	0.00033	18	-1.02	4%	0
221.30	Acid Soluble Copper, ICP (PCT)	0009	0.00836	0.00115	0.00908	0.00076	0.00033	18	-0.94	4%	0
221.30	Acid Soluble Copper, ICP (PCT)	0389	0.00850	0.00000	0.00908	0.00076	0.00033	18	-0.76	3%	0
221.30	Acid Soluble Copper, ICP (PCT)	0422	0.00861	0.00005	0.00908	0.00076	0.00033	18	-0.62	3%	0
221.30	Acid Soluble Copper, ICP (PCT)	0433	0.00876	0.00014	0.00908	0.00076	0.00033	18	-0.42	2%	0
221.30	Acid Soluble Copper, ICP (PCT)	0027	0.00900	0.00000	0.00908	0.00076	0.00033	18	-0.10	0%	0
221.30	Acid Soluble Copper, ICP (PCT)	0102	0.00900	0.00000	0.00908	0.00076	0.00033	18	-0.10	0%	0
221.30	Acid Soluble Copper, ICP (PCT)	0368	0.00902	0.00000	0.00908	0.00076	0.00033	18	-0.08	0%	0
221.30	Acid Soluble Copper, ICP (PCT)	0057	0.00922	0.00075	0.00908	0.00076	0.00033	18	0.18	1%	0
221.30	Acid Soluble Copper, ICP (PCT)	0232	0.00940	0.00000	0.00908	0.00076	0.00033	18	0.42	2%	0
221.30	Acid Soluble Copper, ICP (PCT)	0095	0.00943	0.00001	0.00908	0.00076	0.00033	18	0.46	2%	0
221.30	Acid Soluble Copper, ICP (PCT)	0255	0.00944	0.00071	0.00908	0.00076	0.00033	18	0.48	2%	0
221.30	Acid Soluble Copper, ICP (PCT)	0247	0.01000	0.00000	0.00908	0.00076	0.00033	18	1.21	5%	0
221.30	Acid Soluble Copper, ICP (PCT)	0402	0.01000	0.00000	0.00908	0.00076	0.00033	18	1.21	5%	0
221.30	Acid Soluble Copper, ICP (PCT)	0450	0.01150	0.00100	0.00908	0.00076	0.00033	18	3.19	13%	0
221.30	Acid Soluble Copper, ICP (PCT)	0324	0.01640	0.00200	0.00908	0.00076	0.00033	18	9.64	40%	0
221.30	Acid Soluble Copper, ICP (PCT)	0354	0.01400	0.00400	0.00908	0.00076	0.00033	18	6.48	27%	1
221.99	Acid Soluble Copper, Other (Identify) (PCT)	0231	0.00820	0.00000	0.03135	0.03274	0.02950	2	-0.71	37%	0
221.99	Acid Soluble Copper, Other (Identify) (PCT)	0471	0.05450	0.05900	0.03135	0.03274	0.02950	2	0.71	37%	0
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	0474	0.20500	0.01000	1.1673	0.17817	0.04423	13	-5.40	41%	0
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	0258	0.92500	0.01000	1.1673	0.17817	0.04423	13	-1.36	10%	0
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	0030	1.0200	0.08000	1.1673	0.17817	0.04423	13	-0.83	6%	0
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	0363	1.0750	0.03000	1.1673	0.17817	0.04423	13	-0.52	4%	0
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	0397	1.1150	0.05000	1.1673	0.17817	0.04423	13	-0.29	2%	0
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	0371	1.1200	0.02000	1.1673	0.17817	0.04423	13	-0.27	2%	0

