1 of 2

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**MFT HOMOGENEITY STUDY AT TNX - FINAL REPORT ON
THE LOW WEIGHT PERCENT SOLIDS CONCENTRATION (U)**

by

W. J. Jenkins

Westinghouse Savannah River Company
Savannah River Site
Aiken, South Carolina 29808

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WSRC-RP-93-1271-TL

Keywords: DWPF, DWPT, MFT,
Homogeneity, Mixing,
Analytical, Process Control,
Melter Feed

Retention Time: Permanent

September 21, 1993

D. B. AMERINE, MANAGER/DWPF
WESTINGHOUSE SAVANNAH RIVER COMPANY

ATTENTION: J. F. ORTALDO, 704-S (5)

**MFT HOMOGENEITY STUDY AT TNX - FINAL REPORT ON
THE LOW WEIGHT PERCENT SOLIDS CONCENTRATION (U)**

The attached report documents the results and conclusions of the statistical analysis of the results from the low weight percent solids testing phase of the MFT(Melter Feed Tank) Homogeneity Study Task. This test was conducted in the Full-Scale SRAT/SME/MFT tank at TNX. Questions about this report should be addressed to C. T. Randall (803)725-6339.

E. W. HOLTZSCHEITER, MANAGER
DEFENSE WASTE PROCESSING TECHNOLOGY

E. W. Holtzscheiter 773-A
Authorized Derivative Classifier

**WESTINGHOUSE SAVANNAH RIVER COMPANY
SAVANNAH RIVER TECHNOLOGY CENTER**

WSRC-RP-93-1271

Keywords: DWPF, DWPT, MFT,
Homogeneity, Mixing,
Analytical, Process Control,
Melter Feed

Retention: Permanent

September 21, 1993

TO: C. T. Randall, 704-T

FROM: W. John Jenkins

**MFT HOMOGENEITY STUDY AT TNX - FINAL REPORT ON
THE LOW WEIGHT PERCENT SOLIDS CONCENTRATION (U)**

ATTACHMENT: Statistical Analysis of the Low Weight Percent Solids MFT
Homogeneity Study at TNX (U)
SCS-ASG-93-0068

CONCLUSION

No significant inhomogeneity in the melter feed flow was detected for feeds of 42 to 48 weight percent total solids with corresponding yield stress of 26 to 67 dynes per cm². No inhomogeneity was detected in either the low or high weight percent solids slurry mixture at the 6000-gallon level for either low or high agitation speed. A sizable frit segregation from the solids slurry mixture was detected in the 2000-gallon heel for the low weight percent solids concentration even though the heel was continuously agitated at low speed. No frit segregation from the solids slurry mixture was statistically discernible in the 2000-gallon heel for the high weight percent solids concentration with the heel continuously agitated at low speed.

SUMMARY

A statistical design and analysis of both elemental analyses and weight percent solids analyses data was utilized to evaluate the MFT homogeneity at low heel levels and low agitator speed at both high and low solids feed concentrations. The homogeneity was also evaluated at both low and high agitator speed at the 6000+ gallons static level. The dynamic level portion of the test simulated feeding the Melter from the MFT to evaluate the uniformity of the solids slurry composition (Frit-PHA-Sludge) entering the melter from the MFT. This final report provides the results and conclusions from the second half of the study, the low weight percent solids concentration portion, as well as a comparison with the results from the first half of the study, the high weight percent solids portion.

Authorized Derivative Classifier

C. T. Randall, 704-T

The results from the static level phases (items 1, 2 and 4 below) revealed no statistically discernible differences in the paired contrasts of the High Grab-Low Grab Samples used to measure the tank homogeneity for either the weight percent dried solids, weight percent calcined solids, density or any of the elements (Al, B, Ca, Cu, Fe, K, Mg, Mn, Na, Ni, Si and Ti) analyzed.

There was an appreciable difference, however, between the slurry composition of the static level samples from the 2000-gallon heel (item 4 below) and all of the other samples from either the static or dynamic levels (items 1, 2 and 3 below) for the low weight percent solids portion of the test; these sample analyses results were noticeably lower in the weight percent solids, lower in a few elements (Si, Mg and B) that are in frit and higher in many of the elements (K, Ti, Cu, Al, Ca, Fe, Mn and Ni) that are predominately in the PHA and sludge waste. This heel composition difference is consistent with the settling of 1030 to 1060 pounds of Frit #202 from the solids slurry mixture. Thus, the 2000-gallon heel composition became frit-poor and waste-rich over 80 hours of continuous low speed agitation with only the lower agitator four-blade paddle submerged. In practice, this means that if a significant feed outage or delay occurs after the upper agitator hydrofoil is uncovered, then the solids slurry level must be restored above the hydrofoil and the tank agitated on high speed for several hours before feeding is resumed.

Some of the elemental results from the dynamic level phase (item 3 below) revealed statistically discernible differences in the flow homogeneity across decreasing tank level and mixer speed. These differences were not appreciable and there was no discernible trend in flow homogeneity that would indicate either a frit-rich and waste-poor or a frit-poor and waste-rich solids slurry was produced by the decreasing level and mixer speed.

DISCUSSION

The MFT Homogeneity Study consists of two parts: the high weight percent solids (first half) followed by the low weight percent solids (second half). This report documents the low weight percent solids test results and conclusions from this study at TNX and provides a comparison with the results of the first half of the study, the high weight percent solids portion. The statistical analysis of the results is reported in the attachment by Thomas B. Edwards. The statistical analysis of the high weight percent solids (first half) test results is reported in the Reference 1 by Thomas B. Edwards. The high weight percent solids (first half) test results and conclusions are documented in a preliminary report by W. John Jenkins in Reference 2. The task plan for the MFT Homogeneity Study at TNX is described in Reference 3 by W. John Jenkins.

This study supports the DWPF objective of verifying the uniformity of the feed composition (Frit-Sludge-PHA) from the MFT to the melter while maximizing attainment by minimizing the heel level left in the MFT between batches. The objectives of the study are to investigate both tank and flow homogeneity using both elemental and weight percent solids analyses of grab samples taken during the following simulated operating conditions:

- 1) the tank homogeneity at a static level of 6000+ gallons at high agitator speed of 100 RPM,
- 2) the tank homogeneity at a static level of 6000+ gallons at low agitator speed of 67 RPM,
- 3) the flow homogeneity at several levels as the level decreases from 6000+ gallons to 2000 gallons at approximately every 500 gallons increment, and

- 4) the final tank heel homogeneity at a static level of 2000 gallons at low agitator speed of 67 RPM.

The results from the static level phases (items 1, 2 and 4 above) revealed no statistically discernible differences in the paired contrasts of the High Grab-Low Grab Samples used to measure the tank homogeneity for either the weight percent dried solids, weight percent calcined solids, density or any of the elements (Al, B, Ca, Cu, Fe, K, Mg, Mn, Na, Ni, Si and Ti) analyzed. A summary of the paired contrasts of the High Grab-Low Grab samples for the weight percent dried solids, weight percent calcined solids and density analyses is shown in Table 2 Appendix A on page 24 of the attachment. A summary of the paired contrasts of the High Grab-Low Grab samples for the elemental analyses is shown in Table 10 Appendix A on page 42 of the attachment. The smallest significant bias (SSB) is shown in these tables for each contrast. The SSB indicates the minimum difference that is statistically discernible.

There was a very noticeable difference, however, between the slurry composition of the static level samples from the 2000-gallon heel (item 4 above) and all of the other samples from either the static or dynamic levels (items 1, 2 and 3 on page 2) for the low weight percent solids portion of the test; these sample analyses results were noticeably lower in the weight percent dried solids, lower in the weight percent calcined solids, lower in a few elemental results (Si, Mg and B) and higher in many of the elemental results as shown below:

<u>Sample Analysis</u>	<u>2000-gallon Heel Samples</u>	<u>All Other Samples</u>	<u>Relative Difference</u>
Si	22.73%	24.12%	-5.7%
Mg	0.867%	0.901%	-3.8%
B	2.36%	2.38%	-0.7%
Al	1.71%	1.55%	10.4%
Ca	0.896%	0.771%	16.2%
Cu	0.382%	0.336%	13.7%
Fe	9.63%	8.40%	14.7%
Mn	1.94%	1.69%	15.1%
Ni	0.958%	0.847%	13.1%
Ti	0.203%	0.178%	14.3%
K	2.15%	1.84%	17.1%
K(AA)	1.59%	1.33%	19.3%
Na	4.70%	4.61%	2.1%
Na(AA)	4.63%	4.53%	2.2%
Dried Solids	38.65%	42.68%	-9.4%
Calcined Solids	33.86%	38.20%	-11.4%

This heel composition difference is consistent with the settling of 1030 to 1060 pounds of Frit #202 from the solids slurry mixture; a detailed explanation is provided by K. G. Brown in Reference 4. Thus, the 2000-gallon heel composition became frit-poor and waste-rich over 80 hours of continuous low speed (67 RPM) agitation with only the lower agitator blade submerged. A similar much smaller effect could also be deduced for the 2000-gallon heel of the previous high weight percent solids portion of the test but is not supported by any statistically significant differences in the elemental sample analyses

results of the heel composition. Even at high speed agitation, a similar effect is probable at any solids slurry level below the upper agitator hydrofoil whenever the time is significantly extended beyond the normal time required for the nominal 50 gallons per hour feed rate.

The MFT agitator has two agitator blades and operates at two speeds. The upper agitator blade is a three-bladed hydrofoil that produces vertical flow of the slurry downward through the heat transfer coil and then upward between the tank wall and the heat transfer coil. The lower agitator blade is a four-bladed paddle that produces radial flow of the slurry. The solids slurry mixing is impaired when the height of the slurry liquid level drops below the upper agitator blade. The solids slurry mixing can also be impaired when the height of the slurry liquid level drops below the top of the heat transfer coil. Low speed agitation can also impair solids slurry mixing. Although all of the above conditions combine to reduce the ability of the agitator to prevent frit settling from the heel, addition of the next batch of slurry into the MFT should submerge both agitator blades and re-suspend the settled frit after several hours of agitation at high speed.

The weight percent dried solids and weight percent calcined solids results from the dynamic level phase (item 3 on page 2) of the low weight percent solids portion revealed no statistically discernible differences in the flow homogeneity for the final 2000-gallon level compared to all the previous combinations of decreasing tank level and mixer speed; these differences, expressed as a percentage of the overall average, are shown below along with the similar differences for the high weight percent solids portion of the test:

	<u>Overall Average</u>		<u>Relative Difference Range</u>	
	<u>High Solids</u>	<u>Low Solids</u>	<u>High Solids</u>	<u>Low Solids</u>
Dried Solids	48.3 Wt.%	42.6 Wt.%	-6.6%, 2.5%	-1.8%, 1.5%
Calcined Solids	43.1 Wt.%	38.2 Wt.%	-7.0%, 3.0%	-2.2%, 2.6%

The more negative differences seen in the relative difference range above for the high solids portion are attributed to dilution by water used to prime the pump during this phase (between the 2500-gallon level and the 2000-gallon level) of the testing; therefore, these differences are not significant. The averages and differences are shown below after excluding the of 2000-gallon samples diluted by the pump prime water:

	<u>Overall Average</u>		<u>Relative Difference Range</u>	
	<u>High Solids</u>	<u>Low Solids</u>	<u>High Solids</u>	<u>Low Solids</u>
Dried Solids	48.6 Wt.%	42.6 Wt.%	-2.1%, 1.8%	-1.8%, 1.5%
Calcined Solids	43.4 Wt.%	38.2 Wt.%	-2.3%, 2.3%	-2.2%, 2.6%

Some of the elemental results from the dynamic level phase (item 3 on page 2) revealed statistically discernible differences in the flow homogeneity across decreasing tank level and mixer speed; the largest relative difference for each element is shown below along with the similar difference for the high weight percent solids portion of the test:

<u>Element</u>	<u>Largest Relative Difference in MFT Outflow</u>	
	<u>High Wt.% Solids</u>	<u>Low Wt.% Solids</u>
Al	4.9%	4.8% [NS]
B	3.0% [NS]	2.1% [NS]
Ca	7.4%	7.9%
Cu	6.6%	4.6% [NS]
Fe	5.7%	4.2%

K	11.0%	11.7%[NS]
K(AA)	6.0% [NS]	7.2%[NS]
Mg	1.7% [NS]	3.4%
Mn	5.2%	5.6%
Na	2.5% [NS]	2.3%[NS]
Na(AA)	8.9% [NS]	1.3%[NS]
Ni	6.1%	5.1%
Si	4.3% [NS]	5.6%[NS]
Ti	4.1%	5.0%[NS]

NOTE: [NS] - the difference is not significantly different from zero.

Please note that a statistically discernible difference is not necessarily an operationally appreciable difference. There was no discernible trend in flow homogeneity that would indicate either a frit-rich and waste-poor or a frit-poor and waste-rich solids slurry was produced by the decreasing level and mixer speed for the either the low or the high weight percent solids concentrations used in this portion of the study.

A comparison of the overall elemental analyses for the high and low weight percent solids portions of this test is shown in Table 18 Appendix A on page 50 of the attachment. These results compare very well; the largest relative difference is 3.9%. Please note that all elemental analyses are based on the vitrified sample weight rather than on the solids slurry sample weight. A comparison of the elemental analyses paired contrasts of the High Grab-Low Grab samples for the high and low weight percent solids portions of this test is shown in Table 19 Appendix A on pages 51-53 of the attachment. The elemental analyses for the low weight percent solids portion of this test are shown by tank level, mixer speed and sample outlet in Exhibits 51-55 Appendix A on pages 106-110 of the attachment. The elemental analyses for the high weight percent solids portion of this test are shown by tank level, mixer speed and sample outlet in Exhibits 61-65 Appendix A on pages 116-120 of the attachment.

A Technical Review Group formally reviewed the results and conclusions of the statistical analyses of the results from both the low weight percent solids testing phase and the high weight percent testing phase of the MFT(Melter Feed Tank) Homogeneity Study at TNX and issued reports described in References 5 and 6.

Process control sample analyses of the low solids concentration are shown in Table 1 of Appendix A. Rheology sample analyses of yield stress and consistency of the low solids concentration are shown at temperatures of 25°, 35° and 50° Celsius in Table 2 of Appendix A. Exhibit 1 of Appendix A: Dynamic MFT Volume Level Test for the Low Solids Concentration shows a plot of the change in level vs. time for this test. Regression of this data indicates an overall average of 51.6 gallons per hour out-flow rate from the tank. Exhibit 2 of Appendix A: Solids Slurry Temperature and Agitator Power for the Low Solids Concentration shows the solids slurry temperature increase resulting from agitation. The solids slurry temperature was maintained below 35° Celsius by using on/off flow control of the cooling water flow through the tank heat transfer coil.

REFERENCES:

1. T. B. Edwards to W. J. Jenkins, I-O Memorandum, Statistical Analysis of the Low Weight Percent Solids MFT Homogeneity Study at TNX (U), SCS-ASG-93-0068, September 3, 1993.
2. W. John Jenkins to C. T. Randall, MFT Homogeneity Study at TNX - Preliminary Report on the High Weight Percent Solids Concentration (U), WSRC-RP-93-1229, September 2, 1993.
3. W. John Jenkins to C. T. Randall, Task Plan for MFT Homogeneity Study at TNX (U), WSRC-RP-92-1089, December 15, 1992.
4. K. G. Brown to T. B. Edwards, Explanation of Melter Feed Tank Low solids Results (U), SRTC-PMC-93-0172, September 10, 1993.
5. C. P. Ross, et. al. to C. T. Randall, Technical Review of the Statistical Analysis of the Low Weight Percent Solids MFT Homogeneity Study at TNX (U), WSRC-RP-93-1259, September 10, 1993.
6. W. John Jenkins, et. al. to C. T. Randall, Technical Review of the Statistical Analysis of the High Weight Percent Solids MFT Homogeneity Study at TNX (U), WSRC-RP-93-1122, August 9, 1993.

APPENDIX A: Tables and Exhibits

Table 1.	Process Control Sample Analyses for Low Solids Concentration
Table 2.	Rheology Sample Analyses for Low Solids Concentration
Exhibit 1.	Dynamic MFT Volume Level Test for Low Solids Concentration
Exhibit 2.	Solids Slurry Temperature and Agitator Power for Low Solids Concentration

Table 1 Process Control Sample Analyses for Low Solids Concentration

	Total Dried Solids, wt.%	Insoluble Solids, wt.%	Soluble Solids, wt.%	Calcined Solids, wt.%	Density gm/mL	pH
	40.78%	32.54%	8.24%	36.08%	1.256	6.1
	41.42%	32.84%	8.58%	36.82%	1.274	6.1
	41.64%	31.97%	9.67%	37.65%	1.283	6.1
Average	41.28%	32.45%	8.83%	36.85%	1.271	6.1
Rel. Std. Dev.	1.08%	1.36%	8.46%	2.13%	1.08%	0.0%

Table 2. Rheology Sample Analyses for Low Solids Concentration

Temperature C	Increasing Shear Rate		Decreasing Shear Rate	
	Yield Stress dynes/cm2	Consistency cp	Yield Stress dynes/cm2	Consistency cp
25	27.22	13.29	22.50	24.19
25	27.80	14.32	24.85	21.94
25	26.55	15.43	26.23	16.21
Average	27.19	14.35	24.53	20.78
Relative Std. Dev.	2.30%	7.46%	7.69%	19.80%

Temperature C	Increasing Shear Rate		Decreasing Shear Rate	
	Yield Stress dynes/cm2	Consistency cp	Yield Stress dynes/cm2	Consistency cp
35	24.48	14.73	29.63	8.30
35	23.72	13.93	28.74	7.25
35	23.13	19.04	27.77	12.50
Average	23.78	15.90	28.71	9.35
Relative Std. Dev.	2.85%	17.29%	3.24%	29.71%

Temperature C	Increasing Shear Rate		Decreasing Shear Rate	
	Yield Stress dynes/cm2	Consistency cp	Yield Stress dynes/cm2	Consistency cp
50	32.37	10.12	30.89	5.12
50	31.14	10.04	36.78	4.90
50	28.84	10.92	29.81	5.16
50	29.18	9.46	28.71	5.66
Average	30.38	10.14	31.55	5.21
Relative Std. Dev.	5.49%	5.92%	11.41%	6.16%

Exhibit 1: Dynamic MFT Volume Level Test with Low Solids Concentration

Exhibit 2: Solids Slurry Temperature and Agitator Power for Low Solids Concentration

INTER-OFFICE MEMORANDUM
Westinghouse Savannah River Company

SCS-ASG-93-0068
Non-critical Data

September 3, 1993

To: W. J. Jenkins, 704-1T, Rm 210

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R. C. Tuckfield, 773-42A

From: T.B. Edwards, 773-42A (5-5148)

A handwritten signature in dark ink, appearing to be "T.B. Edwards", written over the "From:" line.

A handwritten signature in dark ink, appearing to be "R.C. Tuckfield", written over the signature line.
R. C. Tuckfield, Manager

9/20/93 Date

Statistical Analysis of the Low Weight Percent Solids MFT
Homogeneity Study at TNX (U)

ao = abstract only

In order to conserve paper, two-sided copying has been employed and the abstract only has been sent to some on the distribution list (indicated by "ao"). Those individuals may request the full report from the author by phone (5-5148) or e-mail (EDWARDS-TB-B6678).

1.0 Abstract

This report summarizes the statistical analysis of the results from the Low Weight Percent Solids testing phase for the Melter Feed Tank (MFT) homogeneity study at TNX. The MFT homogeneity study involves sampling from the MFT when the tank's level is static and dynamic. The study consists of two parts: the high weight percent solids (first-half) (already reported on in SCS-ASG-93-0062 [1]) and the low weight percent solids (second-half). The objectives of the study are to investigate tank and flow homogeneity using elemental and weight percent solids analyses. The study, detailed in task plan WSRC-RP-92-1089 [2], supports the DWPF objective of verifying the homogeneity of the feed composition (Frit-Sludge-PHA) from the MFT to the melter while maximizing attainment by minimizing the heel level left in the MFT between batches. The design for this study is provided in document SCS-ASG-92058 [3].

Statistical analyses of both the weight percent solids and elementals data for the low weight percent solids phase of the MFT Homogeneity Study at TNX have been completed. For the static phases of the test, comparisons between the high grab and low grab samplers were made. The results from the weight percent solids analyses revealed no significant differences between the samplers over the tank level and mixer speed combinations of the static phases for the weight percent solids, calcine weight percent, and density measurements. The sampler contrasts for the elemental results also reveal no indication of a significant difference between the samplers for any of the elements.

Samples taken with the low- and high-grab samplers at the 2000 gallon tank level were different from the grab samples at the 6000-gallon tank level and from the MFT outlet samples at all tank levels. The wt % solids values from the high- and low-grab samplers at the 2000 gallon tank level are smaller than the other values. The weight percent values for Al, Ca, Cu, Fe, Mn, K, K-AA, Ni, and Ti from both the high- and low-grab samplers at the 2000 gallon tank level are larger than the values at other tank levels and from the MFT outlets. Discussions during the technical review of these results suggest that these phenomena may have been caused by a sizable quantity of Frit settling from the melter feed mixture during the approximate 80-hour lag between the taking of the last dynamic sample and the taking of the static samples at the 2000-gallon level.

The data from the two MFT outlets corresponding to the dynamic phases of the study have been also analyzed. The results from the weight percent solids and calcine weight percents showed statistically significant differences in these data across tank levels and outlets. For the weight percent solids, these differences expressed as percentages of the overall test average of 42.6 wt % are within the range (-1.8%, 1.5%). For the calcine weight percent solids, the differences expressed as percentages of the overall test average of 38.2 wt % are within the range (-2.2%, 2.6%). For the densities, these differences, which were not statistically significant, expressed as percentages of the overall test average of 1.30 grams/milliliter, are within the range (-1.5%, 0.8%). The results from the elemental analyses also revealed significantly different means and variances for the data over the tank levels and outlets for some of the elements. The relative differences between the largest and smallest average weight percents across the tank levels and outlets by element are: Al (4.8%), B (2.1%), Ca (7.9%), Cu (4.6%), Fe (4.2%), Mg (3.4%), K (11.7%), K-AA (7.2%), Mn (5.6%), Na (2.3%), Na-AA (1.3%), Ni (5.1%), Si (5.6%), and Ti (5.0%).

Comparisons between the results from the High Weight Percent Solids testing and those from the Low Weight Percent Solids testing reveal no inconsistencies between the two phases of the MFT homogeneity test.

2.0 Introduction

This report summarizes the statistical analysis of the results from the Low Weight Percent Solids (LW%S) testing phase for the Melter Feed Tank (MFT) homogeneity study at TNX. The MFT homogeneity study involves sampling from the MFT when the tank's level is static and dynamic. The study consists of two parts: the high weight percent solids (first-half, which was reported on in SCS-ASG-93-0062 [1]) and the low weight percent solids (second-half). The objectives of the study are to investigate tank and flow homogeneity using elemental and weight percent solids analyses. The study, detailed in task plan WSRC-RP-92-1089 [2], supports the DWPF objective of verifying the homogeneity of the feed composition (Frit-Sludge-PHA) from the MFT to the melter while maximizing attainment by minimizing the heel level left in the MFT between batches.

This document provides the statistical analysis of the data from the second-half, the LW%S part, of the MFT homogeneity study.

3.0 Statistical Design

The design for this study is provided in document SCS-ASG-92058 [3].

3.1 Test Conditions and Sample Collection

A total of 360 vials was acquired during the LW%S half of the testing. Samples were taken at static as well as dynamic tank levels and low as well as high mixer speeds. The details of these conditions are provided below. For the static level conditions, samples of the MFT were taken using both Low Grab and High Grab samplers. Vials filled using Low Grab and High Grab samples were identified with a G and H prefix, respectively. For the dynamic level conditions, samples were taken from the two MFT outlets (designated by X and Y prefixes in the vial identifier). The vial identifiers also included a number from 001 through 360 and a suffix of e (for elemental analysis) or a w (for weight percent solids analysis). Thus, the vial identifier sequentially numbers the vials in the order they were filled, indicates the method for filling the vial, and signifies the analytical method (elemental or weight percent solids) to be applied to the samples from the vials.

The test conditions and vials to be collected are given in reference [3].

Some additional comments regarding sample collection are warranted.

1. The Low Grab and High Grab samples were paired. That is, after the Low Grab vial was filled the corresponding High Grab vial for the pair was filled or vice versa (the order of Low and High was reversed).
2. The samples to be taken from each of the tank outlets during the dynamic level conditions were to be collected using a rack sufficiently sized to hold them. In

cases were one of the outlets clogged, all samples were taken from the working outlet.

3. The elevation of the Low Grab sampler is typically about 20 inches above the tank bottom and the elevation of the High Grab sampler is about 6 to 12 inches below the surface of the liquid level. For the testing with the tank level at 2000 gallons (only about 21 inches of depth above the bottom of the tank), special Low Grab samples, which were designated with a T prefix, were taken very near the bottom of the tank.

3.2 Blocking and Sequencing of Analyses

The analytical methods and the sequence of the analyses were designed to support the test objectives. All of the elemental samples were vitrified as soon as possible. K, B and S standards, as used in the previous PRBT study [4], were included in the blocking of the samples for analysis. This blocking allows for the comparison of the Low Grab versus High Grab samples both at the 6000 and 2000 gallons level. Also, the dynamic characteristics of the flow to the melter is investigated by comparisons of the elementals and weight percent solids sampled from the X and Y outlets during the test at the various tank levels.

The blocking of samples for elemental analysis was built around one vial from each outlet for each dynamic test and two vials making up a pair for comparing the two samplers for each static test. Since there were 16 pairs of vials for each phase of the static testing for the elementals, there were 16 blocks for this analysis. The instrumentation calibration (C) and calibration checks (I) were also indicated for each block. If a decision were made to adjust the instrumentation based on the results of an instrumentation calibration check, then the entire block of analytical work was repeated after the adjustment. Reference [3] provides the details on the blocking for the elemental analyses. Minor changes were made in the sequencing of the analyses in [3] to ensure that the first aliquot taken from each vial for analysis was so labeled.

There were 8 blocks for the weight percent solids analysis. Only one measurement was taken on each vial for the elemental. Two aliquots (which were designated by -1 and -2) and one measurement per aliquot were taken for the weight percent solids analysis. Reference [3] provides the details on the blocking used for these analyses.

4.0 Statistical Analysis

The section provides the results of the statistical analyses for both the weight percent and elementals data. The analyses were obtained using the SAS JMP statistical package (SAS Institute, Inc., Cary, NC 27512). See reference [5] for any additional information on this product.

