magruder fertilizer
check sample program

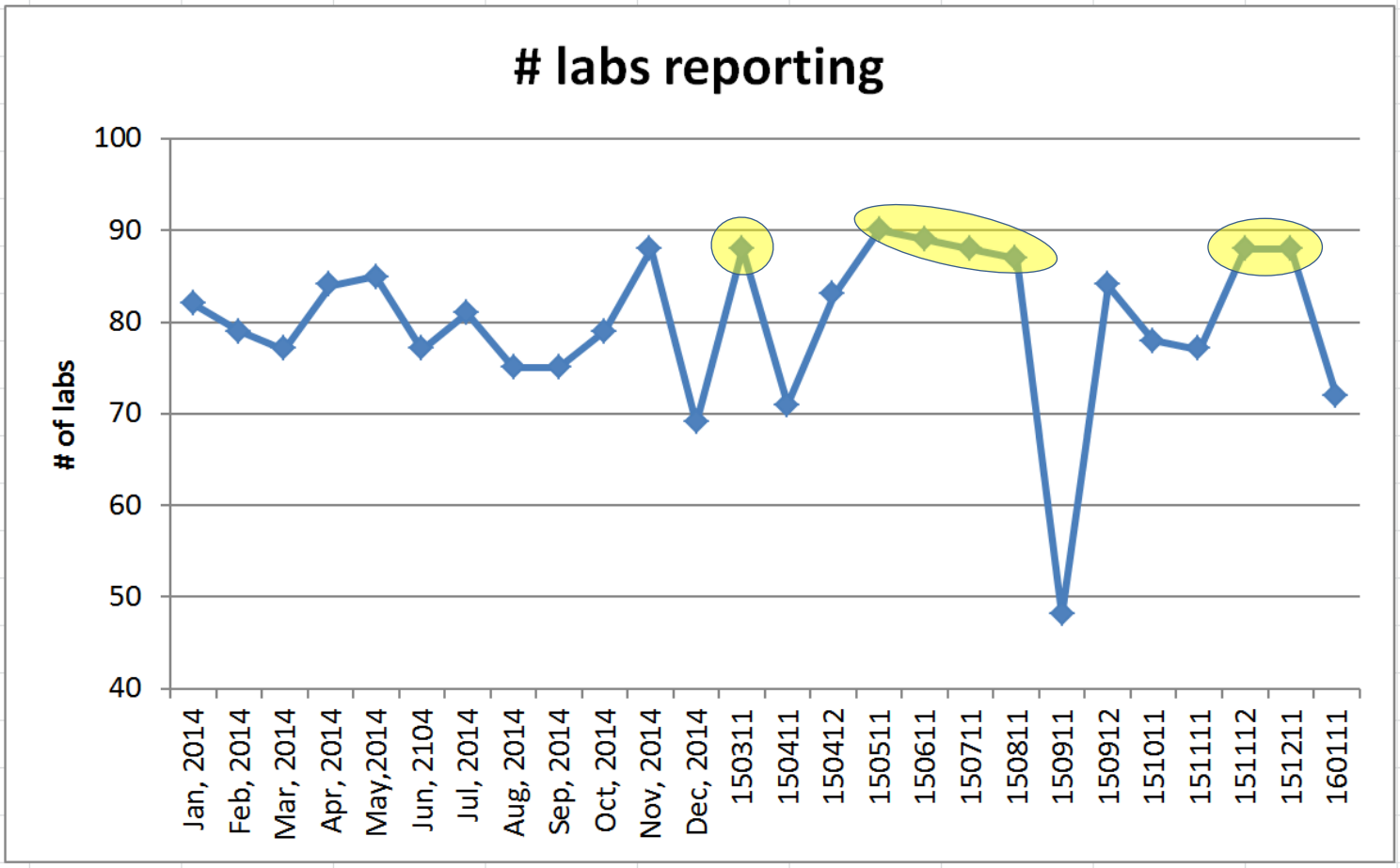
Value of Proficiency Test Program

Frank J. Sikora, Division of Regulatory Services
University of Kentucky

- **Status of Magruder program**
- **Sample label designs for clarification**
- **Interpreting Reports**
- **Data availability**
- **Excel file template for Control charts**