Method Code	Analyte Name, Method	Lab Code	Lab Data		Method Data				Magruder Z Score	Threshold %RSD	Flag
			Value	range	Rob Mean	Rob SD	R-bar	# Labs			
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	0460	1.1500	0.10000	1.1673	0.17817	0.04423	13	-0.10	1%	0
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	0043	1.2500	0.04000	1.1673	0.17817	0.04423	13	0.46	4%	0
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	0029	1.2985	0.06900	1.1673	0.17817	0.04423	13	0.74	6%	0
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	0296	1.3200	0.04000	1.1673	0.17817	0.04423	13	0.86	7%	0
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	0095	1.3285	0.00700	1.1673	0.17817	0.04423	13	0.90	7%	0
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	0028	1.3300	0.08000	1.1673	0.17817	0.04423	13	0.91	7%	0
241.00	Acid Soluble Iron, Atomic Absorption (PCT)	0177	1.3427	0.03900	1.1673	0.17817	0.04423	13	0.98	8%	0
241.30	Acid Soluble Iron, ICP (PCT)	0247	0.38000	0.00000	1.2032	0.19851	0.05095	35	-4.15	34%	0
241.30	Acid Soluble Iron, ICP (PCT)	0426	0.52010	0.11720	1.2032	0.19851	0.05095	35	-3.44	28%	0
241.30	Acid Soluble Iron, ICP (PCT)	0292	0.56500	0.01000	1.2032	0.19851	0.05095	35	-3.21	27%	0
241.30	Acid Soluble Iron, ICP (PCT)	0475	0.63000	0.08000	1.2032	0.19851	0.05095	35	-2.89	24%	0
241.30	Acid Soluble Iron, ICP (PCT)	0402	0.75900	0.08000	1.2032	0.19851	0.05095	35	-2.24	18%	0
241.30	Acid Soluble Iron, ICP (PCT)	0114	0.82000	0.04000	1.2032	0.19851	0.05095	35	-1.93	16%	0
241.30	Acid Soluble Iron, ICP (PCT)	0231	1.0150	0.01000	1.2032	0.19851	0.05095	35	-0.95	8%	0
241.30	Acid Soluble Iron, ICP (PCT)	0102	1.0160	0.10800	1.2032	0.19851	0.05095	35	-0.94	8%	0
241.30	Acid Soluble Iron, ICP (PCT)	0444	1.0280	0.01000	1.2032	0.19851	0.05095	35	-0.88	7%	0
241.30	Acid Soluble Iron, ICP (PCT)	0433	1.0400	0.04000	1.2032	0.19851	0.05095	35	-0.82	7%	0
241.30	Acid Soluble Iron, ICP (PCT)	0420	1.0500	0.08000	1.2032	0.19851	0.05095	35	-0.77	6%	0
241.30	Acid Soluble Iron, ICP (PCT)	0291	1.0600	0.02000	1.2032	0.19851	0.05095	35	-0.72	6%	0
241.30	Acid Soluble Iron, ICP (PCT)	0232	1.0655	0.15910	1.2032	0.19851	0.05095	35	-0.69	6%	0
241.30	Acid Soluble Iron, ICP (PCT)	0419	1.1200	0.08000	1.2032	0.19851	0.05095	35	-0.42	3%	0
241.30	Acid Soluble Iron, ICP (PCT)	0307	1.1650	0.01000	1.2032	0.19851	0.05095	35	-0.19	2%	0
241.30	Acid Soluble Iron, ICP (PCT)	0157	1.2400	0.02000	1.2032	0.19851	0.05095	35	0.19	2%	0
241.30	Acid Soluble Iron, ICP (PCT)	0368	1.2438	0.09510	1.2032	0.19851	0.05095	35	0.20	2%	0
241.30	Acid Soluble Iron, ICP (PCT)	0422	1.2450	0.05000	1.2032	0.19851	0.05095	35	0.21	2%	0
241.30	Acid Soluble Iron, ICP (PCT)	0255	1.2590	0.04400	1.2032	0.19851	0.05095	35	0.28	2%	0
241.30	Acid Soluble Iron, ICP (PCT)	0095	1.2595	0.00300	1.2032	0.19851	0.05095	35	0.28	2%	0
241.30	Acid Soluble Iron, ICP (PCT)	0390	1.2800	0.12000	1.2032	0.19851	0.05095	35	0.39	3%	0
241.30	Acid Soluble Iron, ICP (PCT)	0035	1.2950	0.03000	1.2032	0.19851	0.05095	35	0.46	4%	0
241.30	Acid Soluble Iron, ICP (PCT)	0389	1.3000	0.00000	1.2032	0.19851	0.05095	35	0.49	4%	0
241.30	Acid Soluble Iron, ICP (PCT)	0131	1.3050	0.05000	1.2032	0.19851	0.05095	35	0.51	4%	0
241.30	Acid Soluble Iron, ICP (PCT)	0055	1.3200	0.14000	1.2032	0.19851	0.05095	35	0.59	5%	0
241.30	Acid Soluble Iron, ICP (PCT)	0324	1.3200	0.02000	1.2032	0.19851	0.05095	35	0.59	5%	0
241.30	Acid Soluble Iron, ICP (PCT)	0027	1.3255	0.00900	1.2032	0.19851	0.05095	35	0.62	5%	0
241.30	Acid Soluble Iron, ICP (PCT)	0360	1.3350	0.09000	1.2032	0.19851	0.05095	35	0.66	5%	0
241.30	Acid Soluble Iron, ICP (PCT)	0106	1.3400	0.00000	1.2032	0.19851	0.05095	35	0.69	6%	0
241.30	Acid Soluble Iron, ICP (PCT)	0057	1.3500	0.08000	1.2032	0.19851	0.05095	35	0.74	6%	0
241.30	Acid Soluble Iron, ICP (PCT)	0450	1.3550	0.01000	1.2032	0.19851	0.05095	35	0.76	6%	0
241.30	Acid Soluble Iron, ICP (PCT)	0354	1.4750	0.05800	1.2032	0.19851	0.05095	35	1.37	11%	0
241.30	Acid Soluble Iron, ICP (PCT)	0117	1.5150	0.01000	1.2032	0.19851	0.05095	35	1.57	13%	0
241.30	Acid Soluble Iron, ICP (PCT)	0473	1.5800	0.04000	1.2032	0.19851	0.05095	35	1.90	16%	0
241.30	Acid Soluble Iron, ICP (PCT)	0432	1.5850	0.07000	1.2032	0.19851	0.05095	35	1.92	16%	0