4.1 Weight Percent Solids Analytical Results

The data from the weight percent (wt %) solids analyses are provided in Table 1 of Appendix A. The table provides

- an indicator for Mixer Speed which is L for low and H for high,
- the value for tank level in gallons,
- a sequence number indicating the order of analysis,
- a block indicator ranging from 1 to 8,
- an outlet indicator:

G	-	Low Grab sampler,
H	-	High Grab sampler,
T	-	Low Grab sampler at 2000 gallons,
X	-	one of the MFT outlets, and
Y	-	the other MFT outlet,
- the test sample identifier,
- the dried weight percent solids determination,
- the calcined weight percent solids measurement ,
- the density measurement in grams/milliliter (g/mL), and
- the analytical section's sample identifier.

4.1.1 Analytical Results versus Sequence of Analysis

Exhibit 1 in Appendix A provides plots of wt % solids, calcines, and densities versus analytical sequence numbers. The analytical results of samples from the tank heel are uniquely labeled to identify the source of weight percent solids results which are somewhat lower than the other values for the dried and calcined analyses . This phenomenon will be investigated below. No other significant problems are seen for any of these three plots.

4.1.2 Sampler Contrasts versus Tank Level and Mixer Speed

For each of the measurements of interest (weight percent solids, calcines, and densities), an investigation was made into the differences between the high grab sampler (H) and the low grab sampler (G) by tank level and mixer speed. Eight pairs of vials were taken using these two samplers at each static phase of the test to provide data to estimate the contrast for the two samplers. For this analysis, the two analyses from each vial were averaged to provide a single value for the vial (and thus, the corresponding sampler). The difference between these paired sampler measurements was expressed as a percentage of the low grab sampler value. Thus, there were eight pairs of results at each static phase of the test. The level of the tank at which the sample vial was taken is given in Table 1 in gallons, and the mixer speed is indicated as L (low) or H (high).

Exhibits 2-4 in Appendix A provide the results of a statistical analysis of the sampler contrast by tank level and mixer speed for weight percent solids, calcines, and densities, respectively. The results are summarized in Table 2 in Appendix A. A column of Table 2 provides a smallest significant bias (SSB) for the contrast. This statistic is explained in

Appendix B. The weight percent solids results indicate that the percent difference between the two samplers is not significantly different from zero for each of the three combinations of static tank level and mixer speed tested. There is also no indication of a difference in variability among the contrasts over the tank level and mixer speed combinations.

Similar results are seen in the calcine measurements. The contrast of the two samplers is not significantly different from zero at each combination of tank level and mixer speed with no indication of a difference in variability among the contrasts over the tank levels and mixer speeds. For the densities, the contrasts are not significantly different from zero and their variabilities are not significantly different.

4.1.3 MFT Outlets versus Tank Level and Mixer Speed

Sample vials were taken from each of the two MFT outlets (designated as X and Y) during the test. Questions concerning flow homogeneity across these two outlets and over the various tank levels were investigated using the analytical results from these samples.

4.1.3.1 Weight Percent Solids

Exhibit 5 in Appendix A provides an analysis of the weight percent solids results for each appropriate combination of tank level, mixer speed, and outlet. There is no indication of a significant difference in variability for the weight percent solids results among the combinations of tank levels, mixer speeds, and outlets, but these results are based on small sample sizes (only 4 observations). There is also no indication of a significant difference in mean response across the combinations of test conditions. Recall that the highest tank level (6000 gallons) was the initial level for the test; so this plot is in reverse order of the test sequence. The differences of the mean response values at the test conditions from the overall test average of 42.6 wt % (expressed as a percentage of this overall average) are within the range (-1.8% to 1.5%).

4.1.3.2 Calcines

Exhibit 6 in Appendix A provides a similar analysis for the calcine measurements. There is no indication of a significant difference in variability for these values over the combinations of test conditions. There is also no indication of a significant difference in mean response across the combinations of test conditions. Expressing the differences of the calcine wt % values from the overall test average of 38.2 wt % as a percentage of this average gives a low of -2.2% to a high of 2.6%.

4.1.3.3 Densities

Exhibit 7 in Appendix A provides the same analysis for the density measurements. There is no indication of a significant difference in variability or in mean response for the sample

densities among the combinations of tank level, mixer speed, and outlet. Expressing the differences of the density values from the overall test average of 1.30 g/mL as a percentage of this average gives a range with a low of -1.5% and a high of 0.8%.

4.1.4 Samplers and Outlets versus Tank Level and Mixer Speed

Exhibit 8 in Appendix A provides comparisons of the results (dried weight percent solids, calcined weight percent solids, densities) by sampler or outlet over the various tank level and mixer speed combinations. This chart echoes the phenomenon for the weight percent solids (dried and calcined) results from Exhibit 1. The wt % solids values from the high- and low-grab samplers at the 2000 gallon tank level are smaller than the values from other tank levels (9.4% for the dried wt % solids and 11.4% for the calcined), even those from the MFT outlets at the 2000 gallon level.

During the technical review process for the results from this MFT study, these facts and others presented below were discussed. The suggested explanation for these phenomena was that a sizable quantity of Frit may have settled from the melter feed mixture during the lag between the last dynamic sample being taken and the static, 2000-gallon samples being taken [6]. During the approximate 80-hour lag, the agitation was ineffective because of the low tank volume. A settling of Frit material would lead to a Sludge and PHA-rich melter feed which is consistent with the results for the weight percent solids of this section and with the elemental results presented below.

4.1.5 Descriptive Statistics for Weight Percent Solids, Calcines, and Densities

Table 3 in Appendix A provides summary statistics for each of these three data sets by various combinations of tank level, mixer speed, and sampler/outlet. Included in this table, for each data set, are the descriptive statistics: sample size, sample average, sample standard deviation, and relative standard deviation. The relative standard deviation is the standard deviation divided by the sample average with the ratio expressed as a percentage. The overall variabilities for the weight percent solids measurements, calcines, and densities as given by the sample relative standard deviations are 3.7%, 4.5% and 1.6%, respectively. These calculations include the data from samples from the tank heel. If the data from these samples are excluded from these calculations, then the sample relative standard deviations for the weight percent solids measurements, calcines, and densities are 1.7%, 2.2%, and 1.6%, respectively.

4.1.6 Comparison to Results from High Weight Percent Solids Phase of the Test

Table 4 in Appendix A provides summaries of the overall variabilities of the dried weight percent solids measurements, calcined weight percent solids measurements, and the densities for the two phases of the MFT study. Table 5 in Appendix A provides a comparison of the sampler contrasts across the two test phases. Table 6 in Appendix A provides a comparison of the largest relative differences among the results from the MFT outlets across the two test phases. As stated in [1], the weight percent solids results at the

2000 gallon level for the high weight percent solids test were significantly lower than the results at higher tank levels. This was attributed to dilution by water used to prime the pump during the last phase of that testing. These lower values at the 2000 tank level tend to increase the largest relative differences for the weight percent solids for the high weight percent solids tests. The largest relative differences for the weight percent solids measurements in Table 6 corresponding to the high weight percent solids tests are larger than those corresponding to the low weight percent solids. An additional column has been provided which gives the largest relative differences for the weight percent solids measurements for the high weight percent solids test excluding the 2000-gallon results. This column of results is more in line with the low weight percent solids results. No problems are seen in these three tables.

4.2 Elemental Analytical Results

All twelve of the elements - aluminum (Al), boron (B), calcium (Ca), copper (Cu), iron (Fe), potassium (K), magnesium (Mg), manganese (Mn), sodium (Na), nickel (Ni), silicon (Si), and titanium (Ti) - were measured by Inductively Coupled Plasma/Atomic Emission (ICP); additional measurements for K and Na were made using Atomic Absorption (AA) Spectrophotometer instruments. The elemental analyses are presented in Tables 7 and 8 of Appendix A. The measurements are in weight percent (wt %), and the AA values for K and Na are denoted by a "-AA" suffix in the symbols for the elements.

These tables provide

- the mixer speed indicator (L for low and H for high),
- the value for nominal tank level in gallons,
- the sequence number indicating the order of analysis,
- the block indicator ranging from 1 to 16,
- the vial number,
- the standard, outlet, or sampler identifier,
- the test sample identifier,
- the analytical section's sample identifier
- the ICP measurements in wt % for each element
(Al, B, Ca, Cu, Fe, Mg, and Mn in Table 7 and
Ni, K, Si, and Ti in Table 8), and
- the AA measurements in wt % for K and Na in Table 8.

4.2.1 Check Standards: K, S, and B

The three different types of standards - K, S, and B - were included along with the tank samples for elemental analysis. The K and S check standards were dissolutions of the same EA Glass Standard. A single batch of the K standard, sufficient to provide appropriate samples for this test, was prepped once before the start of this test. Each of the S standards was prepped individually. The B standards are blanks.

Exhibits 9-15 in Appendix A provide a plot of the wt % values for each of the elementals for both the K and S standards versus the analytical blocks. Looking across all of the elementals, no systematic problem is evident in these plots. Some possible outliers may be present in these data: a low value for Al in block 5, a high value for Mg in block 2, and a low value for Na in block 2. The strange appearance of the plot for Cu on Exhibit 10 is explained by the fact that the EA Glass Standard contained no copper. The K-AA results for the first six blocks are recorded as zero values.

The reference values for the elements for the EA Glass Standard are included in Table 9 in Appendix A. This table was prepared from the information appearing in Exhibits 16-18 in Appendix A. These exhibits provide the descriptive statistics for the elemental analyses for the K, S, and B standards, respectively. Across the elements under consideration, only Ca and Na revealed statistically significant biases in the analysis of the B standards and these are of no practical significance. There is also no significant difference between the analytical results for the S and K standards. However, Table 9 reveals that both the S and K standards are biased low compared to the reference values for all elements present in the EA Glass Standard.

4.2.2 Tank Sample Results by Analytical Sequence Number

Exhibits 19-22 in Appendix A provide a plot of the wt % values for each of the elementals versus the analytical sequence number. The results from tank heel samples are uniquely labeled in these graphs. Some potential outliers are seen in these graphs for various elementals, and some trends are also apparent. The patterns causing the most concern are those for K, K-AA, and Na. There appear to be shifts in the mean values for these measurements over the analytical sequence: at about sequence number 25 for K, at about 110 for K-AA, and at about 25 for Na. No modifications were made to the analytical results for these elementals in the statistical analyses below.

4.2.3 Sampler Contrasts versus Tank Level and Mixer Speed

For each of the elementals of interest, an investigation was made into the differences between results from the high grab sampler (H) and the low grab sampler (G) by tank level and mixer speed. Sixteen pairs of vials were taken using these two samplers at each static phase of the test to provide data to estimate the contrast for the two samplers. The difference between these paired sampler measurements was expressed as a percentage of the low grab sampler value. Thus, there were 16 pairs of results at each static phase of the test. The level of the tank at which the sample vial was taken is given in tables 3 and 4 in gallons, and the corresponding mixer speed is indicated as L (low) or H (high).

Exhibits 23-36 in Appendix A provide the results of a statistical analysis of the sampler contrast by tank level and mixer speed for each of the elementals. There are three tank level - mixer speed combinations for the static phase of the study:

Tank Level (gallons)	Mixer Speed
6000	Low
6000	High
2000	Low

These analyses check for significant differences in the sampler contrasts over the three tank level and mixer speed combinations and test that the variances of the contrast data are equal for these three combinations as well. Only for Al, Fe and Ti is there an indication of a significantly different variability in the contrast data over the combinations of tank level and mixer speed. There is no indication of a significant difference between the samplers at each of the three tank level and mixer speed combinations. There is, however, some indication of a statistically significant (but very small) difference in the sampler contrast over the tank level and mixer speed combinations for B, Na, K, and K-AA. The results are summarized in Table 10 in Appendix A. The smallest significant bias (SSB) for each of these comparisons is also included in this table.

4.2.4 MFT Outlets versus Tank Level and Mixer Speed

As for the weight percent solids analyses above, sample vials were taken from each of the two MFT outlets (designated as X and Y) during the dynamic phase of the testing. Questions concerning flow homogeneity, for each of the elements of concern, across these two outlets and over the various tank levels were investigated using the elemental analytical results from these samples.

Exhibits 37-50 in Appendix A provide a statistical analysis for each of the elementals by tank level and outlet. The exhibits provide tests for significantly different means and variances over the tank levels and outlets. The test for equal variances is judged based upon the results of Levene's test. Using this test, only iron shows results with significantly different variances over these combinations of tank levels and outlets. Ca, Fe, Mg, Mn, and Ni show results that indicate significantly different average weight percent measurements over the combinations of tank level, mixer speed, and outlet. The information from these exhibits is used to produce Table 11 in Appendix A. Table 11 provides the largest relative difference over these tank levels and the smallest significant bias for each elemental and indicates significant differences among the means and variances for each elemental.

4.2.5 Samplers and Outlets versus Tank Level and Mixer Speed

Exhibits 51-55 in Appendix A provide comparisons of the elemental wt %'s by sampler and outlet over the various tank level and mixer speed combinations. These charts reinforce the hypothesis that Frit material settled during the lag between the last of the dynamic sampling and the taking of static samples at the 2000-gallon level. A comparison of the elemental weight percent values from the tank heel versus the other samples is given in Table 12 of Appendix A. Samples taken from the tank heel seem to be Sludge and PHA rich. The concentrations of Al, Ca, Fe, Mn and Ni which are in

Sludge and Cu, K, and Ti which are in PHA are higher than expected in the tank heel versus the values of the concentrations from the other samples.

4.2.6 Comparison of ICP versus AA Results for K and Na

An opportunity exists to compare the ICP and AA results for both potassium (K) and sodium (Na). Exhibits 56-59 in Appendix A provide statistical analyses of this comparison across check standards K and S by block and across all tank samples by block.

For the first two exhibits, the differences between the ICP and AA values are analyzed by block for the two check standards K and S. The difference is determined by subtracting the ICP value from the corresponding AA value. Exhibit 50 and 51 provide the analysis for potassium (K) and sodium (Na), respectively. The potassium results are expressed in absolute units since the weight percent of potassium in the EA Glass standards is very small. The sodium results are expressed as a percentage of the ICP values. For both elements, the means of these differences across the analytical blocks are statistically different as well as the variability of these differences. The block 2 results for potassium appear to be different from the other blocks, and there does not appear to be any significant difference in the AA and ICP results if this block is ignored. For sodium, there does not appear to be a systematic difference between the two analytical methods. For the first ten blocks, the ICP results are usually somewhat greater than those from AA with the reverse of this being true after the tenth block.

The last two exhibits analyze the relative differences between the ICP and AA values expressed as a percentage of the ICP value for the tank samples. Exhibit 58 and 59 provide the analysis for potassium (K) and sodium (Na), respectively. Blocks 2 through 5 for potassium appear to be significantly lower than the other blocks. For potassium, the AA values are consistently lower than the ICP values: the AA values are on average 27.1% below those from ICP. The plotted results for sodium reveal no systematic pattern with the AA values on average only 1.6% below the ICP values.

4.2.7 Descriptive Statistics for Elementals

Tables 13-17 in Appendix A provide summary statistics for each elemental data set by various combinations of tank level, mixer speed, and sampler/outlet. Included in these tables, for each element, are the descriptive statistics: sample size, sample average, sample standard deviation, and relative standard deviation. The relative standard deviation is the standard deviation divided by the sample average with the ratio expressed as a percentage. The relative standard deviations for the elements over the entire test are Al (6.8%), B (2.0%), Ca (6.2%), Cu (5.4%), Fe (5.5%), Mg (2.5%), K (9.6%), K-AA (14.6%), Mn (5.7%), Na (3.8%), Na-AA (3.5%), Ni (5.3%), Si (6.4%), and Ti (7.7%). If the results from tank heel samples are excluded from the calculations, the relative standard deviations become: Al (6.0%), B (2.0%), Ca (3.1%), Cu (3.0%), Fe (2.5%), Mg (2.1%), K (8.1%), K-AA (13.4%), Mn (2.7%), Na (3.8%), Na-AA (3.3%), Ni (3.1%), Si (5.9%), and Ti (6.2%).

4.2.8 Comparison to Results from High Weight Percent Solids Phase of the Test

Table 18 in Appendix A provides summaries of the overall variabilities of the elemental weight percent measurements for the two phases of the MFT study. The results compare very well (the largest relative difference is 3.9%), and no problems are seen in this table. Table 19 in Appendix A provides a comparison of the sampler contrasts across the two test phases. No problems are seen in these results. Table 20 in Appendix A provides a comparison of the largest relative differences among the results from the MFT outlets across the two test phases. The results appear to be reasonably consistent over the two tests. Table 21 in Appendix A provides a comparison of the ICP and AA results across the two test phases. The ICP measurements for potassium appear to be consistently larger than those obtained using the AA instrumentation.

4.3 Samplers and MFT Outlets versus Tank Level and Mixer Speed for High Weight Percent Solids Phase of the Test

Are the results from the High Weight Percent Solids Phase of the MFT test consistent with the hypothesis put forward as an explanation for the results from samples taken from the tank heel for the Low Weight Percent Solids Phase of the test? Since there was a lag of about 60 hours between the taking of the last dynamic sample and the taking of the tank heel samples, an opportunity did exist for the Frit to settle from the melter feed mixture. Exhibits 60-65 in Appendix A provide charts for the high weight percent solids phase of the MFT testing for comparing of the wt % solids (dried and calcined), densities, and elemental wt %'s by sampler and outlet over the various tank level and mixer speed combinations.

The weight percent solids (dried and calcined) do show a significant decrease in values associated with the tank heel. However, this decrease is also present in the outlet samples, and these decreases resulted from the addition of water to the tank to prime the pump during the high solids testing. This explanation is reinforced by the elemental results shown in Exhibits 61-65. The elemental results from the tank heel are not statistically different from the values from the MFT outlet at the 2000-gallon tank level. There is, however, some tendency for the elemental results from the heel to follow a pattern consistent with the hypothesis that the Frit settled from the melter feed mixture during the lag between the sampling.

5.0 Areas For Further Analysis

The statistical analyses reported within address issues of sampler contrasts and homogeneity of feed slurry using a univariate approach for analyzing the MFT data, including the elemental data. Although this univariate approach for the analysis of the elemental data is felt to be adequate for the issues of this task, a multivariate treatment of these data may provide information of value for other process control efforts. Also, the estimation of variance components from these data would provide information necessary

for appropriate propagation of error to accommodate changing sample sizes and the like for other studies.

6.0 Conclusions

Statistical analyses of both the weight percent and elementals data for the low weight percent solids phase of the MFT Homogeneity Study at TNX have been completed. For the static phases of the test, comparisons between the high grab and low grab samplers were made. The results from the weight percent solids analyses revealed no significant differences between the samplers over the tank level and mixer speed combinations of the static phases for the weight percent solids, calcine weight percent, and density measurements. The sampler contrasts for the elemental results also reveal no indication of a significant difference between the samplers for any of the elements.

Samples taken with the low- and high-grab samplers at the 2000 gallon tank level were different from the grab samples at the 6000-gallon tank level and from the MFT outlet samples at all tank levels. The wt % solids values from the high- and low-grab samplers at the 2000 gallon tank level are smaller than the other values. The weight percent values for some of the elementals from both the high- and low-grab samplers at the 2000 gallon tank level are different than the values from the samplers at the other tank level and from the MFT outlets at all levels. Discussions during the technical review of these results suggest that these phenomena may have been caused by a sizable quantity of Frit settling from the melter feed mixture during the approximate 80-hour lag between the taking of the last dynamic sample and the taking of the static samples at the 2000-gallon level.

The data from the two MFT outlets corresponding to the dynamic phases of the study have been also analyzed. The results from the weight percent solids and calcine weight percents showed statistically significant differences in these data across tank levels and outlets. For the weight percent solids, these differences expressed as a percentage of the overall test average of 42.6 wt % are within the range (-1.8%, 1.5%). For the calcine weight percent solids, the differences expressed as a percentage of the overall test average of 38.2 wt % are within the range (-2.2%, 2.6%). For the densities, these differences, which were not statistically significant, expressed as a percentage of the overall test average of 1.30 g/mL are within the range (-1.5%, 0.8%). The results from the elemental analyses also revealed significantly different means and variances for the data over the tank levels and outlets for some of the elements. The relative differences between the largest and smallest average weight percents across the tank levels and outlets by element are: Al (4.8%), B (2.1%), Ca (7.9%), Cu (4.6%), Fe (4.2%), Mg (3.4%), K (11.7%), K-AA (7.2%), Mn (5.6%), Na (2.3%), Na-AA (1.3%), Ni (5.1%), Si (5.6%), and Ti (5.0%).

Comparisons between the High Weight Percent Solids results and Low Weight Percent Solids results reveal no inconsistencies between the two phases of the MFT homogeneity test.

7.0 References

- [1] Edwards, T. B., Memorandum to W. J. Jenkins "Statistical Analysis of the High Weight Percent Solids MFT Homogeneity Study at TNX (U)," SCS-ASG-93-0062, August 4, 1993.
- [2] Jenkins, W. J., Memorandum to C. T. Randall "Task Plan for MFT Homogeneity Study at TNX (U)," WSRC-RP-92-1089 Rev. 0, December 15, 1992.
- [3] Edwards, T. B., Memorandum to W. J. Jenkins "Statistical Design for MFT Homogeneity Study at TNX (U)," SCS-ASG-92058, August 27, 1992.
- [4] Edwards, T. B., Memorandum to W. J. Jenkins "Statistical Analysis of PRBT Prototypic Liquid Sampler Test Data (U)," SCS-ASG-92034, April 28, 1992.
- [5] **JMP® User's Guide: Version 2 of JMP**, SAS Institute Inc., SAS Campus Drive, Cary, NC, 1989.
- [6] Brown, K. G., Memorandum to T. B. Edwards "Explanation of Melter Feed Tank Low Solids Results (U)," SRTC-PMC-93-0172, September 10, 1993.
- [7] Reeve, C. P., Memorandum to W. J. Jenkins "Statistical Analysis of WP-19 Sampler Data: PRBT (U)," SCS-ASG-93-0036, April 30, 1993.

8.0 Appendices

8.1 Appendix A: Tables and Exhibits

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- Exhibit 30. Percent Relative Difference Between Samplers for Sodium Concentrations by Tank Level and Mixer Speed

- Exhibit 31. Percent Relative Difference Between Samplers for Sodium (AA) Concentrations by Tank Level and Mixer Speed
- Exhibit 32. Percent Relative Difference Between Samplers for Nickel Concentrations by Tank Level and Mixer Speed
- Exhibit 33. Percent Relative Difference Between Samplers for Potassium Concentrations by Tank Level and Mixer Speed
- Exhibit 34. Percent Relative Difference Between Samplers for Potassium (AA) Concentrations by Tank Level and Mixer Speed
- Exhibit 35. Percent Relative Difference Between Samplers for Silicon Concentrations by Tank Level and Mixer Speed
- Exhibit 36. Percent Relative Difference Between Samplers for Titanium Concentrations by Tank Level and Mixer Speed
- Exhibit 37. Aluminum Concentrations by Outlet by Tank Level
- Exhibit 38. Boron Concentrations by Outlet by Tank Level
- Exhibit 39. Calcium Concentrations by Outlet by Tank Level
- Exhibit 40. Copper Concentrations by Outlet by Tank Level
- Exhibit 41. Iron Concentrations by Outlet by Tank Level
- Exhibit 42. Magnesium Concentrations by Outlet by Tank Level
- Exhibit 43. Manganese Concentrations by Outlet by Tank Level
- Exhibit 44. Nickel Concentrations by Outlet by Tank Level
- Exhibit 45. Potassium Concentrations by Outlet by Tank Level
- Exhibit 46. Potassium (AA) Concentrations by Outlet by Tank Level
- Exhibit 47. Silicon Concentrations by Outlet by Tank Level
- Exhibit 48. Sodium Concentrations by Outlet by Tank Level
- Exhibit 49. Sodium (AA) Concentrations by Outlet by Tank Level
- Exhibit 50. Titanium Concentrations by Outlet by Tank Level

- Exhibit 51. Aluminum, Boron, and Calcium by Tank Level, Mixer Speed, Sampler, and Outlet
- Exhibit 52. Copper, Iron, and Magnesium by Tank Level, Mixer Speed, Sampler, and Outlet
- Exhibit 53. Manganese, Potassium, and Potassium (AA) by Tank Level, Mixer Speed, Sampler, and Outlet
- Exhibit 54. Nickel, Sodium, and Sodium (AA) by Tank Level, Mixer Speed, Sampler, and Outlet
- Exhibit 55. Silicon and Titanium by Tank Level, Mixer Speed, Sampler, and Outlet
- Exhibit 56. Differences Between ICP and AA Results for Potassium for the K and S Standards by Block
- Exhibit 57. Percent Relative Difference Between ICP and AA Results for Sodium for the K and S Standards by Block
- Exhibit 58. Percent Relative Difference Between ICP and AA Results for Potassium for Tank Samples by Block
- Exhibit 59. Percent Relative Difference Between ICP and AA Results for Sodium for Tank Samples by Block
- Exhibit 60. Average Weight Percent Solids, Calcines, and Densities by Tank Level, Mixer Speed, Outlet and Sampler for High Weight Percent Solids Test
- Exhibit 61. Aluminum, Boron, and Calcium by Tank Level, Mixer Speed, Sampler, and Outlet for High Weight Percent Solids Test
- Exhibit 62. Copper, Iron, and Magnesium by Tank Level, Mixer Speed, Sampler, and Outlet for High Weight Percent Solids Test
- Exhibit 63. Manganese, Potassium, and Potassium (AA) by Tank Level, Mixer Speed, Sampler, and Outlet for High Weight Percent Solids Test
- Exhibit 64. Nickel, Sodium, and Sodium (AA) by Tank Level, Mixer Speed, Sampler, and Outlet for High Weight Percent Solids Test
- Exhibit 65. Silicon and Titanium by Tank Level, Mixer Speed, Sampler, and Outlet for High Weight Percent Solids Test

Table 1. Weight Percent Solids, Calcine, and Density Measurements

All measurements are expressed as a weight percent except density which is grams/milliliter.