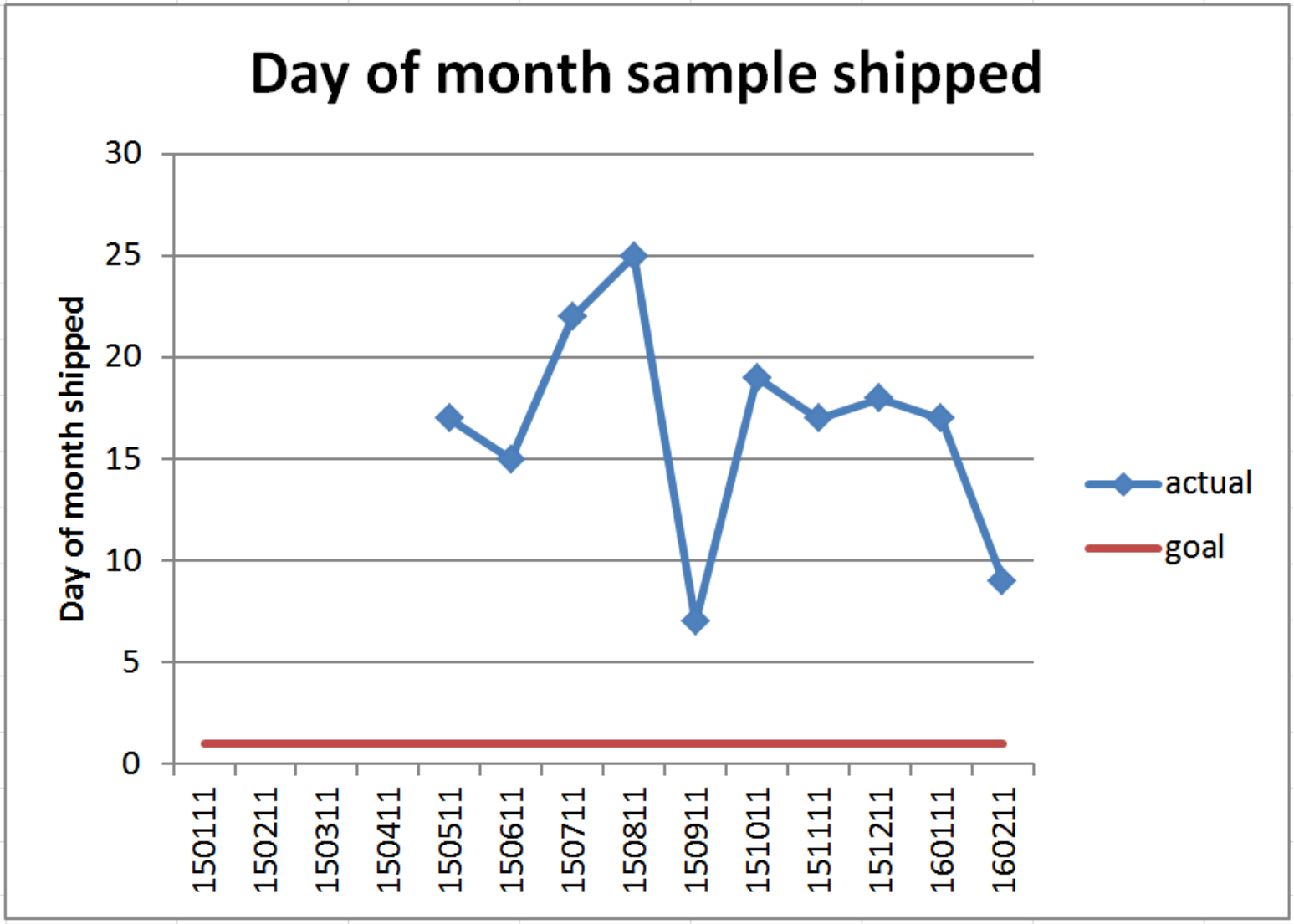
Albuquerque, New Mexico, Feb 2016

magruder fertilizer
check sample program



150311	6-9-22
150411	UAN
150412	SPM
150511	32-0-4
150611	MAP plus S
150711	organic
150811	25-5-15
150911	boron
150912	8-4-8
151011	15-5-10
151111	KCl
151112	MAP
151211	10-10-10
160111	micros

magruder fertilizer
check sample program



Magruder 150912 8-4-8

results due October 15, 2015

Guaranteed Analysis

Total Nitrogen(N)		8.00%
Ammoniacal Nitrogen (N)	7.00%	
Water Soluble Nitrogen(N)	0.10%	
Water Insoluble Nitrogen(N)	0.90%	
Available Phosphate(P2Os)		4.00%
Soluble Potash (K20)		8.00%
Total Magnesium as Mg		1.20%
Water Soluble Magnesium (Mg)	1.20%	
Sulphur as S (combined)		5.50%
Boron (B)		0.02%
Chlorine (Cl) not more than		6.00%
Total Copper (Cu)		0.05%
Total Iron (Fe)		0.50%
Total Manganese (Mn)		0.06%
Molybdenum (Mo)		0.0005%
Total Zinc (Zn)		0.05%

Also analyze for:

Arsenic (As), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Lead (Pb), Mercury (Hg), Nickel (Ni), Selenium (Se)

SDS and GHS label for this product can be found at:

http://www.magrudercheckssample.org/SDS/150912sds.pdf

Magruder 160111 Micro Mix

results due February 15, 2016

Guaranteed Analysis

Boron (B)	1.50 %
Copper (Cu)	3.00 %
Iron (Fe)	18.00 %
Manganese (Mn)	7.50 %
Molybdenum (Mo)	200 ppm
Zinc (Zn)	7.00 %

Report Units: Report found concentrations in the units shown above as appears in the Data Reporting Website.