Method Code	Analyte Name, Method	Lab Code	Lab Data		Method Data				Magruder Z Score	Threshold %RSD	Flag
			Value	range	Rob Mean	Rob SD	R-bar	# Labs			
241.99	Acid Soluble Iron, Other (Identify) (PCT)	0042	1.0850	0.05000	1.1525	0.09546	0.04500	2	-0.71	3%	0
241.99	Acid Soluble Iron, Other (Identify) (PCT)	0476	1.2200	0.04000	1.1525	0.09546	0.04500	2	0.71	3%	0
251.30	Total Lead , ICP (PPM)	0474	3.0000	0.00000	5.1682	1.7004	1.0749	7	-1.28	21%	0
251.30	Total Lead , ICP (PPM)	0102	3.3145	0.31100	5.1682	1.7004	1.0749	7	-1.09	18%	0
251.30	Total Lead , ICP (PPM)	0232	4.9700	3.5400	5.1682	1.7004	1.0749	7	-0.12	2%	0
251.30	Total Lead , ICP (PPM)	0450	5.5000	1.0000	5.1682	1.7004	1.0749	7	0.20	3%	0
251.30	Total Lead , ICP (PPM)	0368	5.6500	1.1000	5.1682	1.7004	1.0749	7	0.28	5%	0
251.30	Total Lead , ICP (PPM)	0009	6.5675	0.69300	5.1682	1.7004	1.0749	7	0.82	14%	0
251.30	Total Lead , ICP (PPM)	0419	7.0500	0.88000	5.1682	1.7004	1.0749	7	1.11	18%	0
251.99	Total Lead , Other (Identify) (PPM)	0231	2.7950	0.15000			0.15000	1			
261.30	Acid Soluble Manganese, ICP (PCT)	0419	0.00016	0.00002	0.01622	0.00121	0.00061	12	-13.27	49%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0102	0.01500	0.00000	0.01622	0.00121	0.00061	12	-1.01	4%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0389	0.01550	0.00100	0.01622	0.00121	0.00061	12	-0.59	2%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0035	0.01555	0.00010	0.01622	0.00121	0.00061	12	-0.55	2%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0131	0.01565	0.00130	0.01622	0.00121	0.00061	12	-0.47	2%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0027	0.01600	0.00000	0.01622	0.00121	0.00061	12	-0.18	1%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0232	0.01615	0.00010	0.01622	0.00121	0.00061	12	-0.06	0%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0057	0.01685	0.00070	0.01622	0.00121	0.00061	12	0.52	2%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0247	0.01700	0.00200	0.01622	0.00121	0.00061	12	0.65	2%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0390	0.01705	0.00010	0.01622	0.00121	0.00061	12	0.69	3%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0354	0.01750	0.00100	0.01622	0.00121	0.00061	12	1.06	4%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0009	0.01835	0.00099	0.01622	0.00121	0.00061	12	1.76	7%	0
261.30	Acid Soluble Manganese, ICP (PCT)	0422	0.01500	0.01000	0.01622	0.00121	0.00061	12	-1.01	4%	1
261.99	Acid Soluble Manganese, Other (Identify) (PCT)	0474	0.01140	0.00020	0.01245	0.00148	0.00060	2	-0.71	4%	0
261.99	Acid Soluble Manganese, Other (Identify) (PCT)	0363	0.01350	0.00100	0.01245	0.00148	0.00060	2	0.71	4%	0
281.30	Total Mercury , ICP (PPM)	0450	0.00000	0.00000			0.00000	1			
289.30	Total Molybdenum , ICP (PPM)	0474	9.5000	1.0000	13.718	2.1172	0.62714	14	-1.99	15%	0
289.30	Total Molybdenum , ICP (PPM)	0255	10.078	0.74700	13.718	2.1172	0.62714	14	-1.72	13%	0
289.30	Total Molybdenum , ICP (PPM)	0037	11.220	1.4600	13.718	2.1172	0.62714	14	-1.18	9%	0
289.30	Total Molybdenum , ICP (PPM)	0419	11.550	0.10000	13.718	2.1172	0.62714	14	-1.02	8%	0
289.30	Total Molybdenum , ICP (PPM)	0027	11.775	0.15000	13.718	2.1172	0.62714	14	-0.92	7%	0
289.30	Total Molybdenum , ICP (PPM)	0433	13.815	0.15000	13.718	2.1172	0.62714	14	0.05	0%	0
289.30	Total Molybdenum , ICP (PPM)	0102	13.870	0.43300	13.718	2.1172	0.62714	14	0.07	1%	0
289.30	Total Molybdenum , ICP (PPM)	0390	14.500	0.20000	13.718	2.1172	0.62714	14	0.37	3%	0
289.30	Total Molybdenum , ICP (PPM)	0247	14.750	0.50000	13.718	2.1172	0.62714	14	0.49	4%	0
289.30	Total Molybdenum , ICP (PPM)	0035	15.050	0.10000	13.718	2.1172	0.62714	14	0.63	5%	0
289.30	Total Molybdenum , ICP (PPM)	0368	15.300	1.2000	13.718	2.1172	0.62714	14	0.75	6%	0
289.30	Total Molybdenum , ICP (PPM)	0057	15.450	1.1000	13.718	2.1172	0.62714	14	0.82	6%	0
289.30	Total Molybdenum , ICP (PPM)	0009	15.480	0.64000	13.718	2.1172	0.62714	14	0.83	6%	0
289.30	Total Molybdenum , ICP (PPM)	0450	16.500	1.0000	13.718	2.1172	0.62714	14	1.31	10%	0
289.30	Total Molybdenum , ICP (PPM)	0232	14.790	4.1800	13.718	2.1172	0.62714	14	0.51	4%	1
289.99	Total Molybdenum , Other (Identify) (PPM)	0231	2.4700	0.10000	14.907	11.446	3.6667	3	-1.09	42%	0