Mixer Speed	Tank Level (gallons)	Vial #	Sample ID	Block	Analytical Sequence	Sampler/Outlet	Dried Wt % Solids	Calcined Wt % Solids	Density (grams/milliliter)	Lab Sample ID
L	3500	240	2Y240W-1	1	1	Y	41.89	37.89	1.3301	200032002
H	5000	165	2Y165W-1	1	2	Y	40.80	36.90	1.2997	200032003
H	5000	165	2Y165W-2	1	3	Y	41.34	37.37	1.2962	200032004
L	2500	288	2Y288W-1	1	4	Y	42.69	38.23	1.3403	200032005
H	4000	214	2Y214W-1	1	5	Y	41.40	37.40	1.3195	200032006
L	2000	311	2Y311W-1	1	6	Y	41.48	37.37	1.3172	200032007
H	5500	142	2Y142W-1	1	7	Y	41.33	37.06	1.3201	200032008
L	6000	42	2G042W-1	1	8	G	42.01	37.79	1.3311	200032009
L	6000	41	2H041W-1	1	9	H	42.94	38.57	1.3286	200032010
H	6000	89	2G089W-1	1	10	G	42.81	38.53	1.3352	200032011
H	6000	90	2H090W-1	1	11	H	43.58	39.10	1.3584	200032012
L	2000	354	2T354W-1	1	12	T	39.19	34.46	1.3344	200032013
L	2000	353	2H353W-1	1	13	H	37.79	33.15	1.2976	200032014
H	5500	142	2Y142W-2	1	14	Y	41.48	36.98	1.3270	200032015
H	4500	191	2Y191W-1	1	15	Y	41.49	36.98	1.3270	200032016
L	3000	261	2Y261W-1	1	16	Y	41.43	36.95	1.3159	200032017
L	3500	240	2Y240W-2	1	17	Y	42.20	37.65	1.3242	200032018
L	6000	42	2G042W-2	1	18	G	42.76	38.30	1.3474	200032019
L	6000	41	2H041W-2	1	19	H	43.26	38.74	1.3506	200032020
H	6000	89	2G089W-2	1	20	G	43.14	38.72	1.3452	200032021
H	6000	90	2H090W-2	1	21	H	42.84	38.25	1.3438	200032022
L	2000	354	2T354W-2	1	22	T	38.72	33.79	1.3336	200032023
L	2000	353	2H353W-2	1	23	H	38.13	33.20	1.2908	200032024
L	2500	288	2Y288W-2	1	24	Y	42.23	37.52	1.3311	200032025
H	6000	117	2Y117W-1	1	25	Y	41.26	36.77	1.3290	200032026
H	6000	117	2Y117W-2	1	26	Y	42.15	37.26	1.3489	200032027
L	2000	311	2Y311W-2	1	27	Y	43.91	38.77	1.3556	200032028
L	3000	261	2Y261W-2	1	28	Y	42.52	37.80	1.3474	200032029
H	4500	191	2Y191W-2	1	29	Y	42.03	37.18	1.3049	200032030
H	4000	214	2Y214W-2	1	30	Y	41.98	37.13	1.3200	200032031
H	4500	187	2X187W-1	2	31	X	42.60	38.00	1.2984	200032255
L	2000	306	2X306W-1	2	32	X	43.38	38.73	1.2951	200032256
H	5000	162	2X162W-1	2	33	X	41.88	37.29	1.2768	200032257
H	4000	212	2X212W-1	2	34	X	43.07	38.28	1.2731	200032258
H	5500	138	2X138W-1	2	35	X	42.85	38.26	1.2716	200032259
L	2500	281	2X281W-1	2	36	X	42.30	37.62	1.2582	200032260
L	6000	37	2G037W-1	2	37	G	42.82	38.15	1.3045	200032261
L	6000	38	2H038W-1	2	38	H	42.24	37.71	1.2927	200032262
H	6000	85	2G085W-1	2	39	G	43.48	39.09	1.3294	200032263
H	6000	86	2H086W-1	2	40	H	43.39	38.93	1.3178	200032264
L	2000	350	2T350W-1	2	41	T	37.91	33.06	1.2608	200032265
L	2000	349	2H349W-1	2	42	H	38.40	33.61	1.2943	200032266
H	4000	212	2X212W-2	2	43	X	43.63	38.77	1.2381	200032267
L	2000	306	2X306W-2	2	44	X	43.71	39.19	1.2839	200032268
L	6000	37	2G037W-2	2	45	G	43.08	38.61	1.3248	200032269
L	6000	38	2H038W-2	2	46	H	42.97	38.56	1.3134	200032270
H	6000	85	2G085W-2	2	47	G	43.44	39.28	1.3229	200032271
H	6000	86	2H086W-2	2	48	H	42.56	38.20	1.2976	200032272
L	2000	350	2T350W-2	2	49	T	38.48	33.84	1.2661	200032273
L	2000	349	2H349W-2	2	50	H	38.70	34.13	1.2886	200032274
L	3500	235	2X235W-1	2	51	X	42.40	37.99	1.2987	200032275
H	4500	187	2X187W-2	2	52	X	43.33	39.27	1.3226	200032276
H	6000	113	2X113W-1	2	53	X	41.92	37.65	1.3067	200032277
L	2500	281	2X281W-2	2	54	X	42.70	39.04	1.2932	200032278
L	3000	259	2X259W-1	2	55	X	42.67	38.43	1.2950	200032279
H	5000	162	2X162W-2	2	56	X	42.20	37.82	1.2908	200032280
H	5500	138	2X138W-2	2	57	X	43.35	39.11	1.2980	200032281
L	3000	259	2X259W-2	2	58	X	43.28	41.79	1.2924	200032282
H	6000	113	2X113W-2	2	59	X	42.03	37.99	1.2949	200032283
L	3500	235	2X235W-2	2	60	X	42.92	38.67	1.3256	200032284

Table 1. Weight Percent Solids, Calcine, and Density Measurements (con't)

All measurements are expressed as a weight percent except density which is grams/milliliter.

Mixer Speed	Tank Level (gallons)	Vial #	Sample ID	Block	Analytical Sequence	Sampler/Outlet	Dried Wt % Solids	Calcined Wt % Solids	Density (grams/milliliter)	Lab Sample ID
H	4000	215	2Y215W-1	3	61	Y	41.40	36.57	1.2814	200032432
H	5000	167	2Y167W-1	3	62	Y	42.65	37.88	1.3058	200032433
H	5500	144	2Y144W-1	3	63	Y	42.11	37.35	1.2662	200032434
L	2000	312	2Y312W-1	3	64	Y	41.99	37.31	1.2931	200032435
L	3000	262	2Y262W-1	3	65	Y	42.98	38.46	1.3082	200032436
L	2500	287	2Y287W-1	3	66	Y	42.22	37.65	1.3003	200032437
H	5500	144	2Y144W-2	3	67	Y	41.96	38.78	1.2900	200032438
L	2500	287	2Y287W-2	3	68	Y	42.66	38.17	1.2849	200032439
L	2000	312	2Y312W-2	3	69	Y	42.08	37.55	1.2640	200032440
H	4500	189	2Y189W-1	3	70	Y	41.89	37.32	1.2912	200032441
H	4000	215	2Y215W-2	3	71	Y	41.87	37.32	1.2494	200032442
L	3500	238	2Y238W-1	3	72	Y	42.02	37.49	1.2823	200032443
L	3000	262	2Y262W-2	3	73	Y	43.36	38.92	1.2804	200032444
L	6000	46	2G046W-1	3	74	G	42.69	38.20	1.2952	200032445
L	6000	45	2H045W-1	3	75	H	43.16	38.70	1.3186	200032446
H	6000	93	2G093W-1	3	76	G	42.86	38.32	1.2897	200032447
H	6000	94	2H094W-1	3	77	H	43.52	39.01	1.2500	200032448
L	2000	358	2T358W-1	3	78	T	38.21	33.32	1.2829	200032449
L	2000	357	2H357W-1	3	79	H	38.47	33.89	1.2620	200032450
H	5000	167	2Y167W-2	3	80	Y	42.93	38.48	1.2696	200032451
L	3500	238	2Y238W-2	3	81	Y	42.62	38.07	1.2578	200032452
H	6000	118	2Y118W-1	3	82	Y	41.16	36.76	1.2559	200032453
H	6000	118	2Y118W-2	3	83	Y	41.58	37.06	1.2825	200032454
L	6000	46	2G046W-2	3	84	G	42.88	38.33	1.3094	200032455
L	6000	45	2H045W-2	3	85	H	43.41	38.99	1.3121	200032456
H	6000	93	2G093W-2	3	86	G	42.76	38.21	1.2873	200032457
H	6000	94	2H094W-2	3	87	H	43.52	38.85	1.2866	200032458
L	2000	358	2T358W-2	3	88	T	38.26	33.52	1.2751	200032459
L	2000	357	2H357W-2	3	89	H	38.95	33.23	1.2662	200032460
H	4500	189	2Y189W-2	3	90	Y	42.18	37.40	1.2828	200032461
H	4000	209	2X209W-1	4	91	X	42.16	37.45	1.2688	200032518
H	6000	116	2X116W-1	4	92	X	41.94	37.13	1.3065	200032519
L	2500	283	2X283W-1	4	93	X	42.27	37.69	1.3106	200032520
H	4500	186	2X186W-1	4	94	X	42.35	37.60	1.2918	200032521
L	3000	257	2X257W-1	4	95	X	42.86	38.21	1.2880	200032522
H	5500	139	2X139W-1	4	96	X	43.21	38.61	1.3020	200032523
L	3500	236	2X236W-1	4	97	X	42.74	38.21	1.3067	200032524
H	5000	161	2X161W-1	4	98	X	42.21	37.68	1.2930	200032525
H	5500	139	2X139W-2	4	99	X	43.51	39.04	1.3119	200032526
L	6000	33	2G033W-1	4	100	G	43.25	38.55	1.3176	200032527
L	6000	34	2H034W-1	4	101	H	42.92	38.19	1.3274	200032528
H	6000	81	2G081W-1	4	102	G	42.57	38.18	1.3136	200032529
H	6000	82	2H082W-1	4	103	H	42.12	37.52	1.3479	200032530
L	2000	346	2T346W-1	4	104	T	38.28	33.35	1.2910	200032531
L	2000	345	2H345W-1	4	105	H	39.14	34.11	1.2894	200032532
L	3500	236	2X236W-2	4	106	X	42.97	38.31	1.3138	200032533
H	4500	186	2X186W-2	4	107	X	42.54	37.89	1.3220	200032534
L	2500	283	2X283W-2	4	108	X	42.95	38.38	1.3230	200032535
H	6000	116	2X116W-2	4	109	X	42.27	37.58	1.3302	200032536
H	5000	161	2X161W-2	4	110	X	42.67	38.16	1.2951	200032537
L	3000	257	2X257W-2	4	111	X	43.18	38.63	1.3166	200032538
L	6000	33	2G033W-2	4	112	G	42.33	40.91	1.3369	200032539
L	6000	34	2H034W-2	4	113	H	43.56	36.06	1.3410	200032540
H	6000	81	2G081W-2	4	114	G	42.84	38.47	1.3269	200032541
H	6000	82	2H082W-2	4	115	H	42.55	38.16	1.3265	200032542
L	2000	346	2T346W-2	4	116	T	38.62	33.90	1.2744	200032543
L	2000	345	2H345W-2	4	117	H	39.40	34.64	1.2800	200032544
H	4000	209	2X209W-2	4	118	X	42.59	38.17	1.2693	200032545
L	2000	308	2X308W-1	4	119	X	43.09	38.50	1.3030	200032546
L	2000	308	2X308W-2	4	120	X	43.07	38.27	1.2976	200032547

Table 1. Weight Percent Solids, Calcine, and Density Measurements (con't)

All measurements are expressed as a weight percent except density which is grams/milliliter.

Mixer Speed	Tank Level (gallons)	Vial #	Sample ID	Block	Analytical Sequence	Sampler/Outlet	Dried Wt % Solids	Calcined Wt % Solids	Density (grams/milliliter)	Lab Sample ID
L	3000	258	2X258W-1	5	121	X	42.77	38.11	1.3096	200032666
H	6000	115	2X115W-1	5	122	X	41.68	37.19	1.3144	200032667
L	2500	282	2X282W-1	5	123	X	42.32	37.88	1.2946	200032668
H	4500	188	2X188W-1	5	124	X	42.61	38.16	1.2982	200032669
L	2500	282	2X282W-2	5	125	X	42.83	38.62	1.2982	200032670
H	5500	137	2X137W-1	5	126	X	42.03	38.24	1.3004	200032671
H	4500	188	2X188W-2	5	127	X	43.35	39.14	1.2890	200032672
H	5500	137	2X137W-2	5	128	X	41.38	37.13	1.3288	200032673
L	3500	233	2X233W-1	5	129	X	42.41	37.95	1.3060	200032674
L	6000	40	2G040W-1	5	130	G	43.32	38.81	1.3204	200032675
L	6000	39	2H039W-1	5	131	H	41.80	37.44	1.3122	200032676
H	6000	88	2G088W-1	5	132	G	42.56	38.13	1.3357	200032677
H	6000	87	2H087W-1	5	133	H	42.85	38.28	1.3071	200032678
L	2000	351	2T351W-1	5	134	T	38.56	33.58	1.2820	200032679
L	2000	352	2H352W-1	5	135	H	39.11	34.21	1.2938	200032680
H	4000	211	2X211W-1	5	136	X	41.90	37.37	1.2783	200032681
L	3500	233	2X233W-2	5	137	X	43.05	38.45	1.3274	200032682
H	4000	211	2X211W-2	5	138	X	42.24	37.85	1.3020	200032683
H	5000	164	2X164W-1	5	139	X	42.03	37.45	1.2903	200032684
L	3000	258	2X258W-2	5	140	X	43.13	38.49	1.3201	200032685
H	5000	164	2X164W-2	5	141	X	42.43	37.93	1.2974	200032686
L	2000	305	2X305W-1	5	142	X	43.15	38.61	1.3182	200032687
L	2000	305	2X305W-2	5	143	X	43.43	38.95	1.2924	200032688
L	6000	40	2G040W-2	5	144	G	42.86	38.49	1.2952	200032689
L	6000	39	2H039W-2	5	145	H	42.45	37.89	1.2980	200032690
H	6000	88	2G088W-2	5	146	G	42.58	37.90	1.3055	200032691
H	6000	87	2H087W-2	5	147	H	42.91	38.22	1.2727	200032692
L	2000	351	2T351W-2	5	148	T	38.77	34.18	1.2718	200032693
L	2000	352	2H352W-2	5	149	H	39.31	34.32	1.2834	200032694
H	6000	115	2X115W-2	5	150	X	41.63	37.06	1.2907	200032695
H	4000	210	2X210W-1	6	151	X	43.29	38.59	1.2897	200032698
H	5500	140	2X140W-1	6	152	X	42.81	37.98	1.3170	200032699
L	3500	234	2X234W-1	6	153	X	42.59	38.12	1.2991	200032700
H	6000	114	2X114W-1	6	154	X	42.03	37.61	1.2873	200032701
L	2500	284	2X284W-1	6	155	X	42.87	38.39	1.3044	200032702
H	4500	185	2X185W-1	6	156	X	43.27	38.78	1.2941	200032703
L	6000	35	2G035W-1	6	157	G	42.28	37.86	1.3112	200032704
L	6000	36	2H036W-1	6	158	H	42.23	37.87	1.3136	200032705
H	6000	84	2G084W-1	6	159	G	43.70	39.24	1.3146	200032706
H	6000	83	2H083W-1	6	160	H	42.28	37.90	1.3158	200032707
L	2000	347	2T347W-1	6	161	T	38.05	33.24	1.2765	200032708
L	2000	348	2H348W-1	6	162	H	38.19	33.03	1.2678	200032709
L	3000	260	2X260W-1	6	163	X	44.06	39.58	1.3203	200032710
L	6000	35	2G035W-2	6	164	G	42.61	38.13	1.3218	200032711
L	6000	36	2H036W-2	6	165	H	42.01	37.30	1.2947	200032712
H	6000	84	2G084W-2	6	166	G	43.89	39.28	1.3044	200032713
H	6000	83	2H083W-2	6	167	H	42.68	38.35	1.3033	200032714
L	2000	347	2T347W-2	6	168	T	38.76	34.23	1.2929	200032715
L	2000	348	2H348W-2	6	169	H	38.73	34.43	1.2946	200032716
H	4500	185	2X185W-2	6	170	X	43.43	39.31	1.2874	200032717
H	6000	114	2X114W-2	6	171	X	42.74	38.20	1.2946	200032718
L	3500	234	2X234W-2	6	172	X	42.81	38.57	1.3013	200032719
L	2500	284	2X284W-2	6	173	X	43.40	39.21	1.2881	200032720
L	2000	307	2X307W-1	6	174	X	41.57	37.45	1.3137	200032721
L	2000	307	2X307W-2	6	175	X	41.74	37.70	1.2988	200032722
H	5000	163	2X163W-1	6	176	X	42.66	38.52	1.3251	200032723
L	3000	260	2X260W-2	6	177	X	44.42	40.26	1.2930	200032724
H	5500	140	2X140W-2	6	178	X	43.72	39.43	1.3359	200032725
H	4000	210	2X210W-2	6	179	X	43.87	39.48	1.3346	200032726
H	5000	163	2X163W-2	6	180	X	43.29	38.96	1.3174	200032727

Non-critical Data**Table 1. Weight Percent Solids, Calcine, and Density Measurements (con't)**

All measurements are expressed as a weight percent except density which is grams/milliliter.

Mixer Speed	Tank Level (gallons)	Vial #	Sample ID	Block	Analytical Sequence	Sampler/Outlet	Dried Wt % Solids	Calcined Wt % Solids	Density (grams/milliliter)	Lab Sample ID
L	6000	47	2G047W-1	7	181	G	42.62	38.07	1.3035	200032733
L	6000	48	2H048W-1	7	182	H	41.89	37.34	1.3133	200032734
H	6000	96	2G096W-1	7	183	G	42.41	35.98	1.3112	200032735
H	6000	95	2H095W-1	7	184	H	43.24	39.06	1.3017	200032736
L	2000	360	2T360W-1	7	185	T	38.85	34.50	1.2742	200032737
L	2000	359	2H359W-1	7	186	H	37.90	33.58	1.2850	200032738
H	5000	168	2Y168W-1	7	187	Y	43.96	39.87	1.3015	200032739
H	4500	192	2Y192W-1	7	188	Y	43.58	39.29	1.2728	200032740
L	2500	286	2Y286W-1	7	189	Y	43.46	39.41	1.3108	200032741
H	6000	120	2Y120W-1	7	190	Y	42.45	38.39	1.2929	200032742
L	3000	264	2Y264W-1	7	191	Y	43.48	39.47	1.3196	200032743
H	4500	192	2Y192W-2	7	192	Y	44.06	39.82	1.2745	200032744
L	2000	310	2Y310W-1	7	193	Y	42.88	38.98	1.3040	200032745
H	6000	120	2Y120W-2	7	194	Y	42.85	38.20	1.2901	200032746
H	4000	216	2Y216W-1	7	195	Y	41.98	37.78	1.3027	200032747
L	6000	47	2G047W-2	7	196	G	42.36	37.67	1.2950	200032748
L	6000	48	2H048W-2	7	197	H	42.34	37.72	1.2931	200032749
H	6000	96	2G096W-2	7	198	G	39.35	34.69	1.2896	200032750
H	6000	95	2H095W-2	7	199	H	43.72	39.37	1.3052	200032751
L	2000	360	2T360W-2	7	200	T	39.43	34.82	1.2655	200032752
L	2000	359	2H359W-2	7	201	H	38.45	34.00	1.2906	200032753
L	3500	239	2Y239W-1	7	202	Y	42.83	38.48	1.3095	200032754
H	5500	141	2Y141W-1	7	203	Y	40.92	36.59	1.2969	200032755
L	2000	310	2Y310W-2	7	204	Y	43.56	39.15	1.3183	200032756
H	5500	141	2Y141W-2	7	205	Y	41.62	37.36	1.2973	200032757
H	5000	168	2Y168W-2	7	206	Y	44.27	39.85	1.3196	200032758
L	2500	286	2Y286W-2	7	207	Y	43.62	39.22	1.2922	200032759
L	3500	239	2Y239W-2	7	208	Y	43.20	38.77	1.2991	200032760
H	4000	216	2Y216W-2	7	209	Y	42.37	37.98	1.2952	200032761
L	3000	264	2Y264W-2	7	210	Y	43.28	38.95	1.2930	200032762
L	2000	309	2Y309W-1	8	211	Y	42.41	37.36	1.2903	200032872
H	5500	143	2Y143W-1	8	212	Y	43.33	38.30	1.2986	200032873
L	6000	44	2G044W-1	8	213	G	42.56	37.66	1.3229	200032874
L	6000	43	2H043W-1	8	214	H	42.11	37.28	1.3156	200032875
H	6000	92	2G092W-1	8	215	G	42.05	37.21	1.3075	200032876
H	6000	91	2H091W-1	8	216	H	42.68	37.92	1.3094	200032877
L	2000	355	2T355W-1	8	217	T	38.65	33.55	1.2838	200032878
L	2000	356	2H356W-1	8	218	H	38.91	33.67	1.2860	200032879
L	2500	285	2Y285W-1	8	219	Y	43.49	38.37	1.3074	200032880
L	3000	263	2Y263W-1	8	220	Y	43.23	38.10	1.3132	200032881
L	3000	263	2Y263W-2	8	221	Y	43.89	39.01	1.3137	200032882
L	2500	285	2Y285W-2	8	222	Y	43.90	38.92	1.3050	200032883
H	6000	119	2Y119W-1	8	223	Y	41.66	36.87	1.2884	200032884
H	4500	190	2Y190W-1	8	224	Y	42.88	37.95	1.3109	200032885
H	4000	213	2Y213W-1	8	225	Y	42.63	37.70	1.3154	200032886
L	3500	237	2Y237W-1	8	226	Y	42.97	38.53	1.3175	200032887
H	6000	119	2Y119W-2	8	227	Y	41.88	37.56	1.2945	200032888
H	5500	143	2Y143W-2	8	228	Y	43.96	39.23	1.3096	200032889
H	5000	166	2Y166W-1	8	229	Y	42.58	38.22	1.3314	200032890
H	4000	213	2Y213W-2	8	230	Y	43.02	38.61	1.3178	200032891
H	4500	190	2Y190W-2	8	231	Y	43.66	39.09	1.2914	200032892
L	2000	309	2Y309W-2	8	232	Y	42.82	38.34	1.2852	200032893
H	5000	166	2Y166W-2	8	233	Y	43.03	38.59	1.2818	200032894
L	6000	44	2G044W-2	8	234	G	42.74	38.34	1.2993	200032895
L	6000	43	2H043W-2	8	235	H	42.34	37.97	1.3070	200032896
H	6000	92	2G092W-2	8	236	G	42.81	38.42	1.2941	200032897
H	6000	91	2H091W-2	8	237	H	43.57	39.31	1.2916	200032898
L	2000	355	2T355W-2	8	238	T	39.46	34.64	1.2708	200032899
L	2000	356	2H356W-2	8	239	H	38.98	34.48	1.2717	200032900
L	3500	237	2Y237W-2	8	240	Y	43.85	39.43	1.3036	200032901

Table 2. Sampler Contrasts by Tank Level and Mixer Speed

H - high grab sampler
G - low grab sampler

100% (H-G)/G

Tank Level	Mixer Speed	Weight Percent Solids			Calcines			Densities		
		Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
6000	H	0.74	2.76	2.3	1.23	4.29	3.6	-0.37	1.26	1.1
	L	-0.22	1.36	1.1	-1.20	2.57	2.1	-0.02	0.66	0.6
2000	L	0.07	1.76	1.5	-0.04	1.78	1.5	0.05	1.61	1.3

Non-critical Data

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Table 3. Descriptive Statistics for Weight Percent Solids, Calcines, and Densities

Tank Level (gallons)	Mixer Speed	Outlet/ Sampler	Sample Size	Dried Weight % Solids			Calcined Weight % Solids			Densities (grams/milliliter)		
				Average	Std Dev	% Rel Std Dev	Average	Std Dev	% Rel Std Dev	Average	Std Dev	% Rel Std Dev
6000	L	G	16	42.698	0.351	0.8%	38.367	0.756	2.0%	1.315	0.016	1.2%
		H	16	42.602	0.568	1.3%	37.896	0.741	2.0%	1.314	0.016	1.3%
		Overall	32	42.650	0.467	1.1%	38.131	0.774	2.0%	1.315	0.016	1.2%
6000	H	G	16	42.703	1.020	2.4%	38.103	1.235	3.2%	1.313	0.018	1.4%
		H	16	43.001	0.509	1.2%	38.527	0.561	1.5%	1.308	0.028	2.1%
		X	8	42.030	0.351	0.8%	37.551	0.410	1.1%	1.303	0.014	1.1%
		Y	8	41.874	0.583	1.4%	37.359	0.639	1.7%	1.298	0.029	2.2%
		Overall	48	42.552	0.828	1.9%	38.028	0.935	2.5%	1.307	0.023	1.8%
6000	Overall	Overall	80	42.591	0.704	1.7%	38.070	0.871	2.3%	1.310	0.021	1.6%
5500	H	X	8	42.858	0.793	1.9%	38.475	0.738	1.9%	1.308	0.020	1.5%
		Y	8	42.089	1.041	2.5%	37.706	0.946	2.5%	1.301	0.019	1.4%
		Overall	16	42.473	0.978	2.3%	38.091	0.911	2.4%	1.304	0.019	1.5%
5000	H	X	8	42.421	0.449	1.1%	37.976	0.555	1.5%	1.298	0.016	1.2%
		Y	8	42.695	1.177	2.8%	38.395	1.064	2.8%	1.301	0.020	1.5%
		Overall	16	42.558	0.872	2.0%	38.186	0.848	2.2%	1.299	0.017	1.3%
4500	H	X	8	42.935	0.447	1.0%	38.519	0.685	1.8%	1.300	0.014	1.1%
		Y	8	42.721	0.957	2.2%	38.129	1.106	2.9%	1.294	0.019	1.4%
		Overall	16	42.828	0.730	1.7%	38.324	0.911	2.4%	1.297	0.016	1.3%
4000	H	X	8	42.844	0.728	1.7%	38.245	0.705	1.8%	1.282	0.028	2.2%
		Y	8	42.081	0.568	1.3%	37.561	0.609	1.6%	1.300	0.025	1.9%
		Overall	16	42.463	0.744	1.8%	37.903	0.728	1.9%	1.291	0.027	2.1%
3500	L	X	8	42.736	0.249	0.6%	38.284	0.264	0.7%	1.310	0.011	0.9%
		Y	8	42.698	0.659	1.5%	38.289	0.642	1.7%	1.303	0.024	1.8%
		Overall	16	42.717	0.481	1.1%	38.286	0.474	1.2%	1.306	0.018	1.4%
3000	L	X	8	43.296	0.626	1.4%	39.188	1.285	3.3%	1.304	0.014	1.0%
		Y	8	43.021	0.754	1.8%	38.458	0.812	2.1%	1.311	0.020	1.5%
		Overall	16	43.159	0.684	1.6%	38.823	1.105	2.8%	1.308	0.017	1.3%
2500	L	X	8	42.705	0.394	0.9%	38.354	0.595	1.6%	1.296	0.019	1.5%
		Y	8	43.013	0.569	1.3%	38.533	0.686	1.8%	1.303	0.021	1.6%
		Overall	16	43.048	0.742	1.7%	38.552	0.846	2.2%	1.307	0.020	1.6%
2000	L	H	16	38.660	0.493	1.3%	33.855	0.517	1.5%	1.284	0.011	0.9%
		T(G)	16	38.638	0.451	1.2%	33.874	0.542	1.6%	1.283	0.022	1.7%
		X	8	42.893	0.794	1.9%	38.425	0.597	1.6%	1.300	0.011	0.9%
		Y	8	42.641	0.818	1.9%	38.104	0.792	2.1%	1.303	0.028	2.1%
		Overall	48	40.021	2.047	5.1%	35.331	2.174	6.2%	1.290	0.020	1.5%
Overall	Overall	Overall	240	42.139	1.543	3.7%	37.623	1.685	4.5%	1.302	0.021	1.6%
		Overall (Excluding the Heel)	208	42.676	0.738	1.7%	38.201	0.847	2.2%	1.305	0.021	1.6%
		G	32	42.701	0.751	1.8%	38.235	1.016	2.7%	1.314	0.017	1.3%
		H	48	41.421	2.045	4.9%	36.759	2.176	5.9%	1.302	0.023	1.8%
		T(G)	16	38.638	0.451	1.2%	33.874	0.542	1.6%	1.283	0.022	1.7%
		X	72	42.746	0.633	1.5%	38.335	0.781	2.0%	1.300	0.018	1.4%
		Y	72	42.539	0.876	2.1%	38.048	0.873	2.3%	1.302	0.022	1.7%