SDS and GHS label for this product can be found at:
http://www.magrudercheckssample.org/SDS/160111sds.pdf

Magruder 160311 5-2-0

results due April 15, 2016

Guaranteed Analysis

Total Nitrogen (N)	5 %
Water Soluble Nitrogen (N)	0.5 %
Water Insoluble Nitrogen (N)	4.5 %
Available Phosphate (P_2O_5)	2 %

Also analyze for:

Arsenic (As), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu)
Lead (Pb), Mercury (Hg), Molybdenum (Mo), Nickel (Ni)
Selenium (Se), Zinc (Zn)

The units above are those required for reporting data from this Magruder sample. They may not be the units required on a commercial fertilizer label.

This Magruder Check Sample material is not to be used in the manufacture of products nor applied to any crops or for other fertilizer uses. It is intended for analytical testing purposes only.

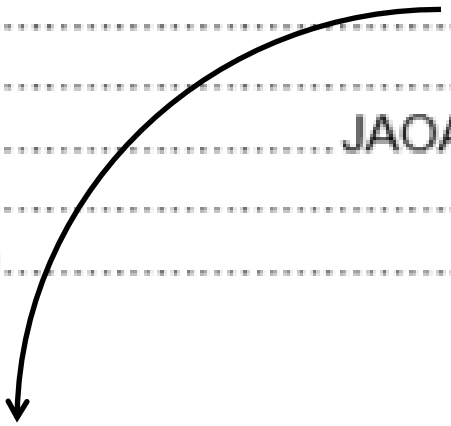
SDS and GHS label for this product can be found at:

http://www.magrudercheckssample.org/SDS/160311sds.pdf

Previous Magruder Codes for S

SULFUR

Gravimetric	980.02(a)	144.01	Total S in solids
Gravimetric	980.02(b)	144.02	Total S in liquids
Gravimetric	980.02(c)	144.03	Total S in urea
Turbidimetric	JAOAC 63.845	144.50	Total S
Spectrometric		144.70	Total S
Other (Identify)		144.99	



Method 980.02

Total Sulfur.

NO METHOD CODES FOR FORMS OF SULFUR (Sulfate-S or Sulfide-S)

NO METHOD CODE FOR TOTAL SULFUR BY COMBUSTION

143.00	Elemental Sulfur	Gravimetric Sulfur - carbon disulfide soluble sulfur
143.99	Elemental Sulfur	Other
145.00	Sulfate Sulfur, HCl soluble	Gravimetric Sulfur - sulfate form
145.99	Sulfate Sulfur, HCl soluble	Other
146.00	Total Sulfur in Liquid	Gravimetric - sulfate, sulfite, thiosulfate, and elemental
146.99	Total Sulfur in Liquid	Other
147.00	Total Sulfur in Urea/Formulations	Gravimetric
147.99	Total Sulfur in Urea/Formulations	Other (Identify)
148.00	Total Sulfur	Combustion
148.01	Total Sulfur	Gravimetric - sulfate and elemental
148.02	Total Sulfur	Tubidimetric, w/Br digestion, modification of JAOAC 63.845
148.03	Total Sulfur	Spectrometric, w/Br digestion
148.04	Total Sulfur	ICP, w/Br digestion
148.05	Total Sulfur	Thermotitration, w/Br digestion
148.06	Total Sulfur	Ion Exchange, w/Br digestion
148.07	Total Sulfur	ICP, test portion as in 2006.03 modified w/9:3 HNO3:HCl
148.99	Total Sulfur	Other
149.02	Sulfur - HNO3 soluble	Turbidimetric, modification of JAOAC 63.845
149.03	Sulfur - HNO3 soluble	Spectrometric
149.04	Sulfur - HNO3 soluble	ICP
149.05	Sulfur - HNO3 soluble	Thermotitration
149.06	Sulfur - HNO3 soluble	Ion Exchange
149.99	Sulfur - HNO3 soluble	Other

Magruder 150611 12-40-0

results due July 15, 2015

Guaranteed Analysis

Total Nitrogen (N)	12.0 %
Ammoniacal Nitrogen (N)	12.0 %
Available Phosphate (P_2O_5)	40.0 %
Total Sulfur (S)	10.0 %
Free Sulfur (S)	5.0 %
Combined Sulfur	5.0 %
Iron (Fe)	0.9 %
Water Soluble Iron (Fe)	0.05 %
Magnesium (Mg)	0.35 %
Zinc (Zn)	1.00 %
Water Soluble Zinc (Zn)	0.50 %