Method Code	Analyte Name, Method	Lab Code	Lab Data		Method Data				Magruder Z Score	Threshold %RSD	Flag
			Value	range	Rob Mean	Rob SD	R-bar	# Labs			
289.99	Total Molybdenum , Other (Identify) (PPM)	0028	17.250	0.90000	14.907	11.446	3.6667	3	0.20	8%	0
289.99	Total Molybdenum , Other (Identify) (PPM)	0422	25.000	10.000	14.907	11.446	3.6667	3	0.88	34%	0
291.30	Total Nickel , ICP (PPM)	0474	2.5000	1.0000	74.167	14.120	2.1192	9	-5.08	48%	0
291.30	Total Nickel , ICP (PPM)	0027	60.000	0.00000	74.167	14.120	2.1192	9	-1.00	10%	0
291.30	Total Nickel , ICP (PPM)	0419	66.250	2.7000	74.167	14.120	2.1192	9	-0.56	5%	0
291.30	Total Nickel , ICP (PPM)	0102	74.234	1.1630	74.167	14.120	2.1192	9	0.00	0%	0
291.30	Total Nickel , ICP (PPM)	0247	75.000	0.00000	74.167	14.120	2.1192	9	0.06	1%	0
291.30	Total Nickel , ICP (PPM)	0035	75.200	1.4000	74.167	14.120	2.1192	9	0.07	1%	0
291.30	Total Nickel , ICP (PPM)	0368	78.650	3.1000	74.167	14.120	2.1192	9	0.32	3%	0
291.30	Total Nickel , ICP (PPM)	0009	88.165	3.7100	74.167	14.120	2.1192	9	0.99	9%	0
291.30	Total Nickel , ICP (PPM)	0450	95.000	6.0000	74.167	14.120	2.1192	9	1.48	14%	0
291.30	Total Nickel , ICP (PPM)	0232	69.900	22.400	74.167	14.120	2.1192	9	-0.30	3%	1
291.99	Total Nickel , Other (Identify) (PPM)	0231	10.975	0.33000	35.518	34.708	2.5750	2	-0.71	35%	0
291.99	Total Nickel , Other (Identify) (PPM)	0037	60.060	4.8200	35.518	34.708	2.5750	2	0.71	35%	0
301.30	Total Selenium , ICP (PPM)	0450	0.00000	0.00000	0.92500	1.3081	0.25000	2	-0.71	50%	0
301.30	Total Selenium , ICP (PPM)	0368	1.8500	0.50000	0.92500	1.3081	0.25000	2	0.71	50%	0
301.99	Total Selenium , Other (Identify) (PPM)	0296	0.44400	0.04600			0.04600	1			
311.30	Sodium, Flame Photometric (PCT)	0105	0.05250	0.00300			0.00300	1			
311.99	Sodium, Other (Identify) (PCT)	0035	0.04700	0.00000	0.05104	0.00156	0.00341	7	-2.58	4%	0
311.99	Sodium, Other (Identify) (PCT)	0102	0.05000	0.00200	0.05104	0.00156	0.00341	7	-0.66	1%	0
311.99	Sodium, Other (Identify) (PCT)	0232	0.05055	0.00150	0.05104	0.00156	0.00341	7	-0.31	0%	0
311.99	Sodium, Other (Identify) (PCT)	0009	0.05085	0.00230	0.05104	0.00156	0.00341	7	-0.12	0%	0
311.99	Sodium, Other (Identify) (PCT)	0474	0.05150	0.00040	0.05104	0.00156	0.00341	7	0.30	0%	0
311.99	Sodium, Other (Identify) (PCT)	0057	0.05265	0.01170	0.05104	0.00156	0.00341	7	1.03	2%	0
311.99	Sodium, Other (Identify) (PCT)	0363	0.08300	0.00600	0.05104	0.00156	0.00341	7	20.46	31%	0
311.99	Sodium, Other (Identify) (PCT)	0422	0.16500	0.03000	0.05104	0.00156	0.00341	7	72.96	112%	1
321.00	Acid Soluble Zinc, Atomic Absorption (PCT)	0095	0.03520	0.00020	0.04311	0.00569	0.00230	5	-1.39	9%	0
321.00	Acid Soluble Zinc, Atomic Absorption (PCT)	0257	0.04150	0.00700	0.04311	0.00569	0.00230	5	-0.28	2%	0
321.00	Acid Soluble Zinc, Atomic Absorption (PCT)	0043	0.04335	0.00090	0.04311	0.00569	0.00230	5	0.04	0%	0
321.00	Acid Soluble Zinc, Atomic Absorption (PCT)	0296	0.04450	0.00300	0.04311	0.00569	0.00230	5	0.24	2%	0
321.00	Acid Soluble Zinc, Atomic Absorption (PCT)	0371	0.05100	0.00040	0.04311	0.00569	0.00230	5	1.39	9%	0
321.00	Acid Soluble Zinc, Atomic Absorption (PCT)	0258	0.57500	0.05000	0.04311	0.00569	0.00230	5	93.52	617%	1
321.30	Acid Soluble Zinc, ICP (PCT)	0368	0.00071	0.00004	0.04126	0.00454	0.00285	20	-8.92	49%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0389	0.03150	0.00100	0.04126	0.00454	0.00285	20	-2.15	12%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0363	0.03200	0.00000	0.04126	0.00454	0.00285	20	-2.04	11%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0422	0.03500	0.01000	0.04126	0.00454	0.00285	20	-1.38	8%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0102	0.03900	0.00600	0.04126	0.00454	0.00285	20	-0.50	3%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0027	0.03950	0.00100	0.04126	0.00454	0.00285	20	-0.39	2%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0247	0.04000	0.00000	0.04126	0.00454	0.00285	20	-0.28	2%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0255	0.04048	0.00070	0.04126	0.00454	0.00285	20	-0.17	1%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0433	0.04065	0.00110	0.04126	0.00454	0.00285	20	-0.13	1%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0131	0.04085	0.00070	0.04126	0.00454	0.00285	20	-0.09	0%	0