Table 4. Comparison of Overall Weight Percent Solids and Densities For the Two Phases of the MFT Study

	Dried Weight % Solids			Calcined Weight % Solids			Densities (grams/milliliter)		
	Average	Std Dev	% Rel S.D.	Average	Std Dev	% Rel S.D.	Average	Std Dev	% Rel S.D.
High Solids	48.366	2.102	4.3%	43.206	2.068	4.8%	1.277	0.104	8.1%
Low Solids	42.139	1.543	3.7%	37.623	1.685	4.5%	1.302	0.021	1.6%

Table 5. Comparison of Sampler Contrasts for Weight Percent Solids and Densities For the Two Phases of the MFT Study

100% (H-G)/G

Dried Weight Percent Solids

Test Phase	6000 gallon Level High Mixer Speed			6000 gallon Level Low Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	-0.83	3.15	2.6	-0.13	3.68	3.1	0.61	0.82	0.7
Low Solids	0.74	2.76	2.3	-0.22	1.36	1.1	0.07	1.76	1.5

Calcined Weight Percent Solids

Test Phase	6000 gallon Level High Mixer Speed			6000 gallon Level Low Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	0.05	2.70	2.3	-0.32	1.36	1.1	0.83	0.97	0.8
Low Solids	1.23	4.29	3.6	-1.20	2.57	2.1	-0.04	1.78	1.5

Densities

Test Phase	6000 gallon Level High Mixer Speed			6000 gallon Level Low Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	0.19	5.41	4.5	-0.21	3.26	2.7	-0.06	1.72	1.4
Low Solids	-0.37	1.26	1.1	-0.02	0.66	0.6	0.05	1.61	1.3

Table 6. Largest Relative Differences Among MFT Outlets for Weight Percent Solids and Densities For the Two Phases of the MFT Study

	Largest Relative Difference Among MFT Outlets Over Test Combinations		
	High Weight % Solids	High Weight % Solids (Results at 2000 gallons excluded)	Low Weight % Solids
Dried Weight % Solids	9.8%	3.9%	3.4%
Calcined Weight % Solids	10.7%	4.7%	4.9%
Densities	9.4%	6.4%	2.3%

Non-critical Data

Table 7. Analytical Results for Al, B, Ca, Cu, Fe, Mg, and Mn

Mixer Speed	Tank Level (gallons)	Analytical Sequence Number	Block Number	Vial #	Standard/Outlet/Sampler	Sample ID	Lab Sample ID	Al (wt %)	B (wt %)	Ca (wt %)	Cu (wt %)	Fe (wt %)	Mg (wt %)	Mn (wt %)
		1	1	0	K	2K-1-1	200032959	1.864	3.440	0.729	0.000	6.089	1.003	0.978
		2	1	0	B	2B-1	200032960	0.000	0.000	0.106	0.000	0.260	0.043	0.000
L	6000	3	1	2	H	2H002E	200032961	1.538	2.364	0.739	0.319	8.138	0.922	1.622
L	6000	4	1	1	G	2G001E	200032962	1.552	2.413	0.750	0.318	8.353	0.920	1.678
H	6000	5	1	55	H	2H055E	200032963	1.592	2.426	0.762	0.323	8.507	0.927	1.648
H	6000	6	1	56	G	2G056E	200032964	1.591	2.418	0.760	0.325	8.479	0.923	1.685
L	2000	7	1	316	T	2T316E	200032965	1.762	2.410	0.898	0.372	9.763	0.881	1.913
L	2000	8	1	315	H	2H315E	200032966	1.757	2.403	0.904	0.371	9.769	0.887	1.919
		9	1	0	K	2K-1-2	200032967	1.932	3.484	0.718	0.000	6.219	1.029	0.944
H	5000	10	1	151	X	2X151E	200032968	1.807	2.411	0.755	0.320	8.528	0.928	1.671
L	3500	11	1	219	X	2X219E	200032969	1.805	2.435	0.772	0.331	8.633	0.927	1.662
		12	1	0	K	2K-1-3	200032971	1.929	3.492	0.713	0.000	6.243	1.035	0.954
		13	1	0	S	2S-1	200032972	1.907	3.464	0.719	0.000	6.126	1.021	0.960
H	5500	14	1	122	X	2X122E	200032973	1.575	2.385	0.756	0.322	8.464	0.914	1.617
H	4500	15	1	169	X	2X169E	200032974	1.577	2.395	0.752	0.330	8.424	0.912	1.652
L	2000	16	1	293	X	2X293E	200032975	1.575	2.378	0.754	0.328	8.525	0.918	1.656
		17	1	0	K	2K-1-4	200032976	1.911	3.497	0.728	0.000	6.179	1.024	0.979
L	3000	18	1	245	X	2X245E	200032978	1.587	2.391	0.771	0.334	8.528	0.917	1.683
H	6000	19	1	100	X	2X100E	200032979	1.576	2.400	0.780	0.332	8.532	0.915	1.697
		20	1	0	K	2K-1-5	200032980	1.912	3.485	0.738	0.000	6.194	1.024	0.974
L	2500	21	1	267	X	2X267E	200032983	1.575	2.370	0.719	0.324	8.510	0.911	1.600
H	4000	22	1	193	X	2X193E	200032984	1.580	2.430	0.770	0.322	8.487	0.925	1.646
		23	2	0	K	2K-2-1	200033018	1.953	3.508	0.740	0.000	6.221	1.099	1.008
		24	2	0	B	2B-2	200033019	0.117	0.275	0.042	0.000	0.477	0.102	0.000
L	2000	25	2	333	H	2H333E	200033020	1.764	2.403	0.908	0.388	9.827	0.881	1.983
L	2000	26	2	334	T	2T334E	200033021	1.756	2.399	0.881	0.390	9.708	0.883	1.966
H	6000	27	2	72	G	2G072E	200033022	1.553	2.417	0.749	0.334	8.307	0.912	1.631
H	6000	28	2	71	H	2H071E	200033023	1.579	2.413	0.757	0.340	8.445	0.912	1.686
L	6000	29	2	25	G	2G025E	200033024	1.584	2.420	0.774	0.341	8.479	0.927	1.692
L	6000	30	2	26	H	2H026E	200033025	1.593	2.401	0.780	0.347	8.520	0.910	1.725
		31	2	0	K	2K-2-2	200033026	1.916	3.479	0.772	0.000	6.182	1.023	1.036
H	5000	32	2	154	Y	2Y154E	200033027	1.626	2.418	0.831	0.353	8.725	0.908	1.793
L	2000	33	2	303	Y	2Y303E	200033028	1.587	2.405	0.808	0.344	8.528	0.914	1.759
L	2500	34	2	277	Y	2Y277E	200033029	1.603	2.380	0.816	0.348	8.643	0.908	1.780
		35	2	0	K	2K-2-3	200033030	1.921	3.474	0.767	0.000	6.202	1.021	1.035
		36	2	0	S	2S-2	200033031	1.912	3.463	0.759	0.000	6.113	1.015	1.029
L	3000	37	2	252	Y	2Y252E	200033032	1.593	2.406	0.786	0.343	8.447	0.907	1.741
L	3500	38	2	230	Y	2Y230E	200033033	1.601	2.392	0.824	0.350	8.660	0.901	1.777
H	5500	39	2	133	Y	2Y133E	200033034	1.631	2.391	0.841	0.353	8.645	0.897	1.807
		40	2	0	K	2K-2-4	200033035	1.922	3.451	0.769	0.000	6.138	1.013	0.893
H	6000	41	2	112	Y	2Y112E	200033036	1.598	2.392	0.824	0.350	8.557	0.910	1.771
H	4500	42	2	184	Y	2Y184E	200033037	1.624	2.372	0.821	0.361	8.709	0.895	1.762
H	4000	43	2	201	Y	2Y201E	200033038	1.634	2.386	0.816	0.348	8.577	0.897	1.769
		44	2	0	K	2K-2-5	200033039	1.906	3.451	0.761	0.000	6.127	1.012	1.036
		45	3	0	K	2K-3-1	200033135	1.827	3.409	0.749	0.000	6.082	0.996	0.988
		46	3	0	B	2B-3	200033136	0.000	0.000	0.090	0.000	0.056	0.015	0.000
H	6000	47	3	105	Y	2Y105E	200033137	1.534	2.332	0.821	0.355	8.561	0.878	1.764
H	4000	48	3	203	Y	2Y203E	200033138	1.498	2.340	0.777	0.341	8.441	0.887	1.702
H	5500	49	3	134	Y	2Y134E	200033139	1.511	2.342	0.791	0.344	8.533	0.881	1.723
		50	3	0	K	2K-3-2	200033140	1.783	3.387	0.736	0.000	6.017	0.987	0.984
H	4500	51	3	182	Y	2Y182E	200033141	1.498	2.342	0.777	0.346	8.435	0.878	1.728
L	2000	52	3	304	Y	2Y304E	200033142	1.437	2.342	0.754	0.340	8.156	0.886	1.680
L	2500	53	3	280	Y	2Y280E	200033143	1.475	2.330	0.762	0.341	8.367	0.877	1.692
		54	3	0	K	2K-3-3	200033144	1.780	3.408	0.737	0.000	6.039	0.987	0.981
L	3000	55	3	250	Y	2Y250E	200033145	1.435	2.348	0.767	0.343	8.158	0.880	1.698
L	3500	56	3	232	Y	2Y232E	200033146	1.441	2.325	0.785	0.348	8.276	0.872	1.718
H	5000	57	3	156	Y	2Y156E	200033147	1.481	2.318	0.783	0.347	8.393	0.876	1.728
		58	3	0	K	2K-3-4	200033148	1.745	3.389	0.734	0.000	5.949	0.879	0.983
		59	3	0	S	2S-3	200033149	1.741	3.342	0.735	0.000	5.895	0.874	1.033
L	6000	60	3	28	H	2H028E	200033150	1.375	2.301	0.756	0.337	7.968	0.876	1.636
L	6000	61	3	27	G	2G027E	200033151	1.375	2.309	0.755	0.339	7.945	0.879	1.664
H	6000	62	3	75	H	2H075E	200033152	1.391	2.304	0.755	0.341	8.132	0.877	1.660
H	6000	63	3	76	G	2G076E	200033153	1.374	2.312	0.750	0.334	7.925	0.887	1.645
L	2000	64	3	336	H	2H336E	200033154	1.557	2.254	0.904	0.396	9.257	0.826	1.954
L	2000	65	3	335	T	2T335E	200033155	1.569	2.287	0.906	0.395	9.397	0.841	1.959
		66	3	0	K	2K-3-5	200033156	1.741	3.365	0.738	0.000	6.014	0.982	0.979

Non-critical Data

Table 7. Analytical Results for Al, B, Ca, Cu, Fe, Mg, and Mn (con't)

Mixer Speed	Tank Level (gallons)	Analytical Sequence Number	Block Number	Vial #	Standard/Outlet/Sampler	Sample ID	Lab Sample ID	Al (wt %)	B (wt %)	Ca (wt %)	Cu (wt %)	Fe (wt %)	Mg (wt %)	Mn (wt %)
		67	4	0	K	2K-4-1	200033081	1.769	3.404	0.738	0.000	8.189	1.024	0.985
		68	4	0	B	2B-4	200033082	0.000	0.000	0.035	0.000	0.000	0.006	0.000
L	6000	69	4	4	H	2H004E	200033083	1.387	2.350	0.796	0.347	8.285	0.919	1.672
L	6000	70	4	3	G	2G003E	200033084	1.423	2.351	0.791	0.352	8.477	0.917	1.728
H	6000	71	4	53	H	2H053E	200033085	1.414	2.335	0.797	0.353	8.376	0.909	1.753
H	6000	72	4	54	G	2G054E	200033086	1.431	2.341	0.791	0.354	8.443	0.908	1.736
L	2000	73	4	323	T	2T323E	200033087	1.589	2.254	0.936	0.409	9.546	0.846	2.058
L	2000	74	4	324	H	2H324E	200033088	1.585	2.335	0.890	0.398	9.590	0.875	1.986
		75	4	0	K	2K-4-2	200033089	1.782	3.400	0.764	0.000	8.200	1.017	1.039
H	4500	76	4	176	X	2X176E	200033090	1.416	2.361	0.805	0.354	8.403	0.914	1.754
H	6000	77	4	102	X	2X102E	200033091	1.464	2.346	0.818	0.360	8.667	0.905	1.804
L	3500	78	4	222	X	2X222E	200033092	1.436	2.341	0.806	0.356	8.548	0.912	1.770
		79	4	0	K	2K-4-3	200033093	1.790	3.371	0.769	0.001	8.171	1.013	1.038
		80	4	0	S	2S-4	200033094	1.796	3.408	0.770	0.001	8.162	1.017	1.054
L	3000	81	4	248	X	2X248E	200033095	1.415	2.374	0.790	0.346	8.329	0.925	1.709
H	4000	82	4	198	X	2X198E	200033096	1.376	2.273	0.800	0.353	8.049	0.911	1.743
H	5000	83	4	150	X	2X150E	200033097	1.409	2.292	0.807	0.355	8.326	0.896	1.767
		84	4	0	K	2K-4-4	200033098	1.801	3.429	0.762	0.001	8.205	1.020	1.033
H	5500	85	4	127	X	2X127E	200033099	1.465	2.345	0.837	0.356	8.542	0.908	1.790
L	2000	86	4	294	X	2X294E	200033100	1.446	2.354	0.792	0.372	8.429	0.914	1.753
L	2500	87	4	269	X	2X269E	200033101	1.456	2.366	0.795	0.351	8.416	0.918	1.749
		88	4	0	K	2K-4-5	200033102	1.750	3.276	0.765	0.001	8.022	0.985	1.036
		89	5	0	K	2K-5-1	200033187	1.900	3.415	0.758	0.000	8.109	1.024	0.974
		90	5	0	B	2B-5	200033188	0.000	0.000	0.135	0.019	0.000	0.000	0.000
L	2500	91	5	274	Y	2Y274E	200033189	1.538	2.367	0.773	0.332	8.129	0.906	1.849
H	5500	92	5	132	Y	2Y132E	200033190	1.618	2.344	0.806	0.345	8.576	0.894	1.705
L	3000	93	5	256	Y	2Y256E	200033191	1.591	2.362	0.779	0.339	8.468	0.900	1.671
		94	5	0	K	2K-5-2	200033192	1.906	3.410	0.744	0.000	8.107	1.002	0.963
L	2000	95	5	298	Y	2Y298E	200033193	1.608	2.346	0.791	0.347	8.546	0.896	1.699
H	4500	96	5	179	Y	2Y179E	200033194	1.597	2.342	0.780	0.341	8.466	0.898	1.669
H	6000	97	5	108	Y	2Y108E	200033195	1.619	2.348	0.800	0.351	8.701	0.893	1.723
		98	5	0	K	2K-5-3	200033196	1.009	3.412	0.742	0.000	8.154	1.009	0.959
L	3500	99	5	227	Y	2Y227E	200033197	1.620	2.364	0.801	0.343	8.637	0.903	1.700
H	5000	100	5	158	Y	2Y158E	200033198	1.631	2.338	0.794	0.348	8.755	0.901	1.711
H	4000	101	5	204	Y	2Y204E	200033199	1.628	2.379	0.796	0.345	8.723	0.909	1.694
		102	5	0	K	2K-5-4	200033200	1.920	3.431	0.737	0.000	8.178	1.014	0.957
		103	5	0	S	2S-5	200033201	1.933	3.444	0.747	0.004	8.141	1.017	0.974
L	2000	104	5	342	H	2H342E	200033202	1.769	2.364	0.908	0.384	9.730	0.875	1.919
L	2000	105	5	341	T	2T341E	200033203	1.774	2.345	0.907	0.385	9.689	0.874	1.912
H	6000	106	5	77	G	2G077E	200033204	1.577	2.357	0.748	0.331	8.303	0.909	1.641
H	6000	107	5	78	H	2H078E	200033205	1.575	2.359	0.765	0.336	8.340	0.911	1.661
L	6000	108	5	24	G	2G024E	200033206	1.540	2.360	0.737	0.331	8.060	0.924	1.590
L	6000	109	5	23	H	2H023E	200033207	1.574	2.363	0.782	0.336	8.292	0.908	1.654
		110	5	0	K	2K-5-5	200033208	1.933	3.424	0.754	0.000	8.162	1.011	0.970
		111	6	0	K	2K-6-1	200033273	1.903	3.501	0.751	0.002	8.313	1.020	0.978
		112	6	0	B	2B-6	200033274	0.000	0.000	0.069	0.000	0.000	0.000	0.000
H	6000	113	6	106	Y	2Y106E	200033275	1.669	2.402	0.876	0.372	9.230	0.885	1.869
H	4000	114	6	207	Y	2Y207E	200033276	1.538	2.373	0.810	0.346	8.594	0.903	1.746
H	4500	115	6	180	Y	2Y180E	200033277	1.479	2.310	0.761	0.334	8.273	0.882	1.648
		116	6	0	K	2K-6-2	200033278	1.855	3.477	0.745	0.001	8.190	1.003	0.980
L	3500	117	6	229	Y	2Y229E	200033279	1.563	2.400	0.795	0.343	8.680	0.895	1.736
L	2000	118	6	299	Y	2Y299E	200033280	1.536	2.399	0.786	0.342	8.500	0.889	1.716
L	3000	119	6	249	Y	2Y249E	200033281	1.527	2.370	0.782	0.339	8.507	0.888	1.706
		120	6	0	K	2K-6-3	200033282	1.843	3.413	0.744	0.000	8.108	0.992	0.968
L	2500	121	6	273	Y	2Y273E	200033283	1.546	2.367	0.802	0.343	8.690	0.887	1.734
H	5500	122	6	135	Y	2Y135E	200033284	1.526	2.365	0.743	0.338	8.580	0.905	1.683
H	5000	123	6	155	Y	2Y155E	200033285	1.531	2.340	0.763	0.324	8.472	0.881	1.645
		124	6	0	K	2K-6-4	200033286	1.834	3.355	0.745	0.000	8.117	0.977	0.973
		125	6	0	S	2S-6	200033287	1.823	3.389	0.740	0.000	8.087	0.999	0.970
L	2000	126	6	344	H	2H344E	200033288	1.641	2.377	0.830	0.364	9.364	0.885	1.839
L	2000	127	6	343	T	2T343E	200033289	1.660	2.302	0.938	0.386	9.586	0.844	2.011
H	6000	128	6	65	G	2G065E	200033290	1.433	2.344	0.742	0.326	7.920	0.897	1.640
H	6000	129	6	66	H	2H066E	200033291	1.478	2.325	0.784	0.342	8.241	0.891	1.717
L	6000	130	6	31	H	2H031E	200033292	1.475	2.308	0.774	0.333	8.166	0.884	1.681
L	6000	131	6	32	G	2G032E	200033293	1.453	2.372	0.739	0.324	8.007	0.898	1.621
		132	6	0	K	2K-6-5	200033294	1.844	3.366	0.769	0.000	8.095	0.996	0.978

Table 7. Analytical Results for Al, B, Ca, Cu, Fe, Mg, and Mn (con't)

Mixer Speed	Tank Level (gallons)	Analytical Sequence Number	Block Number	Vial #	Standard/Outlet/Sampler	Sample ID	Lab Sample ID	Al (wt %)	B (wt %)	Ca (wt %)	Cu (wt %)	Fe (wt %)	Mg (wt %)	Mn (wt %)
		133	7	0	K	2K-7-1	200033328	2.064	3.546	0.762	0.002	6.254	1.048	0.993
		134	7	0	B	2B-7	200033329	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L	2000	135	7	328	H	2H328E	200033330	1.908	2.439	0.933	0.385	9.908	0.898	1.964
L	2000	136	7	327	T	2T327E	200033331	1.919	2.426	0.924	0.390	9.886	0.891	1.986
H	6000	137	7	60	H	2H060E	200033332	1.789	2.470	0.783	0.338	8.744	0.945	1.722
H	6000	138	7	59	G	2G059E	200033333	1.748	2.442	0.767	0.336	8.553	0.940	1.696
L	6000	139	7	9	H	2H009E	200033334	1.748	2.410	0.765	0.337	8.404	0.926	1.696
L	6000	140	7	10	G	2G010E	200033335	1.772	2.447	0.749	0.337	8.500	0.929	1.686
		141	7	0	K	2K-7-2	200033336	2.101	3.464	0.724	0.000	6.256	1.024	0.975
L	3000	142	7	244	X	2X244E	200033337	1.792	2.429	0.733	0.340	8.599	0.927	1.672
L	2500	143	7	266	X	2X266E	200033338	1.779	2.435	0.752	0.341	8.698	0.924	1.684
H	5000	144	7	146	X	2X146E	200033339	1.779	2.418	0.757	0.341	8.583	0.922	1.694
		145	7	0	K	2K-7-3	200033340	2.109	3.456	0.718	0.000	6.168	1.021	0.967
		146	7	0	S	2S-7	200033341	2.120	3.485	0.717	0.000	6.286	1.033	0.961
H	4500	147	7	170	X	2X170E	200033342	1.792	2.418	0.752	0.333	8.540	0.933	1.655
L	2000	148	7	292	X	2X292E	200033343	1.778	2.405	0.742	0.334	8.428	0.927	1.639
H	5500	149	7	121	X	2X121E	200033344	1.778	2.412	0.775	0.335	8.432	0.912	1.688
		150	7	0	K	2K-7-4	200033345	2.113	3.477	0.744	0.001	6.190	1.020	0.976
H	6000	151	7	97	X	2X097E	200033346	1.813	2.412	0.792	0.340	8.582	0.916	1.719
L	3500	152	7	221	X	2X221E	200033347	1.819	2.380	0.790	0.339	8.614	0.908	1.716
H	4000	153	7	199	X	2X199E	200033348	1.808	2.402	0.756	0.337	8.619	0.915	1.688
		154	7	0	K	2K-7-5	200033349	2.131	3.445	0.750	0.001	6.219	1.019	0.986
		155	8	0	K	2K-8-1	200033354	1.798	3.483	0.746	0.001	6.075	0.987	0.986
		156	8	0	B	2B-8	200033355	0.000	0.000	0.057	0.000	0.023	0.002	0.000
L	2000	157	8	337	H	2H337E	200033356	1.600	2.346	0.888	0.381	9.381	0.838	1.954
L	2000	158	8	338	T	2T338E	200033357	1.600	2.327	0.904	0.383	9.498	0.837	1.979
H	6000	159	8	73	G	2G073E	200033358	1.449	2.437	0.752	0.323	8.219	0.897	1.648
H	6000	160	8	74	H	2H074E	200033359	1.388	2.362	0.761	0.328	8.061	0.878	1.670
L	6000	161	8	21	G	2G021E	200033360	1.383	2.368	0.744	0.325	7.970	0.875	1.638
L	6000	162	8	22	H	2H022E	200033361	1.390	2.375	0.773	0.328	8.094	0.874	1.678
		163	8	0	K	2K-8-2	200033362	1.737	3.404	0.740	0.001	5.985	0.976	0.976
H	4000	164	8	206	Y	2Y206E	200033363	1.419	2.352	0.779	0.338	8.356	0.859	1.715
L	2500	165	8	279	Y	2Y279E	200033364	1.371	2.328	0.764	0.332	8.161	0.859	1.694
H	5000	166	8	159	Y	2Y159E	200033365	1.394	2.315	0.758	0.338	8.267	0.855	1.705
		167	8	0	K	2K-8-3	200033366	1.756	3.451	0.736	0.001	6.057	0.985	0.973
		168	8	0	S	2S-8	200033367	1.740	3.421	0.732	0.001	5.998	0.975	0.975
H	4500	169	8	183	Y	2Y183E	200033368	1.412	2.333	0.768	0.340	8.401	0.861	1.698
H	6000	170	8	107	Y	2Y107E	200033369	1.491	2.335	0.835	0.360	8.930	0.840	1.842
L	2000	171	8	302	Y	2Y302E	200033370	1.392	2.367	0.752	0.331	8.248	0.882	1.674
		172	8	0	K	2K-8-4	200033371	1.759	3.440	0.737	0.001	6.094	0.985	0.972
L	3500	173	8	231	Y	2Y231E	200033372	1.458	2.400	0.781	0.340	8.496	0.882	1.722
L	3000	174	8	251	Y	2Y251E	200033373	1.425	2.374	0.736	0.330	8.230	0.887	1.651
H	5500	175	8	136	Y	2Y136E	200033374	1.615	2.464	0.782	0.340	8.778	0.914	1.727
		176	8	0	K	2K-8-5	200033375	1.843	3.497	0.733	0.001	6.122	1.003	0.974
		177	9	0	K	2K-9-1	200033512	1.948	3.526	0.746	0.002	6.272	1.032	0.984
		178	9	0	B	2B-9	200033513	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L	3000	179	9	241	X	2X241E	200033514	1.584	2.448	0.767	0.328	8.482	0.919	1.675
H	4500	180	9	174	X	2X174E	200033515	1.585	2.448	0.781	0.332	8.491	0.918	1.707
L	2000	181	9	290	X	2X290E	200033516	1.581	2.427	0.748	0.328	8.438	0.924	1.674
		182	9	0	K	2K-9-2	200033517	1.947	3.539	0.742	0.001	6.283	1.036	0.978
H	5000	183	9	149	X	2X149E	200033518	1.822	2.430	0.782	0.335	8.662	0.921	1.717
H	6000	184	9	101	X	2X101E	200033519	1.598	2.433	0.777	0.331	8.587	0.919	1.708
H	4000	185	9	197	X	2X197E	200033520	1.602	2.450	0.782	0.335	8.570	0.920	1.712
		186	9	0	K	2K-9-3	200033521	1.941	3.513	0.743	0.001	6.251	1.029	0.978
L	2500	187	9	272	X	2X272E	200033522	1.573	2.424	0.761	0.329	8.440	0.919	1.678
L	3500	188	9	218	X	2X218E	200033523	1.400	2.115	0.757	0.331	7.538	0.819	1.663
H	5500	189	9	128	X	2X128E	200033524	1.596	2.460	0.775	0.333	8.580	0.927	1.688
		190	9	0	K	2K-9-4	200033525	1.937	3.537	0.736	0.001	6.301	1.039	0.976
		191	9	0	S	2S-9	200033526	1.941	3.545	0.732	0.001	6.266	1.043	0.972
L	2000	192	9	313	H	2H313E	200033527	1.754	2.464	0.860	0.375	9.727	0.901	1.886
L	2000	193	9	314	T	2T314E	200033528	1.755	2.437	0.859	0.376	9.706	0.897	1.902
H	6000	194	9	49	G	2G049E	200033529	1.561	2.463	0.723	0.323	8.313	0.937	1.620
H	6000	195	9	50	H	2H050E	200033530	1.593	2.433	0.753	0.329	8.527	0.928	1.673
L	6000	196	9	15	G	2G015E	200033531	1.579	2.436	0.744	0.329	8.444	0.924	1.657
L	6000	197	9	16	H	2H016E	200033532	1.551	2.381	0.736	0.324	8.265	0.910	1.638
		198	9	0	K	2K-9-5	200033533	1.947	3.537	0.725	0.000	6.323	1.037	0.970