Also analyze for:

Arsenic (As), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu)
Lead (Pb), Mercury (Hg), Molybdenum (Mo), Nickel (Ni)
Selenium (Se), Zinc (Zn)

MSDS for this product can be found at:

http://www.magrudercheckssample.org/MSDS/150611msds.pdf

150611	148.00	Total Sulfur, Combustion (10%)	0474	10.26
150611	148.00	Total Sulfur, Combustion (10%)	0136	10.27
150611	148.00	Total Sulfur, Combustion (10%)	0360	10.39
150611	148.00	Total Sulfur, Combustion (10%)	0157	10.40
150611	148.00	Total Sulfur, Combustion (10%)	0029	10.48
150611	148.00	Total Sulfur, Combustion (10%)	0451	10.70
150611	148.00	Total Sulfur, Combustion (10%)	0049	10.77
150611	148.00	Total Sulfur, Combustion (10%)	0351	10.86
150611	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0095	9.935
150611	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0510	10.03
150611	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0114	10.07
150611	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0233	10.10
150611	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0105	10.13
150611	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0485	10.27
150611	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0043	10.34
150611	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0177	10.35
150611	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0029	10.37
150611	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0157	10.40
150611	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0102	10.51
150611	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0444	5.245*
150611	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0230	5.435*
150611	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0324	5.495*
150611	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0483	8.000*
150611	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0515	8.883*
150611	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0292	9.495*
150611	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0102	9.676
150611	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0177	10.22
150611	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0486	10.52
150611	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0421	10.69
150611	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0406	4.590*
150611	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0444	4.795*
150611	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0394	5.040*
150611	148.99	Total Sulfur, Other (10%)	0422	7.270*
150611	148.99	Total Sulfur, Other (10%)	0482	10.40
150611	148.99	Total Sulfur, Other (10%)	0481	10.41
150611	148.99	Total Sulfur, Other (10%)	0072	10.46
150611	148.99	Total Sulfur, Other (10%)	0275	10.62
150611	148.99	Total Sulfur, Other (10%)	0220	11.60
150611	148.99	Total Sulfur, Other (10%)	0096	5.005*
150611	148.99	Total Sulfur, Other (10%)	0421	5.135*
150611	148.99	Total Sulfur, Other (10%)	0307	5.146*
150611	148.99	Total Sulfur, Other (10%)	0354	5.370*

Magruder 151211 10-10-10

results due January 15, 2016

Guaranteed Analysis

Total Nitrogen (N)	10.00 %
Ammoniacal Nitrogen	10.0 %
Available Phosphate (P_2O_5)	10.00 %
Soluble Potash (K_2O)	10.00 %
Magnesium (Mg)	1.20 %
Water Soluble Magnesium (Mg)	1.0%
Sulfur (S) *	10.00 %
Free Sulfur (S) *	1.3 %
Combined Sulfur (S) *	8.7 %
Iron (Fe)	0.80 %
Copper (Cu)	0.05 %
Manganese (Mn)	0.25 %
Water Soluble Manganese (Mn)	0.1 %
Nickel (Ni)	0.003 %
Zinc (Zn)	0.50 %
Water Soluble Zinc (Zn)	0.2 %
Boron (B)	0.06 %
Molybdenum (Mo)	0.003 %

Also analyze for:

Arsenic (As), Cadmium (Cd), Chromium (Cr), Cobalt (Co),
Lead (Pb), Mercury (Hg), Selenium (Se)

*Sulfur (S) is reported with method codes 148.xx
*Free Sulfur (S) is reported with method codes 143.xx
*Combined Sulfur (S) is reported with method codes 145.xx

SDS and GHS label for this product can be found at:

http://www.magrudercheckssample.org/SDS/151211sds.pdf

151211	148.00	Total Sulfur, Combustion (10%)	0157	11.65
151211	148.00	Total Sulfur, Combustion (10%)	0360	12.18
151211	148.00	Total Sulfur, Combustion (10%)	0451	12.20
151211	148.00	Total Sulfur, Combustion (10%)	0025	12.39
151211	148.00	Total Sulfur, Combustion (10%)	0029	12.68
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0498	10.90*
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0444	11.07*
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0102	11.30
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0324	11.40
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0230	11.85
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0114	12.03
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0485	12.09
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0040	12.25
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0481	12.34
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0029	12.40
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0157	12.70
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0095	12.77
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0457	12.91
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0510	12.91
151211	148.01	Total Sulfur, Gravimetric - sulfate and elem... (10%)	0220	13.22
151211	148.04	Total Sulfur, ICP, w/Br digestion (10%)	0394	10.85*
151211	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0515	9.302*
151211	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0444	10.13*
151211	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0486	10.42*
151211	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0421	11.91
151211	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0023	12.11
151211	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0037	12.50
151211	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0494	12.52
151211	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0102	12.61
151211	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0177	12.66
151211	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0483	13.35
151211	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0292	13.36
151211	148.07	Total Sulfur, ICP, test portion as in 2006.03... (10%)	0406	10.39*
151211	148.99	Total Sulfur, Other (10%)	0501	9.965*
151211	148.99	Total Sulfur, Other (10%)	0422	10.37*
151211	148.99	Total Sulfur, Other (10%)	0506	10.45*
151211	148.99	Total Sulfur, Other (10%)	0354	10.63*
151211	148.99	Total Sulfur, Other (10%)	0096	10.87*
151211	148.99	Total Sulfur, Other (10%)	0307	10.93*
151211	148.99	Total Sulfur, Other (10%)	0482	12.70
151211	148.99	Total Sulfur, Other (10%)	0452	12.91
151211	148.99	Total Sulfur, Other (10%)	0072	13.72
151211	148.99	Total Sulfur, Other (10%)	0220	13.76

Lab Portal

Introduction	Method Codes	Data Entry Instructions Training Videos	Statistical Reports Overview Quick Reference Guide Analyte Report Cards	FAQs on DLs	Contacts

2016 Samples and Reports

JAN 2016	FEB 2016	MAR 2016	APR 2016	MAY 2016	JUN 2016
160111 Micros analyte report method report	160211 24-25-4 analyte report method report	160311 Biosolids analyte report method report	160411 Liquid ThioS analyte report method report	160511 Poly-NPK analyte report method report	160611 analyte report method report

Magruder Reports Quick Reference

For more detailed explanations, go to www.magruderchecksamples.org

magruderchecksample.fass.org

Reports

Analyte All Tests Report
Method All Tests Report
Analyte Statistical Summary
Individual Method Performance Summary

Report Cards

Method Report Cards

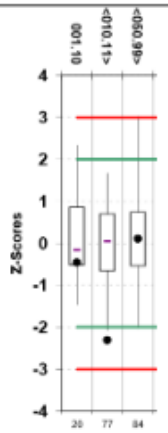
Analyte Report Cards

Menu and information to access

Menu selection	Information
Analyte All Tests Report	Review your result compared with all other results for the analyte regardless of method
Method All Tests Report	Review your result compared with all other results for the method used to determine the analyte
Analyte Statistical Summary	Statistical summary of all results for the analytes
Individual Method Performance Summary	Statistical summary of all results for specific methods. Used to compare and evaluate methods.
Method Report Cards	A report on your lab's proficiency in testing the analytes with respect to specific methods.
Analyte Report Cards	A report on your lab's proficiency in testing the analytes.

Magruder Z Score
3.15
-0.34
0.61
-0.02
0.53
0.58
2.09

Z scores: evaluation of your lab result with respect to other lab results.
Green is compliant
(> -2 and < 2 standard deviations).
Orange is cautionary
(> -3 and < -2 OR > 2 and < 3 standard deviations)
Red is warning
(< -3 OR > 3 standard deviations)
Grey is not actionable
(insufficient number of labs)



Analyte report card has graphical display of your Z score (black dot) compared to other Z scores for the analyte.
Box and vertical lines represent the population of Z scores from other labs.
Box: 50% of population
Lines: 90% of population

Black dot between **green** lines is compliant
Black dot between **green** and **red** lines is cautionary
Black dot beyond **red** lines is warning

Analyte & Method Z Scores

Z score on analyte report card compares your lab result to all results for the analyte regardless of method used. Z score on method report card compares your lab result to other results for the method used.

The analyte Z score measures the lab's proficiency in testing the analyte. One possible reason for a low Z score on an analyte report card may be use of a method that produces a biased result.

In the example below, Z scores for Avail. P_2O_5 indicates the method resulted in a negative bias with a low cautionary Z score for the analyte but a compliant Z score for the method.

	Analyte Report card	Method Report card
	Magruder Z Score	Magruder Z Score
NH_4-N	1.12	0.84
Total N	-0.48	-0.67
Total P_2O_5	-0.60	-0.17
Avail. P_2O_5	-2.78	-1.05

Magruder Reports Quick Reference (cont.)

Other measurement indicators on lab values

Investigational Allowance

Values for guaranteed analytes have square brackets if they are less than the consensus value for the analyte minus the American Association of Plant Food Control Officials (AAPFCO) investigational allowance.

Magruder Z score for acid soluble Zn in the Analyte Report Card below indicates that the lab result is okay WITH RESPECT to all other lab values. However, square brackets around the lab value indicates the value was less than the guarantee minus the investigational allowance.