Method Code	Analyte Name, Method	Lab Code	Lab Data		Method Data				Magruder Z Score	Threshold %RSD	Flag
			Value	range	Rob Mean	Rob SD	R-bar	# Labs			
321.30	Acid Soluble Zinc, ICP (PCT)	0095	0.04180	0.00160	0.04126	0.00454	0.00285	20	0.12	1%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0037	0.04215	0.00150	0.04126	0.00454	0.00285	20	0.20	1%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0057	0.04325	0.00390	0.04126	0.00454	0.00285	20	0.44	2%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0390	0.04380	0.00300	0.04126	0.00454	0.00285	20	0.56	3%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0009	0.04461	0.00059	0.04126	0.00454	0.00285	20	0.74	4%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0402	0.04500	0.00000	0.04126	0.00454	0.00285	20	0.82	5%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0450	0.04500	0.01000	0.04126	0.00454	0.00285	20	0.82	5%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0324	0.04535	0.00090	0.04126	0.00454	0.00285	20	0.90	5%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0419	0.04630	0.00000	0.04126	0.00454	0.00285	20	1.11	6%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0354	0.05950	0.01500	0.04126	0.00454	0.00285	20	4.01	22%	0
321.30	Acid Soluble Zinc, ICP (PCT)	0232	0.06410	0.04840	0.04126	0.00454	0.00285	20	5.03	28%	1
321.99	Acid Soluble Zinc, Other (Identify) (PCT)	0471	0.03700	0.00200	0.04012	0.00301	0.00077	3	-1.04	4%	0
321.99	Acid Soluble Zinc, Other (Identify) (PCT)	0474	0.04035	0.00030	0.04012	0.00301	0.00077	3	0.08	0%	0
321.99	Acid Soluble Zinc, Other (Identify) (PCT)	0231	0.04300	0.00000	0.04012	0.00301	0.00077	3	0.96	4%	0
325.30	Water Soluble Zinc, ICP (PCT)	0393	0.04000	0.00200			0.00200	1			
325.99	Water Soluble Zinc, Other (Identify) (PCT)	0257	0.04150	0.00700			0.00700	1			