Non-critical Data

Table 7. Analytical Results for Al, B, Ca, Cu, Fe, Mg, and Mn (con't)

Mixer Speed	Tank Level (gallons)	Analytical Sequence Number	Block Number	Vial #	Standard/Outlet/Sampler	Sample ID	Lab Sample ID	Al (wt %)	B (wt %)	Ca (wt %)	Cu (wt %)	Fe (wt %)	Mg (wt %)	Mn (wt %)
		199	10	0	K	2K-10-1	200033541	1.914	3.494	0.750	0.002	8.197	1.022	0.992
		200	10	0	B	2B-10	200033542	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L	6000	201	10	8	G	2G008E	200033543	1.568	2.418	0.759	0.330	8.274	0.910	1.662
L	6000	202	10	7	H	2H007E	200033544	1.545	2.412	0.754	0.327	8.180	0.914	1.662
H	6000	203	10	57	G	2G057E	200033545	1.561	2.399	0.758	0.331	8.467	0.905	1.665
H	6000	204	10	58	H	2H058E	200033546	1.564	2.380	0.771	0.334	8.327	0.898	1.692
L	2000	205	10	325	H	2H325E	200033547	1.735	2.388	0.854	0.382	9.682	0.868	1.932
L	2000	206	10	326	T	2T326E	200033548	1.737	2.381	0.873	0.381	9.635	0.874	1.920
		207	10	0	K	2K-10-2	200033550	1.928	3.500	0.739	0.001	8.232	1.022	0.982
L	3500	208	10	217	X	2X217E	200033551	1.578	2.428	0.776	0.340	8.376	0.901	1.698
L	2500	209	10	265	X	2X265E	200033552	1.591	2.430	0.775	0.341	8.546	0.900	1.699
H	4500	210	10	175	X	2X175E	200033553	1.558	2.423	0.770	0.336	8.398	0.914	1.685
		211	10	0	K	2K-10-3	200033554	1.917	3.496	0.738	0.000	8.155	1.015	0.983
		212	10	0	S	2S-10	200033555	1.909	3.508	0.732	0.000	8.200	1.009	0.985
H	6000	213	10	98	X	2X098E	200033556	1.611	2.406	0.770	0.343	8.609	0.902	1.706
L	3000	214	10	247	X	2X247E	200033557	1.505	2.392	0.752	0.332	8.146	0.898	1.645
H	5000	215	10	147	X	2X147E	200033558	1.552	2.427	0.755	0.334	8.269	0.920	1.667
		216	10	0	K	2K-10-4	200033559	1.927	3.505	0.735	0.000	8.229	1.015	0.982
H	5500	217	10	124	X	2X124E	200033560	1.567	2.412	0.769	0.343	8.420	0.905	1.700
L	2000	218	10	289	X	2X289E	200033561	1.550	2.426	0.732	0.336	8.319	0.916	1.673
H	4000	219	10	196	X	2X196E	200033562	1.557	2.413	0.767	0.339	8.335	0.904	1.689
		220	10	0	K	2K-10-5	200033563	1.922	3.502	0.733	0.000	8.220	1.020	0.984
		221	11	0	K	2K-11-1	200033569	1.902	3.529	0.751	0.002	8.216	1.017	0.987
		222	11	0	B	2B-11	200033570	0.000	0.000	0.000	0.000	0.000	0.000	0.000
H	5500	223	11	126	X	2X126E	200033571	1.544	2.390	0.804	0.339	8.395	0.895	1.725
H	5000	224	11	145	X	2X145E	200033572	1.554	2.390	0.775	0.331	8.424	0.910	1.676
H	6000	225	11	104	X	2X104E	200033573	1.604	2.409	0.816	0.347	8.704	0.901	1.749
		226	11	0	K	2K-11-2	200033574	1.919	3.511	0.751	0.002	8.217	1.022	0.984
L	3000	227	11	242	X	2X242E	200033575	1.550	2.430	0.779	0.335	8.373	0.908	1.680
L	3500	228	11	223	X	2X223E	200033576	1.575	2.396	0.778	0.342	8.547	0.897	1.711
L	2500	229	11	268	X	2X268E	200033577	1.588	2.405	0.758	0.338	8.418	0.905	1.682
		230	11	0	K	2K-11-3	200033578	1.907	3.497	0.743	0.001	8.191	1.015	0.978
L	2000	231	11	291	X	2X291E	200033579	1.564	2.406	0.763	0.336	8.388	0.905	1.669
H	4500	232	11	171	X	2X171E	200033580	1.571	2.409	0.771	0.338	8.452	0.900	1.691
H	4000	233	11	195	X	2X195E	200033581	1.565	2.401	0.754	0.330	8.414	0.900	1.659
		234	11	0	K	2K-11-4	200033582	1.912	3.514	0.742	0.001	8.204	1.022	0.981
		235	11	0	S	2S-11	200033583	1.897	3.466	0.737	0.001	8.118	1.007	0.982
L	6000	236	11	11	G	2G011E	200033584	1.499	2.336	0.742	0.330	7.989	0.890	1.624
L	6000	237	11	12	H	2H012E	200033585	1.566	2.396	0.768	0.336	8.378	0.901	1.688
H	6000	238	11	63	G	2G063E	200033586	1.544	2.389	0.759	0.333	8.334	0.903	1.658
H	6000	239	11	64	H	2H064E	200033587	1.533	2.405	0.732	0.328	8.234	0.911	1.631
L	2000	240	11	320	H	2H320E	200033588	1.722	2.369	0.927	0.389	9.616	0.857	1.959
L	2000	241	11	319	T	2T319E	200033589	1.709	2.329	0.932	0.388	9.603	0.857	1.959
		242	11	0	K	2K-11-5	200033590	1.904	3.480	0.745	0.001	8.184	1.010	0.980
		243	12	0	K	2K-12-1	200033591	1.846	3.462	0.740	0.001	8.094	1.010	0.970
		244	12	0	B	2B-12	200033592	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L	2500	245	12	271	X	2X271E	200033593	1.509	2.401	0.766	0.331	8.322	0.904	1.674
H	6000	246	12	103	X	2X103E	200033594	1.543	2.385	0.776	0.333	8.524	0.889	1.691
H	5000	247	12	148	X	2X148E	200033595	1.512	2.384	0.790	0.328	8.362	0.899	1.662
		248	12	0	K	2K-12-2	200033596	1.850	3.469	0.735	0.001	8.131	1.010	0.968
H	4000	249	12	194	X	2X194E	200033597	1.498	2.393	0.756	0.330	8.323	0.894	1.663
L	2000	250	12	296	X	2X296E	200033598	1.476	2.395	0.743	0.322	8.214	0.904	1.657
H	5500	251	12	123	X	2X123E	200033599	1.510	2.398	0.776	0.328	8.390	0.898	1.679
		252	12	0	K	2K-12-3	200033600	1.831	3.464	0.727	0.001	8.103	1.006	0.955
L	3000	253	12	243	X	2X243E	200033601	1.484	2.363	0.741	0.332	8.278	0.887	1.644
H	4500	254	12	172	X	2X172E	200033602	1.481	2.377	0.750	0.323	8.281	0.887	1.637
L	3500	255	12	220	X	2X220E	200033603	1.497	2.380	0.766	0.331	8.433	0.895	1.666
		256	12	0	K	2K-12-4	200033605	1.820	3.456	0.737	0.001	8.065	1.000	0.961
		257	12	0	S	2S-12	200033606	1.794	3.405	0.724	0.001	5.980	0.991	0.954
L	6000	258	12	13	G	2G013E	200033607	1.411	2.327	0.748	0.325	7.917	0.871	1.628
L	6000	259	12	14	H	2H014E	200033608	1.419	2.347	0.741	0.322	7.898	0.881	1.622
H	6000	260	12	61	H	2H061E	200033609	1.444	2.381	0.759	0.328	8.156	0.882	1.652
H	6000	261	12	82	G	2G062E	200033610	1.463	2.323	0.728	0.322	8.234	0.876	1.639
L	2000	262	12	322	H	2H322E	200033611	1.622	2.318	0.860	0.368	9.428	0.844	1.897
L	2000	263	12	321	T	2T321E	200033612	1.620	2.315	0.864	0.374	9.483	0.845	1.909
		264	12	0	K	2K-12-5	200033613	1.791	3.414	0.729	0.001	8.006	0.990	0.961

Non-critical Data

Table 7. Analytical Results for Al, B, Ca, Cu, Fe, Mg, and Mn (con't)

Mixer Speed	Tank Level (gallons)	Analytical Sequence Number	Block Number	Vial #	Standard/ Sampler	Sample ID	Lab Sample ID	Al (wt %)	B (wt %)	Ca (wt %)	Cu (wt %)	Fe (wt %)	Mg (wt %)	Mn (wt %)
		265	13	0	K	2K-13-1	200033619	1.858	3.441	0.746	0.001	8.121	1.000	0.977
		266	13	0	B	2B-13	200033620	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L	8000	267	13	30	G	2G030E	200033621	1.503	2.378	0.784	0.328	8.180	0.903	1.659
L	8000	268	13	29	H	2H029E	200033622	1.497	2.337	0.738	0.325	8.197	0.898	1.621
H	8000	269	13	79	G	2G079E	200033623	1.520	2.350	0.745	0.325	8.188	0.904	1.632
H	8000	270	13	80	H	2H080E	200033624	1.535	2.334	0.740	0.327	8.334	0.911	1.633
L	2000	271	13	339	T	2T339E	200033625	1.778	2.380	0.875	0.378	9.951	0.882	1.917
L	2000	272	13	340	H	2H340E	200033626	1.795	2.366	0.887	0.376	10.046	0.888	1.919
		273	13	0	K	2K-13-2	200033627	1.890	3.442	0.728	0.001	8.232	1.018	0.982
L	3000	274	13	254	Y	2Y254E	200033628	1.552	2.353	0.744	0.335	8.482	0.894	1.680
H	4500	275	13	177	Y	2Y177E	200033629	1.520	2.343	0.771	0.331	8.342	0.887	1.678
H	8000	276	13	109	Y	2Y109E	200033630	1.570	2.354	0.784	0.339	8.582	0.886	1.698
		277	13	0	K	2K-13-3	200033631	1.891	3.423	0.729	0.000	8.179	1.011	0.981
		278	13	0	S	2S-13	200033632	1.914	3.400	0.728	0.001	8.174	1.017	0.980
H	5000	279	13	157	Y	2Y157E	200033633	1.527	2.277	0.780	0.338	8.460	0.860	1.698
H	4000	280	13	205	Y	2Y205E	200033634	1.484	2.267	0.769	0.334	8.288	0.868	1.672
L	2000	281	13	297	Y	2Y297E	200033635	1.504	2.287	0.776	0.342	8.337	0.875	1.693
		282	13	0	K	2K-13-4	200033636	1.813	3.332	0.723	0.000	8.033	0.986	0.958
L	2500	283	13	278	Y	2Y278E	200033637	1.456	2.292	0.753	0.327	8.058	0.883	1.639
H	5500	284	13	129	Y	2Y129E	200033638	1.502	2.284	0.784	0.341	8.430	0.884	1.712
L	3500	285	13	228	Y	2Y228E	200033639	1.580	2.273	0.774	0.337	8.285	0.873	1.684
		286	13	0	K	2K-13-5	200033640	1.813	3.293	0.728	0.001	5.964	0.984	0.959
		287	14	0	K	2K-14-1	200033665	1.905	3.469	0.747	0.001	8.167	1.019	0.976
		288	14	0	B	2B-14	200033666	0.000	0.000	0.000	0.000	0.000	0.000	0.000
H	4000	289	14	200	X	2X200E	200033667	1.563	2.369	0.763	0.328	8.373	0.905	1.649
H	5500	290	14	125	X	2X125E	200033668	1.558	2.385	0.768	0.325	8.402	0.908	1.634
L	3500	291	14	224	X	2X224E	200033669	1.571	2.378	0.775	0.331	8.413	0.905	1.655
		292	14	0	K	2K-14-2	200033670	1.904	3.460	0.755	0.000	8.178	1.018	0.983
L	2000	293	14	295	X	2X295E	200033671	1.547	2.395	0.753	0.319	8.308	0.901	1.610
H	4500	294	14	173	X	2X173E	200033672	1.564	2.383	0.788	0.329	8.400	0.901	1.662
L	3000	295	14	246	X	2X246E	200033673	1.554	2.363	0.768	0.328	8.351	0.898	1.660
		296	14	0	K	2K-14-3	200033674	1.898	3.462	0.753	0.000	8.170	1.022	0.971
H	5000	297	14	152	X	2X152E	200033675	1.559	2.385	0.783	0.332	8.374	0.907	1.657
H	6000	298	14	99	X	2X099E	200033676	1.558	2.362	0.779	0.327	8.240	0.900	1.648
L	2500	299	14	270	X	2X270E	200033677	1.533	2.398	0.754	0.319	8.229	0.907	1.614
		300	14	0	K	2K-14-4	200033678	1.908	3.449	0.745	0.000	6.170	1.017	0.964
		301	14	0	S	2S-14	200033679	1.880	3.437	0.744	0.001	6.043	1.008	0.966
L	6000	302	14	6	G	2G006E	200033680	1.508	2.387	0.722	0.313	8.023	0.907	1.555
L	6000	303	14	5	H	2H005E	200033681	1.528	2.382	0.748	0.318	8.182	0.908	1.585
H	8000	304	14	52	G	2G052E	200033682	1.557	2.385	0.747	0.320	8.265	0.898	1.602
H	8000	305	14	51	H	2H051E	200033683	1.528	2.361	0.758	0.317	8.135	0.898	1.600
L	2000	306	14	318	T	2T318E	200033684	1.743	2.372	0.904	0.370	9.655	0.863	1.882
L	2000	307	14	317	H	2H317E	200033685	1.731	2.329	0.930	0.372	9.687	0.853	1.928
		308	14	0	K	2K-14-5	200033686	1.908	3.463	0.749	0.000	6.163	1.018	0.965
		309	15	0	K	2K-15-1	200033688	1.949	3.518	0.754	0.000	6.231	1.027	0.990
		310	15	0	B	2B-15	200033689	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L	2000	311	15	301	Y	2Y301E	200033690	1.580	2.438	0.786	0.328	8.279	0.930	1.652
H	5000	312	15	160	Y	2Y160E	200033691	1.636	2.424	0.782	0.326	8.538	0.919	1.684
H	6000	313	15	111	Y	2Y111E	200033692	1.673	2.459	0.800	0.335	8.712	0.919	1.715
		314	15	0	K	2K-15-2	200033693	1.955	3.510	0.747	0.000	6.201	1.028	0.974
L	2500	315	15	275	Y	2Y275E	200033694	1.590	2.438	0.766	0.321	8.268	0.917	1.654
H	4500	316	15	178	Y	2Y178E	200033695	1.621	2.427	0.779	0.334	8.451	0.912	1.717
H	5500	317	15	131	Y	2Y131E	200033696	1.648	2.422	0.803	0.338	8.718	0.908	1.750
		318	15	0	K	2K-15-3	200033697	1.928	3.498	0.739	0.000	6.182	1.019	0.978
L	3500	319	15	225	Y	2Y225E	200033698	1.628	2.425	0.801	0.344	8.718	0.907	1.720
L	3000	320	15	253	Y	2Y253E	200033699	1.591	2.416	0.764	0.337	8.437	0.914	1.681
H	4000	321	15	202	Y	2Y202E	200033700	1.624	2.408	0.794	0.339	8.640	0.908	1.712
		322	15	0	K	2K-15-4	200033701	1.921	3.483	0.740	0.000	6.158	1.020	0.973
		323	15	0	S	2S-15	200033702	1.921	3.481	0.744	0.000	6.082	1.014	0.981
L	6000	324	15	17	H	2H017E	200033703	1.574	2.437	0.759	0.328	8.222	0.916	1.641
L	6000	325	15	18	G	2G018E	200033704	1.585	2.449	0.781	0.330	8.331	0.921	1.658
H	6000	326	15	68	G	2G068E	200033705	1.616	2.427	0.776	0.337	8.459	0.911	1.693
H	6000	327	15	67	H	2H067E	200033706	1.600	2.425	0.760	0.328	8.327	0.908	1.663
L	2000	328	15	332	H	2H332E	200033707	1.756	2.399	0.908	0.382	9.689	0.874	1.939
L	2000	329	15	331	T	2T331E	200033708	1.750	2.392	0.873	0.372	9.543	0.879	1.898
		330	15	0	K	2K-15-5	200033709	1.942	3.496	0.728	0.000	6.154	1.024	0.955

Table 7. Analytical Results for Al, B, Ca, Cu, Fe, Mg, and Mn (con't)

Mixer Speed	Tank Level (gallons)	Analytical Sequence Number	Block Number	Vial #	Standard/ Outlet/ Sampler	Sample ID	Lab Sample ID	Al (wt %)	B (wt %)	Ca (wt %)	Cu (wt %)	Fe (wt %)	Mg (wt %)	Mn (wt %)
		331	16	0	K	2K-16-1	200033710	1.890	3.483	0.749	0.002	8.138	1.003	0.992
		332	16	0	B	2B-16	200033711	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L	6000	333	16	20	G	2G020E	200033712	1.534	2.372	0.777	0.331	8.327	0.897	1.712
L	6000	334	16	19	H	2H019E	200033713	1.514	2.373	0.748	0.324	8.141	0.893	1.681
H	6000	335	16	70	G	2G070E	200033714	1.509	2.380	0.759	0.328	8.292	0.894	1.689
H	6000	336	16	69	H	2H069E	200033715	1.526	2.349	0.763	0.330	8.552	0.890	1.685
L	2000	337	16	329	H	2H329E	200033716	1.688	2.353	0.900	0.381	9.457	0.856	1.983
L	2000	338	16	330	T	2T330E	200033717	1.704	2.373	0.906	0.377	9.515	0.849	1.950
		339	16	0	K	2K-16-2	200033718	1.872	3.480	0.718	0.002	8.079	0.995	0.959
L	3000	340	16	255	Y	2Y255E	200033719	1.535	2.345	0.754	0.333	8.247	0.867	1.689
H	4000	341	16	208	Y	2Y208E	200033720	1.554	2.374	0.764	0.327	8.349	0.878	1.707
H	4500	342	16	181	Y	2Y181E	200033721	1.559	2.371	0.759	0.332	8.445	0.879	1.679
		343	16	0	K	2K-16-3	200033722	1.863	3.436	0.720	0.002	8.027	0.990	0.955
		344	16	0	S	2S-16	200033723	1.858	3.445	0.712	0.002	5.959	0.983	0.936
L	2500	345	16	276	Y	2Y276E	200033724	1.629	2.459	0.753	0.329	8.552	0.908	1.672
H	5000	346	16	153	Y	2Y153E	200033725	1.682	2.426	0.789	0.332	8.672	0.897	1.680
H	6000	347	16	110	Y	2Y110E	200033726	1.641	2.413	0.762	0.333	8.503	0.898	1.692
		348	16	0	K	2K-16-4	200033727	1.987	3.564	0.710	0.002	6.253	1.034	0.939
L	3500	349	16	228	Y	2Y228E	200033728	1.689	2.438	0.772	0.341	8.738	0.903	1.709
L	2000	350	16	300	Y	2Y300E	200033729	1.689	2.476	0.759	0.337	8.800	0.913	1.698
H	5500	351	16	130	Y	2Y130E	200033730	1.638	2.451	0.767	0.337	8.550	0.913	1.710
		352	16	0	K	2K-16-5	200033731	1.983	3.554	0.718	0.002	6.218	1.026	0.950

Table 8. Analytical Results for Ni, K, K-AA, Si, Na, Na-AA, and Ti

Mixer Speed	Tank Level (gallons)	Analytical Sequence Number	Block Number	Vial #	Standard/Outlet/Sampler	Sample ID	Lab Sample ID	Ni (wt %)	K (wt %)	K-AA (wt %)	Si (wt %)	Na (wt %)	Na-AA (wt %)	Ti (wt %)
		1	1	0	K	2K-1-1	200032959	0.421	0.000	0.000	22.530	11.542	11.280	0.407
		2	1	0	B	2B-1	200032960	0.000	0.000	0.000	0.327	0.000	0.000	0.000
L	6000	3	1	2	H	2H002E	200032961	0.873	1.412	1.053	25.237	4.031	4.350	0.178
L	6000	4	1	1	G	2G001E	200032962	0.848	1.652	1.059	25.531	4.048	4.410	0.182
H	6000	5	1	55	H	2H055E	200032963	0.841	1.453	1.052	24.925	4.139	4.410	0.184
H	6000	6	1	56	G	2G056E	200032964	0.838	1.469	1.038	25.703	4.016	4.360	0.184
L	2000	7	1	316	T	2T316E	200032965	0.959	1.850	1.381	23.565	4.232	4.490	0.209
L	2000	8	1	315	H	2H315E	200032966	0.944	1.792	1.360	23.808	4.149	4.490	0.212
		9	1	0	K	2K-1-2	200032967	0.423	0.000	0.000	22.560	11.491	10.890	0.415
H	5000	10	1	151	X	2X151E	200032968	0.837	1.433	1.074	26.882	4.029	4.320	0.184
L	3500	11	1	219	X	2X219E	200032969	0.882	1.454	1.102	25.477	4.122	4.530	0.186
		12	1	0	K	2K-1-3	200032971	0.412	0.000	0.000	22.933	11.626	10.300	0.416
		13	1	0	S	2S-1	200032972	0.409	0.000	0.000	23.237	11.237	10.190	0.411
H	5500	14	1	122	X	2X122E	200032973	0.845	1.288	1.084	25.880	3.909	4.350	0.186
H	4500	15	1	189	X	2X189E	200032974	0.860	1.129	1.053	24.970	3.903	4.380	0.183
L	2000	16	1	293	X	2X293E	200032975	0.867	1.435	1.057	25.374	4.006	4.370	0.186
		17	1	0	K	2K-1-4	200032976	0.421	0.000	0.000	22.485	11.438	10.960	0.414
L	3000	18	1	245	X	2X245E	200032978	0.878	1.583	1.099	25.033	3.948	4.420	0.185
H	6000	19	1	100	X	2X100E	200032979	0.877	1.484	1.107	24.888	4.043	4.390	0.184
		20	1	0	K	2K-1-5	200032980	0.430	0.000	0.000	22.577	11.320	10.400	0.413
L	2500	21	1	267	X	2X267E	200032983	0.858	1.337	1.046	25.809	3.825	4.410	0.185
H	4000	22	1	193	X	2X193E	200032984	0.853	1.667	1.061	26.117	4.042	4.320	0.184
		23	2	0	K	2K-2-1	200033018	0.426	0.000	0.000	24.428	11.394	11.190	0.408
		24	2	0	B	2B-2	200033019	0.000	0.000	0.000	0.382	0.157	0.000	0.000
L	2000	25	2	333	H	2H333E	200033020	0.939	2.311	1.346	25.780	4.592	4.690	0.206
L	2000	26	2	334	T	2T334E	200033021	0.919	2.310	1.280	26.601	4.655	4.810	0.204
H	8000	27	2	72	G	2G072E	200033022	0.849	1.769	1.010	26.928	4.413	4.280	0.175
H	6000	28	2	71	H	2H071E	200033023	0.860	1.875	1.036	26.900	4.423	4.360	0.177
L	6000	29	2	25	G	2G025E	200033024	0.854	1.882	1.041	27.353	4.481	4.400	0.177
L	6000	30	2	26	H	2H026E	200033025	0.887	1.891	1.078	26.890	4.493	4.400	0.179
		31	2	0	K	2K-2-2	200033026	0.441	0.322	0.000	24.892	11.396	11.190	0.406
H	5000	32	2	154	Y	2Y154E	200033027	0.907	2.296	1.064	27.075	4.531	4.370	0.182
L	2000	33	2	303	Y	2Y303E	200033028	0.900	2.243	1.041	26.992	4.542	4.390	0.178
L	2500	34	2	277	Y	2Y277E	200033029	0.894	2.273	1.064	26.813	4.521	4.450	0.181
		35	2	0	K	2K-2-3	200033030	0.434	0.216	0.000	24.280	11.418	10.590	0.407
		36	2	0	S	2S-2	200033031	0.438	0.226	0.000	24.522	11.322	10.330	0.403
L	3000	37	2	252	Y	2Y252E	200033032	0.887	2.188	1.051	26.864	4.526	4.470	0.178
L	3500	38	2	230	Y	2Y230E	200033033	0.930	2.188	1.112	26.510	4.492	4.410	0.181
H	5500	39	2	133	Y	2Y133E	200033034	0.921	2.246	1.129	26.255	4.526	4.450	0.182
		40	2	0	K	2K-2-4	200033035	0.436	0.170	0.000	24.251	9.862	11.290	0.405
H	6000	41	2	112	Y	2Y112E	200033036	0.919	2.208	1.104	26.779	4.499	4.380	0.180
H	4500	42	2	184	Y	2Y184E	200033037	0.922	2.125	1.065	26.457	4.405	4.360	0.183
H	4000	43	2	201	Y	2Y201E	200033038	0.910	2.135	1.081	26.389	4.499	4.340	0.179
		44	2	0	K	2K-2-5	200033039	0.435	0.105	0.000	24.071	11.490	10.620	0.403
		45	3	0	K	2K-3-1	200033135	0.418	0.000	0.000	23.362	12.451	11.750	0.398
		46	3	0	B	2B-3	200033136	0.000	0.000	0.000	0.210	0.054	0.000	0.000
H	6000	47	3	105	Y	2Y105E	200033137	0.882	1.971	1.190	25.709	4.742	4.674	0.178
H	4000	48	3	203	Y	2Y203E	200033138	0.872	1.885	1.129	25.319	4.643	4.471	0.175
H	5500	49	3	134	Y	2Y134E	200033139	0.843	1.886	1.132	26.344	4.606	4.469	0.178
		50	3	0	K	2K-3-2	200033140	0.415	0.012	0.000	23.124	12.165	11.440	0.395
H	4500	51	3	182	Y	2Y182E	200033141	0.883	1.901	1.143	25.159	4.648	4.652	0.174
L	2000	52	3	304	Y	2Y304E	200033142	0.833	1.855	1.103	25.600	4.677	5.132	0.169
L	2500	53	3	280	Y	2Y280E	200033143	0.826	1.883	1.115	25.682	4.598	4.510	0.173
		54	3	0	K	2K-3-3	200033144	0.412	0.012	0.000	22.894	12.242	11.690	0.394
L	3000	55	3	250	Y	2Y250E	200033145	0.837	1.859	1.108	25.508	4.669	4.580	0.167
L	3500	56	3	232	Y	2Y232E	200033146	0.850	1.800	1.145	25.398	4.654	4.614	0.169
H	5000	57	3	156	Y	2Y156E	200033147	0.852	1.964	1.153	25.071	4.684	4.582	0.170
		58	3	0	K	2K-3-4	200033148	0.411	0.011	0.000	22.864	12.047	11.460	0.389
		59	3	0	S	2S-3	200033149	0.412	0.000	0.000	23.069	12.269	11.450	0.385
L	6000	60	3	28	H	2H028E	200033150	0.827	1.413	1.085	25.605	4.613	4.617	0.181
L	6000	61	3	27	G	2G027E	200033151	0.838	1.859	1.135	25.334	4.650	4.541	0.181
H	6000	62	3	75	H	2H075E	200033152	0.852	1.791	1.075	25.523	4.592	4.422	0.165
H	6000	63	3	76	G	2G076E	200033153	0.830	1.750	1.057	25.979	4.625	4.685	0.159
L	2000	64	3	336	H	2H336E	200033154	0.984	2.225	1.407	23.855	4.733	4.744	0.188
L	2000	65	3	335	T	2T335E	200033155	0.985	2.178	1.427	23.996	4.737	4.738	0.190
		66	3	0	K	2K-3-5	200033156	0.408	0.009	0.000	23.007	12.006	11.330	0.390