Your lab result may be okay with respect to all other lab values (Z score > -2 AND < 2) but improvement should still be sought since the value could initiate an unwarranted investigation.

Proficiency Testing For 1 Analyte — Issue Date : 03/31/2

Analyte Group	Analyte Group (Units)	Lab 0512 Data		Analyte Values				Magruder	Lab 0512
		Value	range	Rob Mean	Rob SD	R-bar	# Labs	Z Score	Method
321	Acid Soluble Zinc (36%)	[33.66]	0.5000	36.91	1.823	0.5814	52	-1.84	321.99

Threshold % RSD

The Method Report Card presents Threshold % RSD for your lab value. This is a measure of the proximity of the lab value to the robust mean independent of the variance of all other lab values.

Magruder Z score for total N by combustion in the Method Report Card below indicates that the lab result is cautionary (Z score is < -2). However, the threshold %RSD is very low. If an interlaboratory %RSD accepted for the method were 3%, your value would be compliant.

Proficiency For 1 Method — Issue Date : 05/31/2

Method Code	Analyte Name and Method (Units)	Lab 0472 Data		Method Values				Magruder	Threshold
		Value	range	Rob Mean	Rob SD	R-bar	# Tests	Z Score	%RSD
010.60	Total Nitrogen, Combustion (32%)	31.30	0.0450	32.20	0.4102	0.3036	52	-2.21	1%

Precision

Precision of your reported lab values is recorded as the range which is the difference between the duplicate values. Your range can be compared to the average of ranges from all other labs (R-bar) to evaluate how your precision compared to other labs.

Proficiency Testing For 1 Analyte — Issue Date : 10/31/2

Analyte Group	Analyte Group (Units)	Lab 0493 Data		Analyte Values				Magruder	Lab 0493
		Value	range	Rob Mean	Rob SD	R-bar	# Tests	Z Score	Method
041	Direct Available Phosphorus as P2O5 (4%)	4.625	0.0500	4.743	0.1664	0.0772	38	-0.71	041.10

Magruder Check Sample Progr... | 150412.pdf

www.magruderchecksample.org

Search

magruder fertilizer check sample program

STRIVING FOR EXCELLENCE IN ANALYSIS

Lab Portal

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Treasure trove of data !!!

Excel Downloads
2015 Cumulative Analyte Data Report
2015 Cumulative Analyte Summary Report
2015 Cumulative Method Data Report
2015 Cumulative Method Summary Report
2015 Cumulative Method Precision Report

Other Links:

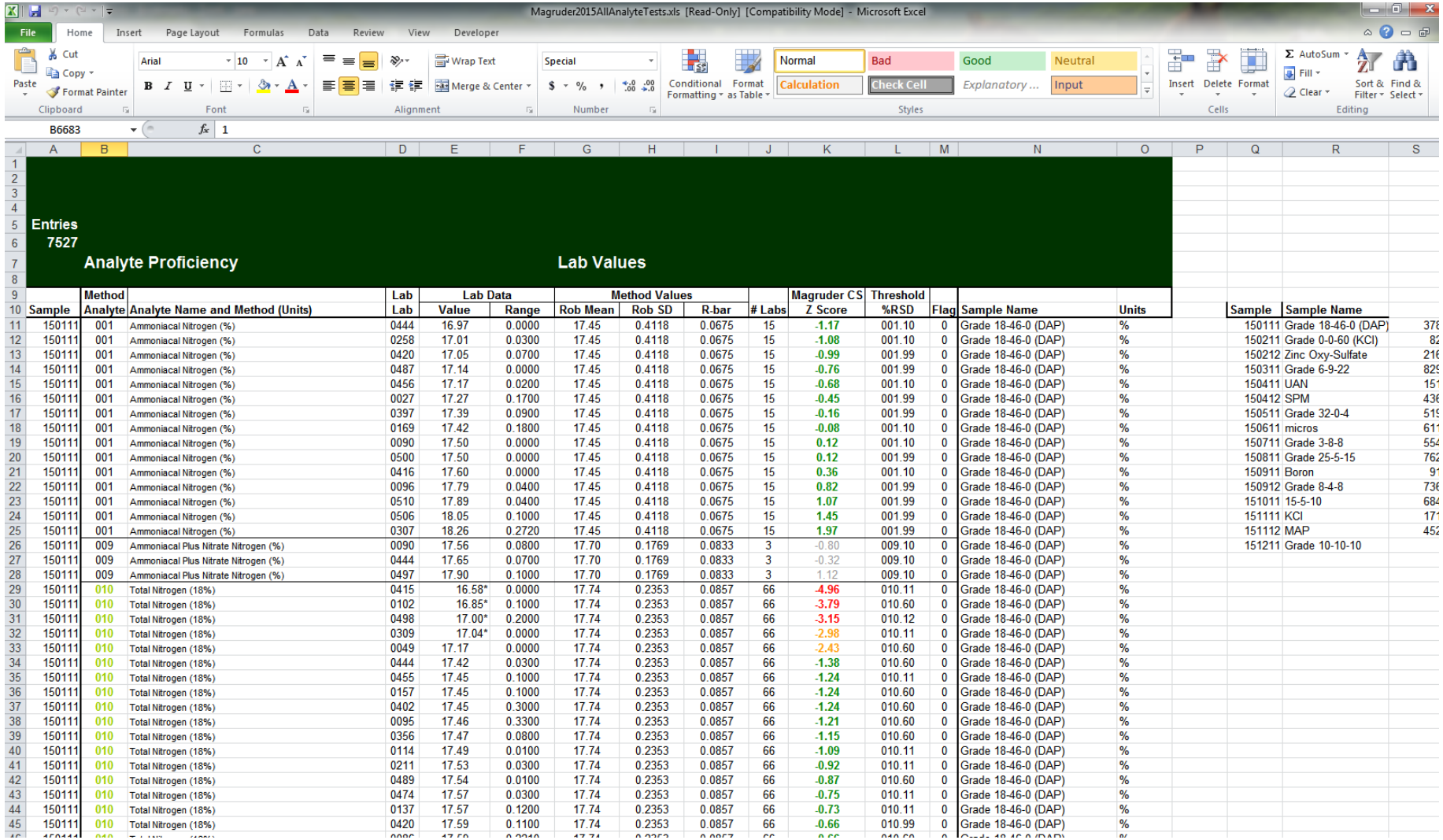
The Association of American Plant Food Control Officials AAPFCO