magruder fertilizer

check sample program



STRIVING FOR EXCELLENCE IN ANALYSIS

Magruder Check Sample For Individual Methods

Methods Report

Sample # 201007

Sort by Method

Grade 25-0-5

Method Code	Total # Labs Submitting	# Labs Included in Calculations	Mean	SD	Assigned Value - Robust Mean	Robust sd	Uncertainty (U)	% RSD	Between Labs sL	Within Labs sr	Reproducibility sR	Between Labs %RSD	Within Labs %rsd	Reproducibility %RSD	sR/sr	Average Range (R-bar)
001.10	8	8	4.8357	1.0511	4.4392	0.20004	0.05001	4.51%	1.0509	0.02572	1.0512	21.73%	0.53%	21.74%	40.878	0.02737
001.99	10	10	4.4010	0.57980	4.3130	0.29667	0.06634	6.88%	0.57835	0.05801	0.58125	13.14%	1.32%	13.21%	10.020	0.06710
002.99	3	3	0.66517	1.1301	0.66517	1.1301	0.46136	169.90%	1.1301	0.00041	1.1301	169.90%	0.06%	169.90%	2,768.1	0.00033
003.10	3	3	3.4560	0.06560	3.4560	0.06560	0.02678	1.90%	0.05989	0.03786	0.07085	1.73%	1.10%	2.05%	1.8714	0.04000
003.99	2	2	3.5275	0.15203												
005.00	1		5.6080													
005.99	2	2	15.683	3.3340												
009.10	1		5.1000													
010.11	11	11	25.022	0.54967	25.184	0.24825	0.05293	0.99%	0.54077	0.13932	0.55843	2.16%	0.56%	2.23%	4.0084	0.15091
010.12	4	4	25.256	0.14133	25.256	0.14133	0.04997	0.56%	0.09116	0.15273	0.17787	0.36%	0.60%	0.70%	1.1646	0.16675
010.60	55	54	25.547	0.30623	25.531	0.25765	0.02479	1.01%	0.26487	0.21734	0.34263	1.04%	0.85%	1.34%	1.5764	0.20098
010.99	4	4	25.025	0.40659	25.025	0.40659	0.14375	1.62%	0.39787	0.11843	0.41513	1.59%	0.47%	1.66%	3.5053	0.14000
020.20	2	2	0.15000	0.14142												
020.50	2	2	0.03250	0.00354												
030.20	1		0.03500													
040.20	1		0.01500													
040.99	1		4.8250													
041.10	2	2	0.10500	0.00707												
041.50	5	5	1.1232	2.4803	1.1232	2.4803	0.78434	220.82%	2.4803	0.01305	2.4803	220.82%	1.16%	220.82%	190.01	0.01040
041.60	1		0.09000													
048.20	1		0.01000													
050.00	15	15	5.3109	0.32728	5.3607	0.21489	0.03923	4.01%	0.31626	0.11909	0.33794	5.95%	2.24%	6.36%	2.8376	0.13667
050.10	1		5.5250													
050.30	5	5	5.2990	0.10514	5.2990	0.10514	0.03325	1.98%	0.07714	0.10104	0.12712	1.46%	1.91%	2.40%	1.2581	0.09400
050.31	1		4.9250													
050.50	11	11	5.2792	0.16445	5.2751	0.05800	0.01236	1.10%	0.14641	0.10592	0.18071	2.77%	2.01%	3.42%	1.7060	0.10464
050.51	10	10	5.3805	0.36197	5.2653	0.10417	0.02329	1.98%	0.36040	0.04749	0.36352	6.70%	0.88%	6.76%	7.6552	0.04700