Non-critical Data

Table 8. Analytical Results for Ni, K, K-AA, Si, Na, Na-AA, and Ti (con't)

Mixer Speed	Tank Level (gallons)	Analytical Sequence Number	Block Number	Standard/Outlet/Sampler	Sample ID	Lab Sample ID	Ni (wt %)	K (wt %)	K-AA (wt %)	Si (wt %)	Na (wt %)	Na-AA (wt %)	Ti (wt %)
		67	4	0	K	2K-4-1	0.415	0.024	0.000	22.273	11.516	10.430	0.391
		68	4	0	B	2B-4	0.000	0.000	0.000	0.000	0.090	0.000	0.000
L	6000	69	4	4	H	2H004E	0.875	1.989	1.128	25.839	4.859	4.441	0.155
L	6000	70	4	3	G	2G003E	0.895	1.962	1.100	25.423	4.893	4.357	0.158
H	6000	71	4	53	H	2H053E	0.877	1.949	1.133	25.073	4.739	4.305	0.157
H	6000	72	4	54	G	2G054E	0.865	1.949	1.121	25.001	4.871	4.356	0.159
L	2000	73	4	323	T	2T323E	1.025	2.213	1.411	23.730	4.804	4.420	0.182
L	2000	74	4	324	H	2H324E	1.011	2.250	1.368	23.924	4.655	4.317	0.184
		75	4	0	K	2K-4-2	0.411	0.016	0.000	22.603	12.055	11.180	0.390
H	4500	76	4	176	X	2X176E	0.882	1.967	1.118	25.594	4.739	4.472	0.158
H	6000	77	4	102	X	2X102E	0.916	2.017	1.164	24.914	4.725	4.416	0.162
L	3500	78	4	222	X	2X222E	0.909	1.973	1.122	25.304	4.703	4.413	0.160
		79	4	0	K	2K-4-3	0.436	0.015	0.000	22.460	11.965	10.860	0.389
		80	4	0	S	2S-4	0.441	0.064	0.000	22.561	12.172	11.110	0.392
L	3000	81	4	248	X	2X248E	0.875	1.905	1.095	25.800	4.719	4.401	0.157
H	4000	82	4	198	X	2X198E	0.886	1.947	1.130	25.421	4.676	4.406	0.152
H	5000	83	4	150	X	2X150E	0.900	1.913	1.112	25.125	4.689	4.415	0.156
		84	4	0	K	2K-4-4	0.439	0.014	0.000	22.354	12.074	10.880	0.393
H	5500	85	4	127	X	2X127E	0.917	1.952	1.122	25.249	4.711	4.500	0.161
L	2000	86	4	294	X	2X294E	0.896	1.921	1.096	25.232	4.738	4.497	0.160
L	2500	87	4	269	X	2X269E	0.892	1.892	1.128	25.559	4.699	4.439	0.158
		88	4	0	K	2K-4-5	0.437	0.017	0.000	22.600	12.056	10.880	0.378
		89	5	0	K	2K-5-1	0.409	0.021	0.000	23.257	11.980	11.180	0.409
		90	5	0	B	2B-5	0.000	0.000	0.000	0.000	0.116	0.000	0.000
L	2500	91	5	274	Y	2Y274E	0.832	1.861	0.994	26.231	4.660	4.550	0.177
H	5500	92	5	132	Y	2Y132E	0.852	1.854	1.053	25.424	4.593	4.584	0.187
L	3000	93	5	256	Y	2Y256E	0.838	1.859	1.009	26.184	4.555	4.576	0.185
		94	5	0	K	2K-5-2	0.405	0.009	0.000	23.289	11.872	11.537	0.409
L	2000	95	5	298	Y	2Y298E	0.831	1.884	1.034	25.937	4.653	4.632	0.188
H	4500	96	5	179	Y	2Y179E	0.826	1.836	1.009	26.080	4.602	4.550	0.186
H	6000	97	5	108	Y	2Y108E	0.863	1.857	1.047	25.812	4.670	4.639	0.189
		98	5	0	K	2K-5-3	0.405	0.011	0.000	23.656	11.904	11.120	0.410
L	3500	99	5	227	Y	2Y227E	0.850	1.828	1.032	26.430	4.597	4.696	0.188
H	5000	100	5	158	Y	2Y158E	0.845	1.836	1.048	25.987	4.578	4.571	0.190
H	4000	101	5	204	Y	2Y204E	0.842	1.863	1.044	26.311	4.596	4.706	0.189
		102	5	0	K	2K-5-4	0.404	0.011	0.000	23.645	11.935	11.860	0.412
		103	5	0	S	2S-5	0.406	0.000	0.000	23.718	11.901	11.390	0.412
L	2000	104	5	342	H	2H342E	0.945	2.060	1.194	24.888	4.708	4.784	0.211
L	2000	105	5	341	T	2T341E	0.956	2.096	1.218	24.830	4.681	4.790	0.212
H	6000	106	5	77	G	2G077E	0.819	1.712	1.001	26.501	4.589	4.587	0.183
H	6000	107	5	78	H	2H078E	0.825	1.715	0.993	26.391	4.632	4.571	0.182
L	6000	108	5	24	G	2G024E	0.806	1.713	1.002	26.579	4.666	4.611	0.178
L	6000	109	5	23	H	2H023E	0.827	1.740	1.028	26.066	4.626	4.599	0.182
		110	5	0	K	2K-5-5	0.411	0.023	0.000	23.574	12.121	11.710	0.411
		111	6	0	K	2K-6-1	0.416	0.018	0.000	19.950	11.936	11.360	0.414
		112	6	0	B	2B-6	0.000	0.000	0.000	0.000	0.228	0.000	0.000
H	6000	113	6	106	Y	2Y106E	0.920	2.105	1.539	22.798	4.711	4.671	0.198
H	4000	114	6	207	Y	2Y207E	0.875	1.919	1.437	24.102	4.732	4.596	0.182
H	4500	115	6	180	Y	2Y180E	0.812	1.823	1.348	23.696	4.493	4.376	0.174
		116	6	0	K	2K-6-2	0.414	0.010	0.000	20.095	12.058	11.550	0.407
L	3500	117	6	229	Y	2Y229E	0.861	1.846	1.389	23.582	4.602	4.517	0.183
L	2000	118	6	299	Y	2Y299E	0.855	1.880	1.401	23.314	4.742	4.594	0.178
L	3000	119	6	249	Y	2Y249E	0.839	1.865	1.367	23.266	4.662	4.397	0.179
		120	6	0	K	2K-6-3	0.414	0.011	0.000	19.635	12.094	11.380	0.404
L	2500	121	6	273	Y	2Y273E	0.847	1.892	1.408	23.508	4.626	4.493	0.182
H	5500	122	6	135	Y	2Y135E	0.853	1.700	1.274	23.544	4.582	4.550	0.181
H	5000	123	6	155	Y	2Y155E	0.809	1.678	1.300	22.680	4.397	4.292	0.180
		124	6	0	K	2K-6-4	0.411	0.003	0.000	19.863	12.081	11.520	0.401
		125	6	0	S	2S-6	0.412	0.036	0.000	21.256	11.856	11.140	0.399
L	2000	126	6	344	H	2H344E	0.886	1.944	1.483	22.433	4.598	4.561	0.204
L	2000	127	6	343	T	2T343E	0.960	2.175	1.653	22.160	4.836	4.751	0.203
H	6000	128	6	65	G	2G065E	0.816	1.678	1.312	23.493	4.670	4.592	0.168
H	6000	129	6	66	H	2H066E	0.858	1.770	1.379	23.376	4.753	4.715	0.173
L	6000	130	6	31	H	2H031E	0.840	1.712	1.355	23.518	4.621	4.492	0.173
L	6000	131	6	32	G	2G032E	0.811	1.685	1.327	23.547	4.611	4.361	0.170
		132	6	0	K	2K-6-5	0.414	0.005	0.000	19.666	11.933	11.040	0.404

Table 8. Analytical Results for Ni, K, K-AA, Si, Na, Na-AA, and Ti (con't)

Mixer Speed	Tank Level (gallons)	Analytical Sequence Number	Block Number	Vial #	Standard/Outlet/Sampler	Sample ID	Lab Sample ID	Ni (wt %)	K (wt %)	K-AA (wt %)	Si (wt %)	Na (wt %)	Na-AA (wt %)	Ti (wt %)
		133	7	0	K	2K-7-1	200033328	0.419	0.015	0.019	21.317	12.116	12.036	0.434
		134	7	0	B	2B-7	200033329	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L	2000	135	7	328	H	2H328E	200033330	0.955	2.246	1.720	23.369	4.837	4.519	0.226
L	2000	136	7	327	T	2T327E	200033331	0.937	2.252	1.756	23.235	4.822	4.650	0.229
H	6000	137	7	60	H	2H060E	200033332	0.847	1.856	1.469	24.312	4.770	4.421	0.203
H	6000	138	7	59	G	2G059E	200033333	0.831	1.795	1.446	24.529	4.706	4.447	0.200
L	6000	139	7	9	H	2H009E	200033334	0.838	1.815	1.462	24.444	4.731	4.529	0.199
L	6000	140	7	10	G	2G010E	200033335	0.825	1.848	1.450	24.034	4.697	4.409	0.204
		141	7	0	K	2K-7-2	200033336	0.409	0.014	0.019	21.123	12.365	11.378	0.433
L	3000	142	7	244	X	2X244E	200033337	0.826	1.813	1.470	24.768	4.730	4.424	0.204
L	2500	143	7	266	X	2X266E	200033338	0.811	1.853	1.488	23.917	4.724	4.354	0.204
H	5000	144	7	146	X	2X146E	200033339	0.812	1.838	1.484	22.145	4.758	4.364	0.204
		145	7	0	K	2K-7-3	200033340	0.403	0.011	0.019	22.243	12.408	11.524	0.431
		146	7	0	S	2S-7	200033341	0.403	0.014	0.018	22.261	12.298	11.427	0.431
H	4500	147	7	170	X	2X170E	200033342	0.810	1.832	1.476	24.625	4.706	4.322	0.206
L	2000	148	7	292	X	2X292E	200033343	0.822	1.774	1.397	25.054	4.674	4.356	0.204
H	5500	149	7	121	X	2X121E	200033344	0.843	1.833	1.487	24.714	4.708	4.436	0.207
		150	7	0	K	2K-7-4	200033345	0.415	0.013	0.019	21.502	12.068	11.495	0.430
H	6000	151	7	97	X	2X097E	200033346	0.861	1.897	1.496	24.029	4.712	4.404	0.208
L	3500	152	7	221	X	2X221E	200033347	0.865	1.846	1.490	24.474	4.675	4.438	0.210
H	4000	153	7	199	X	2X199E	200033348	0.855	1.744	1.428	24.564	4.664	4.287	0.207
		154	7	0	K	2K-7-5	200033349	0.416	0.020	0.019	22.161	12.234	11.432	0.437
		155	8	0	K	2K-8-1	200033354	0.419	0.014	0.017	20.233	12.152	12.150	0.395
		156	8	0	B	2B-8	200033355	0.000	0.000	0.000	0.000	0.112	0.000	0.000
L	2000	157	8	337	H	2H337E	200033356	0.961	2.192	1.888	21.327	4.789	4.449	0.191
L	2000	158	8	338	T	2T338E	200033357	0.995	2.167	1.701	21.221	4.797	4.308	0.191
H	6000	159	8	73	G	2G073E	200033358	0.824	1.789	1.427	22.768	4.659	4.382	0.170
H	6000	160	8	74	H	2H074E	200033359	0.839	1.808	1.457	22.844	4.650	4.301	0.167
L	6000	161	8	21	G	2G021E	200033360	0.827	1.792	1.453	23.319	4.694	4.382	0.159
L	6000	162	8	22	H	2H022E	200033361	0.838	1.841	1.491	22.595	4.729	4.262	0.180
		163	8	0	K	2K-8-2	200033362	0.415	0.012	0.017	19.579	12.119	11.310	0.387
H	4000	164	8	206	Y	2Y206E	200033363	0.856	1.919	1.507	22.373	4.695	4.247	0.185
L	2500	165	8	279	Y	2Y279E	200033364	0.851	1.852	1.483	22.131	4.718	4.036	0.180
H	5000	166	8	159	Y	2Y159E	200033365	0.830	1.816	1.455	22.199	4.641	4.348	0.183
		167	8	0	K	2K-8-3	200033366	0.414	0.016	0.017	19.845	12.051	10.090	0.391
		168	8	0	S	2S-8	200033367	0.415	0.013	0.017	20.041	12.064	11.390	0.389
H	4500	169	8	183	Y	2Y183E	200033368	0.846	1.790	1.468	22.308	4.616	4.284	0.186
H	6000	170	8	107	Y	2Y107E	200033369	0.928	1.983	1.591	21.671	4.722	4.459	0.175
L	2000	171	8	302	Y	2Y302E	200033370	0.846	1.767	1.421	23.058	4.688	4.377	0.183
		172	8	0	K	2K-8-4	200033371	0.416	0.012	0.017	19.791	11.934	10.750	0.394
L	3500	173	8	231	Y	2Y231E	200033372	0.867	1.857	1.502	22.577	4.734	4.421	0.169
L	3000	174	8	251	Y	2Y251E	200033373	0.848	1.776	1.438	22.835	4.692	4.331	0.183
H	5500	175	8	136	Y	2Y136E	200033374	0.870	1.872	1.521	22.158	4.714	4.338	0.185
		176	8	0	K	2K-8-5	200033375	0.414	0.012	0.019	20.666	12.134	10.380	0.402
		177	9	0	K	2K-9-1	200033512	0.419	0.019	0.019	20.340	12.127	11.540	0.417
		178	9	0	B	2B-9	200033513	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L	3000	179	9	241	X	2X241E	200033514	0.826	1.881	1.428	23.476	4.636	4.425	0.185
H	4500	180	9	174	X	2X174E	200033515	0.840	1.932	1.439	23.190	4.743	4.477	0.185
L	2000	181	9	290	X	2X290E	200033516	0.826	1.839	1.395	23.260	4.707	4.531	0.183
		182	9	0	K	2K-9-2	200033517	0.417	0.020	0.019	20.791	12.075	10.590	0.417
H	5000	183	9	149	X	2X149E	200033518	0.845	1.928	1.449	23.176	4.740	4.437	0.188
H	6000	184	9	101	X	2X101E	200033519	0.849	1.923	1.446	23.407	4.739	4.576	0.186
H	4000	185	9	197	X	2X197E	200033520	0.854	1.943	1.467	22.933	4.733	4.527	0.186
		186	9	0	K	2K-9-3	200033521	0.417	0.021	0.019	20.762	12.152	10.810	0.417
L	2500	187	9	272	X	2X272E	200033522	0.835	1.887	1.421	22.924	4.753	4.469	0.183
L	3500	188	9	218	X	2X218E	200033523	0.832	1.862	1.413	20.482	4.640	4.422	0.180
H	5500	189	9	128	X	2X128E	200033524	0.839	1.923	1.447	23.065	4.728	4.403	0.188
		190	9	0	K	2K-9-4	200033525	0.416	0.021	0.019	21.005	12.167	10.360	0.418
		191	9	0	S	2S-9	200033526	0.414	0.020	0.019	21.327	12.407	10.890	0.420
L	2000	192	9	313	H	2H313E	200033527	0.924	2.154	1.628	22.367	4.794	4.571	0.211
L	2000	193	9	314	T	2T314E	200033528	0.944	2.184	1.645	22.217	4.796	4.609	0.210
H	6000	194	9	49	G	2G049E	200033529	0.806	1.794	1.370	23.699	4.688	4.499	0.182
H	6000	195	9	50	H	2H050E	200033530	0.830	1.832	1.419	23.122	4.661	4.554	0.185
L	6000	196	9	15	G	2G015E	200033531	0.822	1.893	1.426	23.228	4.709	4.520	0.184
L	6000	197	9	16	H	2H016E	200033532	0.815	1.844	1.390	23.061	4.706	4.480	0.179
		198	9	0	K	2K-9-5	200033533	0.413	0.019	0.019	20.764	12.205	12.050	0.417

Non-critical Data

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Table 8. Analytical Results for Ni, K, K-AA, Si, Na, Na-AA, and Ti (con't)

Mixer Speed	Tank Level (gallons)	Analytical Sequence Number	Block Number	Vial #	Standard/Outlet Sampler	Sample ID	Sample ID	Ni (wt %)	K (wt %)	K-AA (wt %)	Si (wt %)	Na (wt %)	Na-AA (wt %)	Ti (wt %)
		199	10	0	K	2K-10-1	200033541	0.419	0.018	0.020	20.862	12.194	12.030	0.408
		200	10	0	B	2B-10	200033542	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L	6000	201	10	8	G	2G008E	200033543	0.828	1.864	1.441	22.336	4.706	4.660	0.175
L	6000	202	10	7	H	2H007E	200033544	0.836	1.834	1.437	22.490	4.746	4.626	0.175
H	6000	203	10	57	G	2G057E	200033545	0.849	1.796	1.437	22.061	4.679	4.721	0.175
H	6000	204	10	58	H	2H058E	200033546	0.847	1.807	1.487	21.843	4.699	4.780	0.174
L	2000	205	10	325	H	2H325E	200033547	0.948	2.179	1.761	20.560	4.814	4.877	0.204
L	2000	206	10	326	T	2T326E	200033548	0.963	2.152	1.763	20.383	4.784	5.004	0.201
		207	10	0	K	2K-10-2	200033550	0.419	0.015	0.020	18.988	12.101	11.290	0.405
L	3500	208	10	217	X	2X217E	200033551	0.851	1.853	1.532	21.805	4.723	4.775	0.176
L	2500	209	10	265	X	2X265E	200033552	0.854	1.856	1.524	21.801	4.747	4.761	0.181
H	4500	210	10	175	X	2X175E	200033553	0.838	1.814	1.507	21.775	4.714	4.752	0.176
		211	10	0	K	2K-10-3	200033554	0.416	0.011	0.020	19.526	12.225	11.330	0.403
		212	10	0	S	2S-10	200033555	0.418	0.010	0.020	19.744	12.189	11.500	0.405
H	6000	213	10	98	X	2X098E	200033556	0.856	1.832	1.514	21.729	4.716	4.705	0.182
L	3000	214	10	247	X	2X247E	200033557	0.834	1.775	1.471	21.739	4.695	4.682	0.171
H	5000	215	10	147	X	2X147E	200033558	0.838	1.764	1.467	22.057	4.727	4.699	0.176
		216	10	0	K	2K-10-4	200033559	0.418	0.011	0.020	19.438	12.266	11.630	0.408
H	5500	217	10	124	X	2X124E	200033560	0.870	1.850	1.495	21.770	4.742	4.702	0.176
L	2000	218	10	289	X	2X289E	200033561	0.840	1.774	1.483	21.778	4.608	4.595	0.177
H	4000	219	10	196	X	2X196E	200033562	0.842	1.777	1.502	21.544	4.733	4.641	0.176
		220	10	0	K	2K-10-5	200033563	0.414	0.010	0.020	19.817	12.291	11.880	0.408
		221	11	0	K	2K-11-1	200033569	0.422	0.014	0.020	20.203	12.135	11.810	0.402
		222	11	0	B	2B-11	200033570	0.000	0.000	0.000	0.000	0.000	0.000	0.000
H	5500	223	11	126	X	2X126E	200033571	0.868	1.903	1.522	22.942	4.741	4.615	0.172
H	5000	224	11	145	X	2X145E	200033572	0.845	1.788	1.467	22.864	4.665	4.505	0.173
H	6000	225	11	104	X	2X104E	200033573	0.878	1.918	1.532	22.683	4.719	4.600	0.179
		226	11	0	K	2K-11-2	200033574	0.422	0.010	0.019	20.401	12.100	12.160	0.403
L	3000	227	11	242	X	2X242E	200033575	0.844	1.845	1.453	23.183	4.736	4.641	0.173
L	3500	228	11	223	X	2X223E	200033576	0.870	1.840	1.493	22.555	4.681	4.549	0.176
L	2500	229	11	268	X	2X268E	200033577	0.850	1.840	1.479	22.744	4.709	4.560	0.173
		230	11	0	K	2K-11-3	200033578	0.416	0.014	0.019	20.062	12.094	12.010	0.404
L	2000	231	11	291	X	2X291E	200033579	0.842	1.786	1.469	22.861	4.653	4.586	0.173
H	4500	232	11	171	X	2X171E	200033580	0.837	1.800	1.488	22.854	4.677	4.567	0.175
H	4000	233	11	195	X	2X195E	200033581	0.832	1.779	1.459	22.870	4.611	4.499	0.174
		234	11	0	K	2K-11-4	200033582	0.414	0.011	0.020	20.249	12.091	11.870	0.404
		235	11	0	S	2S-11	200033583	0.417	0.011	0.021	20.451	12.087	11.790	0.401
L	6000	236	11	11	G	2G011E	200033584	0.817	1.718	1.417	22.433	4.659	4.512	0.167
L	6000	237	11	12	H	2H012E	200033585	0.855	1.723	1.439	22.495	4.710	4.507	0.174
H	6000	238	11	63	G	2G063E	200033586	0.844	1.733	1.432	22.586	4.642	4.528	0.173
H	6000	239	11	64	H	2H064E	200033587	0.829	1.702	1.410	22.735	4.692	4.460	0.170
L	2000	240	11	320	H	2H320E	200033588	0.967	2.077	1.745	20.801	4.793	4.608	0.199
L	2000	241	11	319	T	2T319E	200033589	0.984	2.105	1.776	20.692	4.812	4.598	0.199
		242	11	0	K	2K-11-5	200033590	0.418	0.005	0.019	19.692	12.043	11.980	0.403
		243	12	0	K	2K-12-1	200033591	0.413	0.020	0.020	20.143	11.931	12.110	0.404
		244	12	0	B	2B-12	200033592	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L	2500	245	12	271	X	2X271E	200033593	0.832	1.887	1.476	23.765	4.688	4.640	0.176
H	6000	246	12	103	X	2X103E	200033594	0.846	1.888	1.502	23.074	4.567	4.528	0.176
H	5000	247	12	148	X	2X148E	200033595	0.839	1.908	1.508	23.304	4.679	4.558	0.174
		248	12	0	K	2K-12-2	200033596	0.412	0.021	0.020	20.340	11.939	12.030	0.404
H	4000	249	12	194	X	2X194E	200033597	0.835	1.899	1.474	23.672	4.618	4.537	0.173
L	2000	250	12	296	X	2X296E	200033598	0.819	1.832	1.473	23.206	4.617	4.633	0.173
H	5500	251	12	123	X	2X123E	200033599	0.836	1.903	1.517	23.097	4.568	4.614	0.173
		252	12	0	K	2K-12-3	200033600	0.410	0.021	0.020	20.410	11.840	11.970	0.401
L	3000	253	12	243	X	2X243E	200033601	0.824	1.843	1.476	22.967	4.582	4.590	0.170
H	4500	254	12	172	X	2X172E	200033602	0.822	1.848	1.483	22.855	4.562	4.583	0.170
L	3500	255	12	220	X	2X220E	200033603	0.848	1.905	1.484	23.006	4.509	4.501	0.173
		256	12	0	K	2K-12-4	200033605	0.416	0.021	0.020	20.188	11.875	12.190	0.399
		257	12	0	S	2S-12	200033606	0.410	0.019	0.019	20.499	11.816	11.890	0.395
L	6000	258	12	13	G	2G013E	200033607	0.823	1.846	1.439	22.711	4.677	4.581	0.163
L	6000	259	12	14	H	2H014E	200033608	0.821	1.811	1.450	22.525	4.654	4.609	0.165
H	6000	260	12	61	H	2H061E	200033609	0.838	1.845	1.465	22.744	4.606	4.575	0.169
H	6000	261	12	62	G	2G062E	200033610	0.832	1.812	1.430	22.356	4.476	4.392	0.169
L	2000	262	12	322	H	2H322E	200033611	0.935	2.129	1.705	21.633	4.670	4.496	0.194
L	2000	263	12	321	T	2T321E	200033612	0.951	2.136	1.720	20.684	4.706	4.495	0.193
		264	12	0	K	2K-12-5	200033613	0.411	0.020	0.020	19.634	11.854	11.720	0.395