The Association of Fertilizer and Phosphate Chemists AFPC

The Fertilizer Institute TFI

AOAC, Intl.

last updated August 24, 2015



Magruder2015AllAnalyteTests.xls [Read-Only] [Compatibility Mode] - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer

Cut Copy Format Painter Paste — Clipboard

Arial 10 — Font

Wrap Text Merge & Center — Alignment

Special — Number

Conditional Formatting Format as Table

Normal Bad Good Neutral Calculation Check Cell Explanatory ... Input — Styles

Insert Delete Format — Cells

AutoSum Fill Clear Sort & Filter Find & Select — Editing

B6683 1

Entries
7527

Analyte Proficiency

Lab Values

Sample	Method Analyte	Analyte Name and Method (Units)	Lab Lab	Lab Data Value	Lab Data Range	Method Values Rob Mean	Method Values Rob SD	Method Values R-bar	# Labs	Magruder CS Z Score	Threshold %RSD	Flag	Sample Name	Units
150111	001	Ammoniacal Nitrogen (%)	0444	16.97	0.0000	17.45	0.4118	0.0675	15	-1.17	001.10	0	Grade 18-46-0 (DAP)	%
150111	001	Ammoniacal Nitrogen (%)	0258	17.01	0.0300	17.45	0.4118	0.0675	15	-1.08	001.10	0	Grade 18-46-0 (DAP)	%
150111	001	Ammoniacal Nitrogen (%)	0420	17.05	0.0700	17.45	0.4118	0.0675	15	-0.99	001.99	0	Grade 18-46-0 (DAP)	%
150111	001	Ammoniacal Nitrogen (%)	0487	17.14	0.0000	17.45	0.4118	0.0675	15	-0.76	001.99	0	Grade 18-46-0 (DAP)	%
150111	001	Ammoniacal Nitrogen (%)	0456	17.17	0.0200	17.45	0.4118	0.0675	15	-0.68	001.10	0	Grade 18-46-0 (DAP)	%
150111	001	Ammoniacal Nitrogen (%)	0027	17.27	0.1700	17.45	0.4118	0.0675	15	-0.45	001.99	0	Grade 18-46-0 (DAP)	%
150111	001	Ammoniacal Nitrogen (%)	0397	17.39	0.0900	17.45	0.4118	0.0675	15	-0.16	001.99	0	Grade 18-46-0 (DAP)	%
150111	001	Ammoniacal Nitrogen (%)	0169	17.42	0.1800	17.45	0.4118	0.0675	15	-0.08	001.10	0	Grade 18-46-0 (DAP)	%
150111	001	Ammoniacal Nitrogen (%)	0090	17.50	0.0000	17.45	0.4118	0.0675	15	0.12	001.10	0	Grade 18-46-0 (DAP)	%
150111	001	Ammoniacal Nitrogen (%)	0500	17.50	0.0000	17.45	0.4118	0.0675	15	0.12	001.99	0	Grade 18-46-0 (DAP)	%
150111	001	Ammoniacal Nitrogen (%)	0416	17.60	0.0000	17.45	0.4118	0.0675	15	0.36	001.10	0	Grade 18-46-0 (DAP)	%
150111	001	Ammoniacal Nitrogen (%)	0096	17.79	0.0400	17.45	0.4118	0.0675	15	0.82	001.99	0	Grade 18-46-0 (DAP)	%
150111	001	Ammoniacal Nitrogen (%)	0510	17.89	0.0400	17.45	0.4118	0.0675	15	1.07	001.99	0	Grade 18-46-0 (DAP)	%
150111	001	Ammoniacal Nitrogen (%)	0506	18.05	0.1000	17.45	0.4118	0.0675	15	1.45	001.99	0	Grade 18-46-0 (DAP)	%
150111	001	Ammoniacal Nitrogen (%)	0307	18.26	0.2720	17.45	0.4118	0.0675	15	1.97	001.99	0	Grade 18-46-0 (DAP)	%
150111	009	Ammoniacal Plus Nitrate Nitrogen (%)	0090	17.56	0.0800	17.70	0.1769	0.0833	3	-0.80	009.10	0	Grade 18-46-0 (DAP)	%
150111	009	Ammoniacal Plus Nitrate Nitrogen (%)	0444	17.65	0.0700	17.70	0.1769	0.0833	3	-0.32	009.10	0	Grade 18-46-0 (DAP)	%