Method Code	Total # Labs Submitting	# Labs Included in Calculations	Mean	SD	Assigned Value - Robust Mean	Robust sd	Uncertainty (U)	% RSD	Between Labs sL	Within Labs sr	Reproducibility sR	Between Labs %RSD	Within Labs %rsd	Reproducibility %RSD	sR/sr	Average Range (R-bar)
050.60	3	3	5.2913	0.07050	5.2913	0.07050	0.02878	1.33%	0.06235	0.04654	0.07780	1.18%	0.88%	1.47%	1.6717	0.06200
050.61	9	9	5.3299	0.12726	5.3325	0.09574	0.02257	1.80%	0.10363	0.10446	0.14714	1.94%	1.96%	2.76%	1.4086	0.11779
050.99	19	18	5.2705	0.16831	5.2967	0.09925	0.01654	1.87%	0.16030	0.07254	0.17595	3.04%	1.38%	3.34%	2.4256	0.08128
060.00	5	5	1.1926	0.38245	1.1926	0.38245	0.12094	32.07%	0.29259	0.34831	0.45489	24.53%	29.21%	38.14%	1.3060	0.28400
101.30	17	16	4.6448	0.31898	4.6038	0.24597	0.04348	5.34%	0.30508	0.13174	0.33231	6.57%	2.84%	7.15%	2.5225	0.09749
121.00	1		1.5900													
121.30	16	15	1.6287	0.09946	1.6195	0.08587	0.01568	5.30%	0.09866	0.01774	0.10025	6.06%	1.09%	6.15%	5.6518	0.01787
131.30	1		0.06000													
144.01	16	16	5.1024	0.06429	5.1177	0.03483	0.00616	0.68%	0.06067	0.03004	0.06770	1.19%	0.59%	1.33%	2.2537	0.03306
144.70	1		5.7450													
144.99	28	26	5.1779	0.38940	5.1163	0.24602	0.03412	4.81%	0.38581	0.07466	0.39297	7.45%	1.44%	7.59%	5.2633	0.07779
151.30	5	5	1.2220	0.55903	1.2220	0.55903	0.17678	45.75%	0.39789	0.55534	0.68317	32.56%	45.44%	55.91%	1.2302	0.63200
151.99	1		0.98000													
165.99	3	3	0.00523	0.00445	0.00523	0.00445	0.00182	85.02%	0.00429	0.00168	0.00460	81.92%	32.17%	88.01%	2.7354	0.00167
181.30	8	7	0.43636	0.33648	0.40634	0.31590	0.08443	77.74%	0.33620	0.01940	0.33676	77.05%	4.45%	77.18%	17.359	0.01471
181.99	1		0.20500													
190.00	9	8	4.5594	1.4340	4.0881	0.11209	0.02802	2.74%	1.4334	0.06211	1.4347	31.44%	1.36%	31.47%	23.101	0.05175
190.99	7	7	3.6106	0.57802	3.7661	0.43194	0.11544	11.47%	0.57607	0.06705	0.57996	15.95%	1.86%	16.06%	8.6499	0.07310
191.30	10	9	127.55	50.197	134.69	26.597	6.2691	19.75%	49.523	11.586	50.861	38.83%	9.08%	39.88%	4.3899	10.392
191.99	1		14.875													
202.00	1		4.0000													
202.30	12	12	20.747	9.2200	21.619	8.3892	1.7124	38.81%	9.1796	1.2204	9.2603	44.24%	5.88%	44.63%	7.5881	1.3309