Table 8. Analytical Results for Ni, K, K-AA, Si, Na, Na-AA, and Ti (con't)

Mixer Speed	Tank Level (gallons)	Analytical Sequence Number	Block Number	Vial #	Standard/ Outlet/ Sampler	Sample ID	Lab Sample ID	Ni (wt %)	K (wt %)	K-AA (wt %)	Si (wt %)	Na (wt %)	Na-AA (wt %)	Ti (wt %)
		265	13	0	K	2K-13-1	200033619	0.417	0.017	0.020	20.973	12.001	12.110	0.401
		266	13	0	B	2B-13	200033620	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L	6000	267	13	30	G	2G030E	200033621	0.828	1.849	1.427	24.571	4.657	4.539	0.170
L	6000	268	13	29	H	2H029E	200033622	0.811	1.795	1.401	24.238	4.588	4.400	0.172
H	6000	269	13	79	G	2G079E	200033623	0.809	1.846	1.454	24.229	4.663	4.478	0.174
H	6000	270	13	80	H	2H080E	200033624	0.813	1.880	1.452	24.908	4.629	4.451	0.175
L	2000	271	13	339	T	2T339E	200033625	0.951	2.215	1.743	23.699	4.742	4.550	0.211
L	2000	272	13	340	H	2H340E	200033626	0.957	2.225	1.752	23.834	4.719	4.591	0.214
		273	13	0	K	2K-13-2	200033627	0.409	0.023	0.020	21.701	12.128	11.790	0.408
L	3000	274	13	254	Y	2Y254E	200033628	0.834	1.910	1.486	24.499	4.674	4.440	0.177
H	4500	275	13	177	Y	2Y177E	200033629	0.835	1.922	1.500	23.714	4.662	4.500	0.175
H	6000	276	13	109	Y	2Y109E	200033630	0.844	1.970	1.503	23.687	4.629	4.482	0.179
		277	13	0	K	2K-13-3	200033631	0.408	0.022	0.020	21.326	12.104	11.810	0.405
		278	13	0	S	2S-13	200033632	0.404	0.022	0.020	22.338	12.022	11.810	0.409
H	5000	279	13	157	Y	2Y157E	200033633	0.836	1.961	1.504	23.065	4.614	4.561	0.176
H	4000	280	13	205	Y	2Y205E	200033634	0.852	1.949	1.480	22.756	4.609	4.481	0.173
L	2000	281	13	297	Y	2Y297E	200033635	0.855	1.923	1.482	23.030	4.630	4.660	0.174
		282	13	0	K	2K-13-4	200033636	0.407	0.024	0.020	20.567	12.002	11.810	0.398
L	2500	283	13	278	Y	2Y278E	200033637	0.810	1.901	1.439	23.499	4.677	4.586	0.169
H	5500	284	13	129	Y	2Y129E	200033638	0.860	1.961	1.508	22.725	4.633	4.551	0.175
L	3500	285	13	226	Y	2Y226E	200033639	0.847	1.939	1.493	22.834	4.666	4.626	0.170
		286	13	0	K	2K-13-5	200033640	0.406	0.023	0.020	20.353	12.036	11.920	0.394
		287	14	0	K	2K-14-1	200033645	0.416	0.017	0.019	21.313	11.990	11.776	0.408
		288	14	0	B	2B-14	200033646	0.000	0.000	0.000	0.000	0.000	0.000	0.000
H	4000	289	14	200	X	2X200E	200033647	0.845	1.877	1.356	24.188	4.553	4.509	0.177
H	5500	290	14	125	X	2X125E	200033648	0.832	1.876	1.369	24.074	4.517	4.586	0.179
L	3500	291	14	224	X	2X224E	200033649	0.847	1.909	1.395	24.125	4.574	4.516	0.179
		292	14	0	K	2K-14-2	200033670	0.410	0.017	0.019	21.542	11.887	11.698	0.410
L	2000	293	14	295	X	2X295E	200033671	0.826	1.850	1.320	24.306	4.482	4.395	0.177
H	4500	294	14	173	X	2X173E	200033672	0.845	1.857	1.376	24.085	4.571	4.408	0.179
L	3000	295	14	248	X	2X248E	200033673	0.849	1.927	1.384	24.141	4.607	4.492	0.178
		296	14	0	K	2K-14-3	200033674	0.413	0.022	0.018	21.406	11.917	11.744	0.407
H	5000	297	14	152	X	2X152E	200033675	0.842	1.889	1.363	24.189	4.603	4.446	0.178
H	6000	298	14	99	X	2X099E	200033676	0.825	1.877	1.363	23.934	4.575	4.386	0.176
L	2500	299	14	270	X	2X270E	200033677	0.818	1.813	1.315	24.003	4.537	4.487	0.177
		300	14	0	K	2K-14-4	200033678	0.409	0.018	0.019	21.539	11.763	11.877	0.407
		301	14	0	S	2S-14	200033679	0.412	0.017	0.021	21.820	11.748	11.714	0.405
L	6000	302	14	6	G	2G006E	200033680	0.798	1.777	1.336	24.402	4.506	4.450	0.173
L	6000	303	14	5	H	2H005E	200033681	0.810	1.820	1.360	24.228	4.505	4.402	0.175
H	6000	304	14	52	G	2G052E	200033682	0.823	1.810	1.343	24.151	4.471	4.320	0.177
H	6000	305	14	51	H	2H051E	200033683	0.820	1.822	1.346	23.846	4.471	4.561	0.174
L	2000	306	14	318	T	2T318E	200033684	0.955	2.217	1.656	22.562	4.582	4.411	0.205
L	2000	307	14	317	H	2H317E	200033685	0.978	2.270	1.684	22.053	4.633	4.550	0.205
		308	14	0	K	2K-14-5	200033686	0.411	0.017	0.018	21.609	11.792	11.579	0.408
		309	15	0	K	2K-15-1	200033688	0.415	0.015	0.019	21.742	12.069	12.412	0.413
		310	15	0	B	2B-15	200033689	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L	2000	311	15	301	Y	2Y301E	200033690	0.825	1.799	1.393	24.913	4.643	4.700	0.182
H	5000	312	15	160	Y	2Y160E	200033691	0.831	1.839	1.456	24.425	4.578	4.693	0.188
H	6000	313	15	111	Y	2Y111E	200033692	0.848	1.858	1.462	24.192	4.565	4.678	0.192
		314	15	0	K	2K-15-2	200033693	0.407	0.013	0.018	22.213	11.970	12.389	0.415
L	2500	315	15	275	Y	2Y275E	200033694	0.814	1.826	1.385	24.611	4.628	4.715	0.183
H	4500	316	15	178	Y	2Y178E	200033695	0.835	1.829	1.418	24.268	4.690	4.764	0.187
H	5500	317	15	131	Y	2Y131E	200033696	0.864	1.903	1.472	24.060	4.643	4.741	0.190
		318	15	0	K	2K-15-3	200033697	0.409	0.013	0.019	21.235	12.210	12.221	0.412
L	3500	319	15	225	Y	2Y225E	200033698	0.889	1.894	1.461	24.012	4.585	4.710	0.188
L	3000	320	15	253	Y	2Y253E	200033699	0.840	1.775	1.408	24.268	4.554	4.667	0.184
H	4000	321	15	202	Y	2Y202E	200033700	0.848	1.853	1.312	23.938	4.632	4.698	0.187
		322	15	0	K	2K-15-4	200033701	0.410	0.011	0.019	21.641	12.092	12.379	0.409
		323	15	0	S	2S-15	200033702	0.413	0.012	0.018	21.718	12.183	12.287	0.412
L	6000	324	15	17	H	2H017E	200033703	0.819	1.781	1.387	24.463	4.570	4.638	0.181
L	6000	325	15	18	G	2G018E	200033704	0.830	1.806	1.406	24.455	4.589	4.717	0.183
H	6000	326	15	68	G	2G068E	200033705	0.844	1.833	1.404	24.115	4.622	4.666	0.186
H	6000	327	15	67	H	2H067E	200033706	0.833	1.781	1.379	24.040	4.559	4.711	0.182
L	2000	328	15	332	H	2H332E	200033707	0.982	2.178	1.675	22.459	4.684	4.733	0.210
L	2000	329	15	331	T	2T331E	200033708	0.959	2.095	1.635	22.735	4.658	4.670	0.208
		330	15	0	K	2K-15-5	200033709	0.399	0.011	0.018	21.429	11.962	12.374	0.413

Table 8. Analytical Results for Ni, K, K-AA, Si, Na, Na-AA, and Ti (con't)

Mixer Speed	Tank Level (gallons)	Analytical Sequence Number	Block Number	Vial #	Standard/ Outlet/ Sampler	Lab Sample ID	Sample ID	Ni (wt %)	K (wt %)	K-AA (wt %)	Si (wt %)	Na (wt %)	Na-AA (wt %)	Ti (wt %)
		331	16	0	K	2K-16-1	200033710	0.425	0.018	0.019	20.884	12.269	12.349	0.406
		332	16	0	B	2B-16	200033711	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L	6000	333	16	20	G	2G020E	200033712	0.839	1.852	1.496	23.173	4.802	4.856	0.176
L	6000	334	16	19	H	2H019E	200033713	0.798	1.785	1.479	23.388	4.781	4.829	0.174
H	6000	335	16	70	G	2G070E	200033714	0.844	1.806	1.468	23.272	4.768	4.802	0.172
H	6000	336	16	69	H	2H069E	200033715	0.842	1.828	1.466	23.582	4.759	4.764	0.175
L	2000	337	16	329	H	2H329E	200033716	0.968	2.142	1.755	21.362	4.909	4.861	0.200
L	2000	338	16	330	T	2T330E	200033717	0.936	2.172	1.786	21.781	4.811	4.899	0.202
		339	16	0	K	2K-16-2	200033718	0.408	0.014	0.019	20.693	12.105	12.398	0.402
L	3000	340	16	255	Y	2Y255E	200033719	0.824	1.820	1.503	23.293	4.740	4.727	0.175
H	4000	341	16	208	Y	2Y208E	200033720	0.841	1.849	1.505	23.476	4.680	4.836	0.177
H	4500	342	16	181	Y	2Y181E	200033721	0.838	1.840	1.493	22.586	4.677	4.805	0.178
		343	16	0	K	2K-16-3	200033722	0.408	0.014	0.019	21.003	12.014	12.533	0.397
		344	16	0	S	2S-16	200033723	0.400	0.012	0.019	21.418	12.039	12.509	0.397
L	2500	345	16	276	Y	2Y276E	200033724	0.828	1.858	1.489	24.677	4.675	4.837	0.189
H	5000	346	16	153	Y	2Y153E	200033725	0.835	1.867	1.487	23.571	4.633	4.776	0.191
H	6000	347	16	110	Y	2Y110E	200033726	0.861	1.884	1.537	23.072	4.711	4.855	0.189
		348	16	0	K	2K-16-4	200033727	0.404	0.014	0.019	21.649	12.012	12.554	0.416
L	3500	349	16	228	Y	2Y228E	200033728	0.865	1.906	1.527	24.329	4.627	4.780	0.192
L	2000	350	16	300	Y	2Y300E	200033729	0.855	1.883	1.526	24.766	4.767	4.843	0.194
H	5500	351	16	130	Y	2Y130E	200033730	0.849	1.890	1.549	23.765	4.756	4.750	0.188
		352	16	0	K	2K-16-5	200033731	0.405	0.015	0.020	21.613	12.008	12.333	0.413

Table 9. Elemental Analysis of Check Standards

Values are expressed as weight percents.

Element	Check/ Blank	Sample Mean	Sample Std Dev	95% C.I. for Mean	
				Lower	Upper
Al	B	0.007	0.029	-0.008	0.023
B	B	0.017	0.069	-0.019	0.054
Ca	B	0.033	0.045	0.009	0.057
Cu	B	0.001	0.005	-0.001	0.004
Fe	B	0.051	0.131	-0.019	0.121
K	B	0.000	0.000	0.000	0.000
K-AA	B	0.000	0.000	0.000	0.000
Mg	B	0.011	0.027	-0.004	0.025
Mn	B	0.000	0.000	0.000	0.000
Na	B	0.047	0.072	0.009	0.086
Na-AA	B	0.000	0.000	0.000	0.000
NI	B	0.000	0.000	0.000	0.000
Si	B	0.226	0.767	-0.183	0.635
Ti	B	0.000	0.000	0.000	0.000

Element	Check/ Blank	Sample Mean	Sample Std Dev	95% C.I. for Mean		EA Glass Standard Reference Values
				Lower	Upper	
Al	K	1.8798	0.1290	1.8510	1.9085	1.96
	S	1.8803	0.0920	1.8313	1.9293	
B	K	3.4578	0.0567	3.4452	3.4704	3.51
	S	3.4437	0.0498	3.4171	3.4702	
Ca	K	0.7415	0.0138	0.7384	0.7446	0.80
	S	0.7358	0.0151	0.7277	0.7438	
Cu	K	0.0006	0.0007	0.0005	0.0008	0.00
	S	0.0008	0.0010	0.0003	0.0014	
Fe	K	6.1565	0.0815	6.1384	6.1747	6.29
	S	6.1019	0.1079	6.0444	6.1594	
K	K	0.0233	0.0456	0.0131	0.0335	0.03
	S	0.0298	0.0546	0.0007	0.0588	
K-AA	K	0.0120	0.0093	0.0099	0.0140	0.03
	S	0.0120	0.0097	0.0069	0.0171	
Mg	K	1.0127	0.0191	1.0085	1.0170	1.04
	S	1.0077	0.0193	0.9974	1.0180	
Mn	K	0.9777	0.0235	0.9724	0.9829	1.04
	S	0.9808	0.0315	0.9640	0.9975	
Na	K	11.9635	0.3376	11.8884	12.0386	12.50
	S	11.9756	0.3265	11.8016	12.1496	
Na-AA	K	11.5351	0.5966	11.4023	11.6679	12.50
	S	11.4261	0.6164	11.0976	11.7545	
NI	K	0.4155	0.0086	0.4136	0.4174	0.45
	S	0.4139	0.0109	0.4081	0.4197	
Si	K	21.4683	1.4105	21.1544	21.7822	22.78
	S	21.8738	1.3482	21.1554	22.5921	
Ti	K	0.4061	0.0108	0.4037	0.4085	0.42
	S	0.4041	0.0118	0.3978	0.4104	

Table 10. Sampler Contrasts for Elementals By Tank Level and Mixer Speed

H - high grab sampler

G - low grab sampler

100% (H-G)/G

Element	Tank at 6000 gallons Low Mixer Speed			Tank at 6000 gallons High Mixer Speed			Tank at 2000 gallons Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
Al	0.05	1.77	0.9	0.08	1.79	1.0	-0.07	0.66	0.4
B	-0.53	1.31	0.7	-0.36	1.13	0.6	0.54	1.44	0.8
Ca	0.86	2.90	1.5	1.24	2.29	1.2	-0.57	3.63	1.9
Cu	0.11	1.45	0.8	0.77	1.76	0.9	-0.54	1.81	1.0
Fe	0.08	2.13	1.1	0.57	2.00	1.1	0.00	1.02	0.5
K	-2.74	6.96	3.7	1.24	2.34	1.2	-0.44	3.27	1.7
K-AA	0.39	2.22	1.2	1.22	1.85	1.0	-1.05	3.21	1.7
Mg	-0.35	0.94	0.5	-0.19	0.83	0.4	0.45	1.63	0.9
Mn	0.25	2.52	1.3	0.93	1.86	1.0	-0.47	2.58	1.4
Na	-0.11	0.72	0.4	0.33	1.29	0.7	-0.51	1.70	0.9
Na-AA	-0.16	1.78	0.9	-0.02	3.42	1.8	-0.42	2.11	1.1
Ni	0.63	2.62	1.4	0.97	1.72	0.9	-0.59	2.78	1.5
Si	-0.38	1.29	0.7	-0.28	1.51	0.8	-0.03	1.34	0.7
Ti	0.13	1.93	1.0	0.23	1.78	1.0	0.32	0.92	0.5

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Table 11. Summary of Results on MFT Outlets versus Tank Level and Mixer Speed

Element	Sample Results for Largest Average			Sample Results for Smallest Average			Largest Relative Difference Over Test Combinations	Smallest Significant Bias (SSB) (2-sample based)	Statistically Significant Differences Among Means (95% Level)	Statistically Significant Differences Among Std Devs (95% Level)
	Average wt %	Std Dev wt %	Sample Size	Average wt %	Std Dev wt %	Sample Size				
Al	1.599	0.065	8	1.526	0.087	8	4.8%	5.3%	No	No
B	2.403	0.026	8	2.355	0.035	8	2.1%	1.4%	No	No
Ca	0.813	0.035	8	0.753	0.018	8	7.9%	3.7%	Yes	No
Cu	0.349	0.013	8	0.334	0.017	8	4.6%	4.8%	No	No
Fe	8.722	0.246	8	8.372	0.137	8	4.2%	2.5%	Yes	Yes
K	1.979	0.123	8	1.772	0.266	8	11.7%	12.3%	No	No
K-AA	1.391	0.167	8	1.297	0.204	8	7.2%	15.0%	No	No
Mg	0.914	0.010	8	0.884	0.019	8	3.4%	1.8%	Yes	No
Mn	1.759	0.066	8	1.666	0.041	8	5.6%	3.4%	Yes	No
Na	4.665	0.069	8	4.561	0.237	8	2.3%	4.1%	No	No
Na-AA	4.666	0.244	8	4.605	0.154	8	1.3%	4.7%	No	No
NI	0.881	0.035	8	0.838	0.027	8	5.1%	3.9%	Yes	No
SI	24.711	1.474	8	23.404	1.754	8	5.6%	7.3%	No	No
TI	0.185	0.008	8	0.176	0.008	8	5.0%	4.6%	No	No

Table 12. Comparison of Tank Heel Samples to Other Samples for Elementals

Element	Tank Heel Samples (wt %)	Other Samples (wt %)	% Relative Difference
Al	1.712	1.551	10.4%
B	2.363	2.381	-0.7%
Ca	0.896	0.771	16.2%
Cu	0.382	0.336	13.7%
Fe	9.634	8.403	14.7%
K	2.153	1.838	17.1%
K-AA	1.588	1.331	19.3%
Mg	0.867	0.901	-3.8%
Mn	1.940	1.686	15.1%
Na	4.704	4.606	2.1%
Na-AA	4.626	4.528	2.2%
Ni	0.958	0.847	13.1%
Si	22.735	24.120	-5.7%
Ti	0.203	0.178	14.3%

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Table 13. Descriptive Statistics for Aluminum, Boron, and Calcium

Tank Level (gallons)	Mixer Speed	Outlet/ Scmpler	Sample Size	Al (wt %)			B (wt %)			Ca (wt %)		
				Average	Std Dev	% Rel Std Dev	Average	Std Dev	% Rel Std Dev	Average	Std Dev	% Rel Std Dev
6000	L	G	16	1.517	0.099	6.5%	2.384	0.043	1.8%	0.754	0.017	2.3%
		H	16	1.517	0.095	6.3%	2.371	0.037	1.6%	0.760	0.018	2.4%
		Overall	32	1.517	0.095	6.3%	2.378	0.040	1.7%	0.757	0.018	2.3%
6000	H	G	16	1.530	0.089	5.8%	2.385	0.046	1.9%	0.753	0.017	2.2%
		H	16	1.532	0.096	6.3%	2.376	0.046	2.0%	0.763	0.016	2.1%
		X	8	1.596	0.100	6.2%	2.394	0.028	1.2%	0.789	0.019	2.4%
		Y	8	1.599	0.065	4.0%	2.379	0.045	1.9%	0.813	0.035	4.3%
		Overall	48	1.553	0.093	6.0%	2.383	0.043	1.8%	0.772	0.030	3.8%
6000	Overall	Overall	80	1.539	0.095	6.2%	2.381	0.041	1.7%	0.766	0.027	3.5%
5500	H	X	8	1.574	0.092	5.8%	2.398	0.033	1.4%	0.783	0.026	3.3%
		Y	8	1.586	0.061	3.9%	2.380	0.066	2.8%	0.790	0.029	3.7%
		Overall	16	1.580	0.076	4.8%	2.389	0.051	2.1%	0.786	0.027	3.4%
5000	H	X	8	1.574	0.105	6.7%	2.392	0.044	1.9%	0.776	0.019	2.4%
		Y	8	1.559	0.096	6.2%	2.357	0.058	2.5%	0.783	0.023	2.9%
		Overall	16	1.566	0.098	6.2%	2.374	0.053	2.2%	0.779	0.021	2.6%
4500	H	X	8	1.568	0.108	6.9%	2.402	0.028	1.2%	0.771	0.020	2.6%
		Y	8	1.539	0.075	4.9%	2.355	0.035	1.5%	0.777	0.019	2.5%
		Overall	16	1.553	0.091	5.9%	2.378	0.039	1.7%	0.774	0.019	2.5%
4000	H	X	8	1.569	0.120	7.7%	2.391	0.054	2.2%	0.769	0.016	2.0%
		Y	8	1.547	0.079	5.1%	2.360	0.042	1.8%	0.788	0.019	2.4%
		Overall	16	1.558	0.099	6.3%	2.376	0.050	2.1%	0.778	0.020	2.5%
3500	L	X	8	1.560	0.128	8.2%	2.357	0.102	4.3%	0.778	0.015	1.9%
		Y	8	1.570	0.085	5.4%	2.377	0.055	2.3%	0.792	0.017	2.2%
		Overall	16	1.565	0.105	6.7%	2.367	0.080	3.4%	0.785	0.017	2.2%
3000	L	X	8	1.559	0.110	7.1%	2.399	0.033	1.4%	0.763	0.019	2.5%
		Y	8	1.531	0.068	4.4%	2.372	0.026	1.1%	0.764	0.018	2.4%
		Overall	16	1.545	0.089	5.8%	2.385	0.032	1.3%	0.763	0.018	2.4%
2500	L	X	8	1.573	0.094	6.0%	2.403	0.026	1.1%	0.760	0.022	2.8%
		Y	8	1.598	0.076	4.8%	2.390	0.036	1.5%	0.756	0.019	2.5%
		Overall	16	1.551	0.086	5.6%	2.383	0.028	1.2%	0.762	0.019	2.5%
2000	L	H	16	1.712	0.091	5.3%	2.369	0.050	2.1%	0.893	0.029	3.3%
		T(G)	16	1.713	0.091	5.3%	2.357	0.052	2.2%	0.899	0.026	2.9%
		X	8	1.566	0.099	6.3%	2.398	0.024	1.0%	0.753	0.018	2.4%
		Y	8	1.542	0.096	6.2%	2.382	0.059	2.5%	0.774	0.020	2.6%
		Overall	48	1.659	0.118	7.1%	2.372	0.050	2.1%	0.852	0.068	8.0%
Overall	Overall	Overall	240	1.573	0.107	6.8%	2.378	0.048	2.0%	0.788	0.049	6.2%
		Overall (Excluding Heel)	208	1.551	0.093	6.0%	2.381	0.047	2.0%	0.771	0.024	3.1%
		G	32	1.524	0.093	6.1%	2.385	0.044	1.8%	0.753	0.017	2.2%
		H	48	1.587	0.128	8.1%	2.372	0.044	1.8%	0.805	0.066	8.3%
		T(G)	16	1.713	0.091	5.3%	2.357	0.052	2.2%	0.899	0.026	2.9%
		X	72	1.571	0.101	6.4%	2.393	0.047	2.0%	0.771	0.021	2.7%
		Y	72	1.555	0.079	5.1%	2.370	0.049	2.1%	0.784	0.026	3.3%

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Table 14. Descriptive Statistics for Copper, Iron, and Magnesium

Tank Level (gallons)	Mixer Speed	Outlet/ Sampler	Sample Size	Cu (wt %)			Fe (wt %)			Mg (wt %)		
				Average	Std Dev	% Rel Std Dev	Average	Std Dev	% Rel Std Dev	Average	Std Dev	% Rel Std Dev
6000	L	G	16	0.330	0.009	2.8%	8.205	0.216	2.6%	0.906	0.019	2.1%
		H	16	0.331	0.009	2.7%	8.208	0.155	1.9%	0.903	0.017	1.8%
		Overall	32	0.330	0.009	2.7%	8.206	0.185	2.3%	0.904	0.018	2.0%
6000	H	G	16	0.330	0.008	2.5%	8.294	0.179	2.2%	0.906	0.017	1.8%
		H	16	0.333	0.009	2.6%	8.340	0.183	2.2%	0.905	0.019	2.1%
		X	8	0.339	0.011	3.2%	8.556	0.141	1.7%	0.906	0.010	1.1%
		Y	8	0.349	0.013	3.8%	8.722	0.246	2.8%	0.888	0.024	2.7%
		Overall	48	0.336	0.012	3.5%	8.424	0.243	2.9%	0.903	0.019	2.1%
6000	Overall	Overall	80	0.334	0.011	3.3%	8.337	0.245	2.9%	0.903	0.018	2.0%
5500	H	X	8	0.335	0.011	3.3%	8.453	0.071	0.8%	0.908	0.010	1.1%
		Y	8	0.342	0.005	1.5%	8.601	0.110	1.3%	0.897	0.017	1.9%
		Overall	16	0.339	0.009	2.7%	8.527	0.118	1.4%	0.903	0.015	1.6%
5000	H	X	8	0.335	0.010	3.1%	8.441	0.136	1.6%	0.913	0.012	1.3%
		Y	8	0.338	0.011	3.1%	8.535	0.171	2.0%	0.887	0.023	2.6%
		Overall	16	0.336	0.010	3.0%	8.488	0.157	1.9%	0.900	0.022	2.4%
4500	H	X	8	0.334	0.009	2.7%	8.424	0.076	0.9%	0.911	0.012	1.3%
		Y	8	0.340	0.010	2.9%	8.440	0.127	1.5%	0.884	0.018	2.0%
		Overall	16	0.337	0.010	2.9%	8.432	0.101	1.2%	0.898	0.020	2.2%
4000	H	X	8	0.334	0.009	2.8%	8.396	0.177	2.1%	0.909	0.010	1.1%
		Y	8	0.340	0.007	2.0%	8.496	0.159	1.9%	0.889	0.019	2.1%
		Overall	16	0.337	0.008	2.5%	8.446	0.170	2.0%	0.899	0.018	2.0%
3500	L	X	8	0.338	0.009	2.6%	8.388	0.356	4.2%	0.896	0.033	3.6%
		Y	8	0.343	0.004	1.1%	8.561	0.188	2.2%	0.892	0.014	1.6%
		Overall	16	0.340	0.007	2.1%	8.475	0.289	3.4%	0.894	0.024	2.7%
3000	L	X	8	0.335	0.006	1.8%	8.383	0.144	1.7%	0.910	0.015	1.6%
		Y	8	0.337	0.005	1.4%	8.372	0.137	1.6%	0.892	0.015	1.7%
		Overall	16	0.336	0.005	1.6%	8.378	0.136	1.6%	0.901	0.017	1.9%
2500	L	X	8	0.334	0.010	3.1%	8.447	0.142	1.7%	0.911	0.008	0.9%
		Y	8	0.336	0.006	1.7%	8.476	0.127	1.5%	0.902	0.017	1.9%
		Overall	16	0.336	0.006	1.8%	8.406	0.152	1.8%	0.901	0.016	1.8%
2000	L	H	16	0.381	0.009	2.5%	9.635	0.213	2.2%	0.869	0.022	2.5%
		T(G)	16	0.383	0.010	2.7%	9.634	0.145	1.5%	0.865	0.020	2.3%
		X	8	0.334	0.017	5.0%	8.381	0.097	1.2%	0.914	0.010	1.0%
		Y	8	0.339	0.007	1.9%	8.424	0.208	2.5%	0.898	0.019	2.1%
		Overall	48	0.367	0.024	6.6%	9.224	0.611	6.6%	0.880	0.027	3.0%
Overall	Overall	Overall	240	0.342	0.019	5.4%	8.567	0.468	5.5%	0.897	0.022	2.5%
		Overall (Excluding Heel)	208	0.336	0.010	3.0%	8.403	0.212	2.5%	0.901	0.019	2.1%
		G	32	0.330	0.009	2.6%	8.249	0.200	2.4%	0.906	0.018	1.9%
		H	48	0.348	0.025	7.2%	8.728	0.675	7.7%	0.892	0.025	2.8%
		T(G)	16	0.383	0.010	2.7%	9.634	0.145	1.5%	0.865	0.020	2.3%
		X	72	0.335	0.010	3.0%	8.430	0.168	2.0%	0.909	0.015	1.7%
		Y	72	0.340	0.009	2.6%	8.501	0.205	2.4%	0.891	0.018	2.1%