150111	009	Ammoniacal Plus Nitrate Nitrogen (%)	0497	17.90	0.1000	17.70	0.1769	0.0833	3	1.12	009.10	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0415	16.58*	0.0000	17.74	0.2353	0.0857	66	-4.96	010.11	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0102	16.85*	0.1000	17.74	0.2353	0.0857	66	-3.79	010.60	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0498	17.00*	0.2000	17.74	0.2353	0.0857	66	-3.15	010.12	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0309	17.04*	0.0000	17.74	0.2353	0.0857	66	-2.98	010.11	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0049	17.17	0.0000	17.74	0.2353	0.0857	66	-2.43	010.60	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0444	17.42	0.0300	17.74	0.2353	0.0857	66	-1.38	010.60	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0455	17.45	0.1000	17.74	0.2353	0.0857	66	-1.24	010.11	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0157	17.45	0.1000	17.74	0.2353	0.0857	66	-1.24	010.60	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0402	17.45	0.3000	17.74	0.2353	0.0857	66	-1.24	010.60	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0095	17.46	0.3300	17.74	0.2353	0.0857	66	-1.21	010.60	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0356	17.47	0.0800	17.74	0.2353	0.0857	66	-1.15	010.60	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0114	17.49	0.0100	17.74	0.2353	0.0857	66	-1.09	010.11	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0211	17.53	0.0300	17.74	0.2353	0.0857	66	-0.92	010.11	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0489	17.54	0.0100	17.74	0.2353	0.0857	66	-0.87	010.60	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0474	17.57	0.0300	17.74	0.2353	0.0857	66	-0.75	010.11	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0137	17.57	0.1200	17.74	0.2353	0.0857	66	-0.73	010.11	0	Grade 18-46-0 (DAP)	%
150111	010	Total Nitrogen (18%)	0420	17.59	0.1100	17.74	0.2353	0.0857	66	-0.66	010.99	0	Grade 18-46-0 (DAP)	%

Sample	Sample Name
150111	Grade 18-46-0 (DAP)
150211	Grade 0-0-60 (KCl)
150212	Zinc Oxy-Sulfate
150311	Grade 6-9-22
150411	UAN
150412	SPM
150511	Grade 32-0-4
150611	micros
150711	Grade 3-8-8
150811	Grade 25-5-15
150911	Boron
150912	Grade 8-4-8
151011	15-5-10
151111	KCl
151112	MAP
151211	Grade 10-10-10

magruder fertilizer
check sample program

More Precision Stuff:
How precise are the Methods?

Repeatability of the Analytical Methods (s_r) aka Within Lab sd

$$s_r = \sqrt{\frac{\sum_{i=1}^{n} (\text{Range of Duplicates})^2}{2n}}$$

Direct Available P as P_2O_5 Repeatability				
Method	**df (n-1)**	**sd**	**Variance**	**%rsd**
Gravimetric (a)	**92 - 1**	**0.140**	**0.0195**[(bc)]	**0.65%**
ICP (b)	**99 - 1**	**0.342**	**0.1172**[(ac)]	**1.80%**
Colorimetric (c)	**113 - 1**	**0.212**	**0.0448**[(ab)]	**1.03%**

Red superscript indicates significant f (α=0.05).

The best Method precision is Gravimetric < Colorimetric < ICP.

EXCEL FILE TEMPLATE FOR CONTROL CHARTS