202.99	1		5.4050													
221.00	3	3	0.00880	0.00035	0.00880	0.00035	0.00014	3.98%	0.00033	0.00015	0.00037	3.78%	1.74%	4.16%	2.3979	0.00020
221.30	19	18	0.00908	0.00291	0.00908	0.00076	0.00013	8.37%	0.00289	0.00045	0.00293	31.86%	5.01%	32.25%	6.4365	0.00033
221.99	2	2	0.03135	0.03274												
241.00	13	13	1.1138	0.30464	1.1673	0.17817	0.03494	15.26%	0.30349	0.03738	0.30578	27.25%	3.36%	27.45%	8.1801	0.04423
241.30	35	35	1.1475	0.29414	1.2032	0.19851	0.02373	16.50%	0.29223	0.04731	0.29603	25.47%	4.12%	25.80%	6.2579	0.05095
241.99	2	2	1.1525	0.09546												
251.30	7	7	5.1503	1.5284	5.1682	1.7004	0.45445	32.90%	1.3271	1.0721	1.7061	25.77%	20.82%	33.13%	1.5913	1.0749
251.99	1		2.7950													
261.30	13	12	0.01506	0.00479	0.01622	0.00121	0.00025	7.46%	0.00477	0.00062	0.00481	31.67%	4.11%	31.93%	7.7736	0.00061
261.99	2	2	0.01245	0.00148												
281.30	1		0.00000													
289.30	15	14	13.488	2.2335	13.718	2.1172	0.40011	15.43%	2.2001	0.54418	2.2664	16.31%	4.03%	16.80%	4.1648	0.62714
289.99	3	3	14.907	11.446	14.907	11.446	4.6729	76.79%	11.073	4.0992	11.808	74.28%	27.50%	79.21%	2.8805	3.6667
291.30	10	9	68.333	26.798	74.167	14.120	3.3281	19.04%	26.761	1.9857	26.835	39.16%	2.91%	39.27%	13.514	2.1192
291.99	2	2	35.518	34.708												

Method Code	Total # Labs Submitting	# Labs Included in Calculations	Mean	SD	Assigned Value - Robust Mean	Robust sd	Uncertainty (U)	% RSD	Between Labs sL	Within Labs sr	Reproducibility sR	Between Labs %RSD	Within Labs %rstd	Reproducibility %RSD	sR/sr	Average Range (R-bar)
301.30	2	2	0.92500	1.3081												
301.99	1		0.44400													
311.30	1		0.05250													
311.99	8	7	0.05508	0.01243	0.05104	0.00156	0.00042	3.06%	0.01217	0.00363	0.01270	22.09%	6.59%	23.05%	3.4968	0.00341
321.00	6	5	0.04311	0.00569	0.04311	0.00569	0.00180	13.19%	0.00542	0.00243	0.00594	12.58%	5.63%	13.78%	2.4459	0.00230
321.30	21	20	0.03982	0.01091	0.04126	0.00454	0.00072	11.01%	0.01062	0.00352	0.01119	26.66%	8.84%	28.09%	3.1788	0.00285
321.99	3	3	0.04012	0.00301	0.04012	0.00301	0.00123	7.50%	0.00295	0.00083	0.00306	7.35%	2.06%	7.64%	3.7098	0.00077
325.30	1		0.04000													
325.99	1		0.04150													