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Table 15. Descriptive Statistics for Potassium, Potassium (AA), and Manganese

Tank Level (gallons)	Mixer Speed	Outlet/ Sampler	Sample Size	K (wt %)			K-AA (wt %)			Mn (wt %)		
				Average	Std Dev	% Rel Std Dev	Average	Std Dev	% Rel Std Dev	Average	Std Dev	% Rel Std Dev
6000	L	G	16	1.812	0.084	4.6%	1.310	0.176	13.4%	1.653	0.044	2.7%
		H	16	1.763	0.152	8.6%	1.314	0.172	13.1%	1.657	0.034	2.1%
		Overall	32	1.788	0.123	6.9%	1.312	0.171	13.0%	1.655	0.039	2.3%
6000	H	G	16	1.771	0.101	5.7%	1.297	0.181	14.0%	1.656	0.034	2.0%
		H	16	1.793	0.109	6.1%	1.312	0.183	13.9%	1.672	0.038	2.3%
		X	8	1.855	0.159	8.6%	1.391	0.167	12.0%	1.715	0.046	2.7%
		Y	8	1.979	0.123	6.2%	1.372	0.220	16.0%	1.759	0.066	3.8%
		Overall	48	1.827	0.136	7.5%	1.330	0.184	13.8%	1.688	0.057	3.4%
6000	Overall	Overall	80	1.811	0.132	7.3%	1.323	0.178	13.5%	1.675	0.053	3.1%
5500	H	X	8	1.816	0.217	11.9%	1.378	0.183	13.3%	1.690	0.053	3.2%
		Y	8	1.914	0.154	8.0%	1.330	0.206	15.5%	1.727	0.038	2.2%
		Overall	16	1.865	0.188	10.1%	1.354	0.190	14.0%	1.709	0.048	2.8%
5000	H	X	8	1.808	0.163	9.0%	1.366	0.174	12.7%	1.691	0.036	2.1%
		Y	8	1.907	0.181	9.5%	1.308	0.195	14.9%	1.706	0.043	2.5%
		Overall	16	1.857	0.174	9.4%	1.337	0.181	13.5%	1.698	0.039	2.3%
4500	H	X	8	1.772	0.266	15.0%	1.367	0.180	13.2%	1.680	0.038	2.2%
		Y	8	1.883	0.107	5.7%	1.306	0.202	15.5%	1.697	0.037	2.2%
		Overall	16	1.828	0.204	11.2%	1.336	0.188	14.0%	1.689	0.037	2.2%
4000	H	X	8	1.829	0.102	5.6%	1.360	0.170	12.5%	1.681	0.034	2.0%
		Y	8	1.922	0.093	4.9%	1.312	0.199	15.2%	1.715	0.030	1.8%
		Overall	16	1.875	0.106	5.6%	1.336	0.180	13.5%	1.698	0.035	2.1%
3500	L	X	8	1.830	0.158	8.7%	1.379	0.171	12.4%	1.693	0.039	2.3%
		Y	8	1.907	0.122	6.4%	1.333	0.202	15.2%	1.721	0.028	1.6%
		Overall	16	1.869	0.142	7.6%	1.356	0.182	13.4%	1.707	0.036	2.1%
3000	L	X	8	1.822	0.108	5.9%	1.360	0.165	12.1%	1.671	0.021	1.3%
		Y	8	1.879	0.125	6.6%	1.299	0.206	15.9%	1.685	0.029	1.7%
		Overall	16	1.850	0.117	6.3%	1.329	0.183	13.8%	1.678	0.026	1.5%
2500	L	X	8	1.796	0.187	10.4%	1.359	0.181	13.3%	1.673	0.047	2.8%
		Y	8	1.781	0.184	10.3%	1.368	0.213	15.6%	1.668	0.030	1.8%
		Overall	16	1.819	0.173	9.5%	1.311	0.199	15.2%	1.677	0.032	1.9%
2000	L	H	16	2.148	0.131	6.1%	1.579	0.187	11.9%	1.935	0.039	2.0%
		T(G)	16	2.157	0.100	4.6%	1.597	0.188	11.8%	1.945	0.047	2.4%
		X	8	1.776	0.146	8.2%	1.336	0.169	12.7%	1.666	0.041	2.5%
		Y	8	1.902	0.146	7.7%	1.300	0.205	15.8%	1.697	0.032	1.9%
		Overall	48	2.048	0.197	9.6%	1.498	0.223	14.9%	1.854	0.130	7.0%
Overall	Overall	Overall	240	1.880	0.180	9.6%	1.366	0.199	14.6%	1.720	0.098	5.7%
		Overall (Excluding Heel)	208	1.838	0.149	8.1%	1.331	0.179	13.4%	1.686	0.046	2.7%
		G	32	1.792	0.094	5.2%	1.303	0.176	13.5%	1.655	0.039	2.3%
		H	48	1.902	0.219	11.5%	1.402	0.218	15.5%	1.754	0.134	7.6%
		T(G)	16	2.157	0.100	4.6%	1.597	0.188	11.8%	1.945	0.047	2.4%
		X	72	1.811	0.166	9.2%	1.366	0.164	12.0%	1.685	0.041	2.4%
		Y	72	1.912	0.130	6.8%	1.317	0.194	14.7%	1.711	0.044	2.6%

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Table 16. Descriptive Statistics for Sodium, Sodium (AA), and Nickel

Tank Level (gallons)	Mixer Speed	Outlet/ Sampler	Sample Size	Na (wt %)			Na-AA (wt %)			Ni (wt %)		
				Average	Std Dev	% Rel Std Dev	Average	Std Dev	% Rel Std Dev	Average	Std Dev	% Rel Std Dev
6000	L	G	16	4.615	0.170	3.7%	4.519	0.141	3.1%	0.831	0.022	2.7%
		H	16	4.610	0.176	3.8%	4.511	0.139	3.1%	0.836	0.025	3.0%
		Overall	32	4.613	0.170	3.7%	4.515	0.138	3.1%	0.833	0.024	2.9%
6000	H	G	16	4.585	0.179	3.9%	4.527	0.158	3.5%	0.833	0.016	1.9%
		H	16	4.611	0.160	3.5%	4.524	0.156	3.4%	0.841	0.016	1.9%
		X	8	4.600	0.235	5.1%	4.501	0.119	2.7%	0.864	0.027	3.2%
		Y	8	4.656	0.086	1.8%	4.605	0.154	3.3%	0.881	0.035	4.0%
		Overall	48	4.608	0.168	3.6%	4.535	0.150	3.3%	0.848	0.028	3.3%
6000	Overall	Overall	80	4.610	0.168	3.6%	4.527	0.145	3.2%	0.842	0.027	3.2%
5500	H	X	8	4.578	0.283	6.2%	4.526	0.122	2.7%	0.856	0.028	3.3%
		Y	8	4.632	0.074	1.6%	4.554	0.141	3.1%	0.864	0.025	2.8%
		Overall	16	4.605	0.202	4.4%	4.540	0.128	2.8%	0.860	0.026	3.0%
5000	H	X	8	4.611	0.240	5.2%	4.468	0.119	2.7%	0.845	0.025	2.9%
		Y	8	4.588	0.094	2.0%	4.524	0.172	3.8%	0.843	0.029	3.4%
		Overall	16	4.600	0.177	3.8%	4.496	0.146	3.2%	0.844	0.026	3.1%
4500	H	X	8	4.577	0.281	6.1%	4.495	0.137	3.0%	0.842	0.022	2.6%
		Y	8	4.599	0.100	2.2%	4.536	0.192	4.2%	0.847	0.034	4.0%
		Overall	16	4.588	0.204	4.5%	4.516	0.163	3.6%	0.844	0.028	3.3%
4000	H	X	8	4.579	0.225	4.9%	4.466	0.119	2.7%	0.850	0.017	2.0%
		Y	8	4.636	0.072	1.5%	4.547	0.199	4.4%	0.862	0.023	2.7%
		Overall	16	4.607	0.164	3.6%	4.506	0.164	3.6%	0.856	0.020	2.4%
3500	L	X	8	4.578	0.198	4.3%	4.518	0.116	2.6%	0.861	0.023	2.7%
		Y	8	4.620	0.070	1.5%	4.597	0.136	3.0%	0.870	0.028	3.2%
		Overall	16	4.599	0.145	3.2%	4.557	0.129	2.8%	0.865	0.025	2.9%
3000	L	X	8	4.582	0.263	5.7%	4.509	0.112	2.5%	0.845	0.022	2.6%
		Y	8	4.634	0.078	1.7%	4.524	0.137	3.0%	0.843	0.019	2.2%
		Overall	16	4.608	0.189	4.1%	4.516	0.121	2.7%	0.844	0.020	2.3%
2500	L	X	8	4.585	0.315	6.9%	4.515	0.133	2.9%	0.844	0.026	3.0%
		Y	8	4.566	0.309	6.8%	4.562	0.151	3.3%	0.839	0.016	1.9%
		Overall	16	4.565	0.275	6.0%	4.517	0.137	3.0%	0.847	0.020	2.4%
2000	L	H	16	4.692	0.170	3.6%	4.615	0.155	3.4%	0.955	0.029	3.0%
		T(G)	16	4.716	0.149	3.1%	4.637	0.194	4.2%	0.961	0.026	2.7%
		X	8	4.561	0.237	5.2%	4.495	0.109	2.4%	0.842	0.027	3.2%
		Y	8	4.665	0.069	1.5%	4.666	0.244	5.2%	0.850	0.024	2.8%
		Overall	48	4.674	0.168	3.6%	4.611	0.182	4.0%	0.921	0.059	6.4%
Overall	Overall	Overall	240	4.619	0.176	3.8%	4.541	0.157	3.5%	0.862	0.046	5.3%
		Overall (Excluding Heel)	208	4.606	0.176	3.8%	4.528	0.151	3.3%	0.847	0.026	3.1%
		G	32	4.600	0.172	3.7%	4.523	0.148	3.3%	0.832	0.019	2.3%
		H	48	4.638	0.170	3.7%	4.550	0.154	3.4%	0.877	0.061	6.9%
		T(G)	16	4.716	0.149	3.1%	4.637	0.194	4.2%	0.961	0.026	2.7%
		X	72	4.583	0.241	5.3%	4.499	0.116	2.6%	0.850	0.024	2.8%
		Y	72	4.630	0.078	1.7%	4.564	0.178	3.9%	0.855	0.029	3.4%

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Table 17. Descriptive Statistics for Silicon and Titanium

Tank Level (gallons)	Mixer Speed	Outlet/ Sampler	Sample Size	Si (wt %)			Ti (wt %)		
				Average	Std Dev	% Rel Std Dev	Average	Std Dev	% Rel Std Dev
6000	L	G	16	24.277	1.468	6.0%	0.174	0.012	6.7%
		H	16	24.180	1.405	5.8%	0.174	0.010	6.0%
		Overall	32	24.228	1.414	5.8%	0.174	0.011	6.2%
6000	H	G	16	24.211	1.487	6.1%	0.175	0.010	5.8%
		H	16	24.135	1.405	5.8%	0.176	0.010	5.9%
		X	8	23.582	1.091	4.6%	0.182	0.013	7.1%
		Y	8	24.190	1.725	7.1%	0.185	0.008	4.2%
		Overall	48	24.077	1.417	5.9%	0.178	0.011	6.0%
6000	Overall	Overall	80	24.138	1.409	5.8%	0.176	0.011	6.2%
5500	H	X	8	23.846	1.369	5.7%	0.180	0.014	7.6%
		Y	8	24.284	1.570	6.5%	0.183	0.006	3.0%
		Overall	16	24.065	1.441	6.0%	0.182	0.010	5.6%
5000	H	X	8	23.718	1.632	6.9%	0.179	0.014	7.7%
		Y	8	24.259	1.700	7.0%	0.180	0.010	5.5%
		Overall	16	23.988	1.634	6.8%	0.180	0.012	6.5%
4500	H	X	8	23.719	1.308	5.5%	0.179	0.014	7.7%
		Y	8	24.284	1.520	6.3%	0.178	0.007	4.0%
		Overall	16	24.001	1.401	5.8%	0.178	0.011	5.9%
4000	H	X	8	23.914	1.481	6.2%	0.179	0.015	8.6%
		Y	8	24.333	1.530	6.3%	0.178	0.008	4.4%
		Overall	16	24.123	1.471	6.1%	0.179	0.012	6.6%
3500	L	X	8	23.404	1.754	7.5%	0.178	0.016	9.0%
		Y	8	24.459	1.519	6.2%	0.180	0.009	5.2%
		Overall	16	23.931	1.676	7.0%	0.179	0.013	7.1%
3000	L	X	8	23.891	1.308	5.5%	0.178	0.014	7.8%
		Y	8	24.590	1.473	6.0%	0.176	0.008	4.3%
		Overall	16	24.240	1.393	5.7%	0.177	0.011	6.2%
2500	L	X	8	23.790	1.326	5.6%	0.180	0.013	7.2%
		Y	8	24.039	1.444	6.0%	0.183	0.010	5.3%
		Overall	16	24.219	1.542	6.4%	0.178	0.011	6.1%
2000	L	H	16	22.728	1.550	6.8%	0.204	0.011	5.3%
		T(G)	16	22.742	1.649	7.2%	0.203	0.011	5.4%
		X	8	23.884	1.305	5.5%	0.179	0.013	7.1%
		Y	8	24.711	1.474	6.0%	0.178	0.010	5.6%
		Overall	48	23.256	1.680	7.2%	0.195	0.016	8.2%
Overall	Overall	Overall	240	23.935	1.525	6.4%	0.181	0.014	7.7%
		Overall (Excluding Heel)	208	24.120	1.434	5.9%	0.178	0.011	6.2%
		G	32	24.244	1.454	6.0%	0.175	0.011	6.2%
		H	48	23.681	1.578	6.7%	0.184	0.017	9.3%
		T(G)	16	22.742	1.649	7.2%	0.203	0.011	5.4%
		X	72	23.750	1.337	5.6%	0.179	0.013	7.4%
		Y	72	24.418	1.489	6.1%	0.179	0.008	4.6%

**Table 18. Comparison of Overall Elemental Weight Percents
For the Two Phases of the MFT Study**

	Al (wt%)			B (wt%)			Ca (wt%)		
	Average	Std Dev	% Rel S.D.	Average	Std Dev	% Rel S.D.	Average	Std Dev	% Rel S.D.
High Solids	1.565	0.042	2.7%	2.470	0.061	2.5%	0.802	0.034	4.2%
Low Solids	1.573	0.107	6.8%	2.378	0.048	2.0%	0.788	0.049	6.2%
% Rel Diff.	0.5%			3.9%			1.8%		

	Cu (wt%)			Fe (wt%)			Mg (wt%)		
	Average	Std Dev	% Rel S.D.	Average	Std Dev	% Rel S.D.	Average	Std Dev	% Rel S.D.
High Solids	0.344	0.011	3.2%	8.489	0.193	2.3%	0.920	0.017	1.8%
Low Solids	0.342	0.019	5.6%	8.567	0.468	5.5%	0.897	0.022	2.5%
% Rel Diff.	0.6%			0.9%			2.6%		

	Mn (wt%)			K (wt%)			K-AA (wt%)		
	Average	Std Dev	% Rel S.D.	Average	Std Dev	% Rel S.D.	Average	Std Dev	% Rel S.D.
High Solids	1.721	0.046	2.7%	1.827	0.136	7.4%	1.333	0.084	6.3%
Low Solids	1.720	0.098	5.7%	1.880	0.180	9.6%	1.366	0.199	14.6%
% Rel Diff.	0.1%			2.9%			2.5%		

	Ni (wt%)			Na (wt%)			Na-AA (wt%)		
	Average	Std Dev	% Rel S.D.	Average	Std Dev	% Rel S.D.	Average	Std Dev	% Rel S.D.
High Solids	0.862	0.036	4.2%	4.749	0.088	1.9%	4.561	0.259	5.7%
Low Solids	0.862	0.046	5.3%	4.619	0.176	3.8%	4.541	0.157	3.5%
% Rel Diff.	0.0%			2.8%			0.4%		

	Si (wt%)			Ti (wt%)		
	Average	Std Dev	% Rel S.D.	Average	Std Dev	% Rel S.D.
High Solids	24.088	0.765	3.2%	0.182	0.005	2.7%
Low Solids	23.935	1.525	6.4%	0.181	0.014	7.7%
% Rel Diff.	0.6%			0.6%		

% Rel Diff. is the percent relative difference between the high and low weight percent solids results.

Table 19. Comparison of Sampler Contrasts for Elementals For the Two Phases of the MFT Study

100% (H-G)/G

Aluminum

Test Phase	6000 gallon Level Low Mixer Speed			6000 gallon Level High Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	-0.18	1.57	0.8	1.11	3.45	1.8	-0.34	1.48	0.8
Low Solids	0.05	1.77	0.9	0.08	1.79	1.0	-0.07	0.66	0.4

Boron

Test Phase	6000 gallon Level Low Mixer Speed			6000 gallon Level High Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	-0.45	1.18	0.6	0.30	0.83	0.4	-0.33	1.10	0.6
Low Solids	-0.53	1.31	0.7	-0.36	1.13	0.6	0.54	1.44	0.8

Calcium

Test Phase	6000 gallon Level Low Mixer Speed			6000 gallon Level High Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	-0.77	2.12	1.1	0.58	2.30	1.2	-1.00	3.06	1.6
Low Solids	0.86	2.90	1.5	1.24	2.29	1.2	-0.57	3.63	1.9

Copper

Test Phase	6000 gallon Level Low Mixer Speed			6000 gallon Level High Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	-0.35	1.87	1.0	-0.60	1.60	0.9	0.22	1.93	1.0
Low Solids	0.11	1.45	0.8	0.77	1.76	0.9	-0.54	1.81	1.0

Iron

Test Phase	6000 gallon Level Low Mixer Speed			6000 gallon Level High Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	-0.35	1.37	0.7	1.08	3.69	2.0	-0.61	1.55	0.8
Low Solids	0.08	2.13	1.1	0.57	2.00	1.1	0.00	1.02	0.5

Table 19. Comparison of Sampler Contrasts for Elementals For the Two Phases of the MFT Study (con't)

100% (H-G)/G

Test Phase	Potassium								
	6000 gallon Level Low Mixer Speed			6000 gallon Level High Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	-0.63	5.52	2.9	1.16	5.82	3.1	-0.44	3.12	1.7
Low Solids	-2.74	6.96	3.7	1.24	2.34	1.2	-0.44	3.27	1.7

Test Phase	Potassium (AA)								
	6000 gallon Level Low Mixer Speed			6000 gallon Level High Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	-0.38	2.56	1.4	0.08	2.59	1.4	0.35	2.18	1.2
Low Solids	0.39	2.22	1.2	1.22	1.85	1.0	-1.05	3.21	1.7

Test Phase	Magnesium								
	6000 gallon Level Low Mixer Speed			6000 gallon Level High Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	-0.65	0.92	0.5	1.19	3.68	2.0	-0.20	1.22	0.6
Low Solids	-0.35	0.94	0.5	-0.19	0.83	0.4	0.45	1.63	0.9

Test Phase	Manganese								
	6000 gallon Level Low Mixer Speed			6000 gallon Level High Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	-0.48	1.59	0.8	0.09	1.84	1.0	0.06	3.30	1.8
Low Solids	0.25	2.52	1.3	0.93	1.86	1.0	-0.47	2.58	1.4

Test Phase	Nickel								
	6000 gallon Level Low Mixer Speed			6000 gallon Level High Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	0.46	3.08	1.6	1.13	2.51	1.3	1.24	6.11	3.3
Low Solids	0.63	2.62	1.4	0.97	1.72	0.9	-0.59	2.78	1.5

Table 19. Comparison of Sampler Contrasts for Elementals For the Two Phases of the MFT Study (con't)

100% (H-G)/G

Test Phase	Sodium								
	6000 gallon Level Low Mixer Speed			6000 gallon Level High Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	-0.65	1.31	0.7	0.30	1.68	0.9	0.03	1.81	1.0
Low Solids	-0.11	0.72	0.4	0.33	1.29	0.7	-0.51	1.70	0.9

Test Phase	Sodium (AA)								
	6000 gallon Level Low Mixer Speed			6000 gallon Level High Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	1.02	5.88	3.1	-0.52	3.24	1.7	-0.97	2.79	1.5
Low Solids	-0.16	1.78	0.9	-0.02	3.42	1.8	-0.42	2.11	1.1

Test Phase	Silicon								
	6000 gallon Level Low Mixer Speed			6000 gallon Level High Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	-1.07	1.75	0.9	0.08	1.77	0.9	0.40	2.71	1.4
Low Solids	-0.38	1.29	0.7	-0.28	1.51	0.8	-0.03	1.34	0.7

Test Phase	Titanium								
	6000 gallon Level Low Mixer Speed			6000 gallon Level High Mixer Speed			2000 gallon Level Low Mixer Speed		
	Average	Std Dev	SSB	Average	Std Dev	SSB	Average	Std Dev	SSB
High Solids	-0.35	1.43	0.8	1.29	3.46	1.8	-0.34	1.41	0.7
Low Solids	0.13	1.93	1.0	0.23	1.78	1.0	0.32	0.92	0.5

Table 20. Largest Relative Differences Among MFT Outlets for Elementals For the Two Phases of the MFT Study

Element	Largest Relative Difference Among MFT Outlets Over Test Combinations	
	High Weight % Solids	Low Weight % Solids
Al	4.9%	4.8%
B	3.0%	2.1%
Ca	7.4%	7.9%
Cu	6.6%	4.6%
Fe	5.7%	4.2%
K	11.0%	11.7%
K-AA	6.0%	7.2%
Mg	1.7%	3.4%
Mn	5.2%	5.6%
Na	2.5%	2.3%
Na-AA	8.9%	1.3%
Ni	6.1%	5.1%
Si	4.3%	5.6%
Ti	4.1%	5.0%

Table 21. Comparison of the ICP versus AA Results for Potassium and Sodium for the Two Phases of the MFT Study

K and S Standards		
Test Phase	Potassium Average Difference (AA-ICP) (wt%)	Sodium Average Relative Difference (AA-ICP)/ICP (%)
High Solids	0.01	-2.6%
Low Solids	-0.01	-3.7%

Tank Samples		
Test Phase	Potassium Average Relative Difference (AA-ICP)/ICP (%)	Sodium Average Relative Difference (AA-ICP)/ICP (%)
High Solids	-26.6%	-4.0%
Low Solids	-27.1%	-1.6%

Exhibit 1. Weight Percent Solids, Calcine, and Density Measurements by Analytical Sequence Number

+ - sample value from tank heel;

x - other sample values

Weight Percent Solids vs Analytical Sequence **Densities vs Analytical Sequence** **Calcines vs Analytical Sequence**

Exhibit 2. Sampler Contrasts for Weight Percent Solids by Tank Level and Mixer Speed

Wt % Solids (100% (H-G)/G) By Level x Speed

Means with confid. interval

Means**Summary of Fit**

Rsquare	0.042777
Root Mean Square Error	2.045334
Mean of Response	0.196753
Observations (or Sum Wgts)	24

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob>F
Model	2	3.925971	1.96299	0.4692	
Error	21	87.851244	4.18339		
C Total	23	91.777215		0.6319	

Mean Estimates

Level	number	Mean	Std Error
2000-L	8	0.069470	0.72313
6000-H	8	0.743325	0.72313
6000-L	8	-0.22254	0.72313

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	8	1.756873	1.377450	1.359015
6000-H	8	2.759531	1.856647	1.852868
6000-L	8	1.359619	1.143703	1.007913

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[5]	1.0893	2	21	0.3547
Brown-Forsythe	0.7234	2	21	0.4968
Levene	0.6408	2	21	0.5369
Bartlett	1.7172	2	-	0.1796

Welch Anova testing Means Equal, allowing Std's Not Equal				
F Ratio	DF Num	DF Den	Prob>F	
0.3842	2	13.164	0.6884	

Exhibit 3. Sampler Contrasts for Calcines by Tank Level and Mixer Speed

Calcines (100% (H-G)/G) By Level x Speed

Means with confid. interval

Means

Summary of Fit

Resquare 0.106998
 Root Mean Square Error 3.063569
 Mean of Response -0.00297
 Observations (or Sum Wgts) 24

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	2	23.61541	11.8077	1.2581	
Error	21	197.09449	9.3855		0.3048
C Total	23	220.70991			

Mean Estimates

Level	number	Mean	Std Error
2000-L	8	-0.04076	1.0831
6000-H	8	1.23037	1.0831
6000-L	8	-1.19853	1.0831

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	8	1.775201	1.307588	1.301103
6000-H	8	4.289889	2.785736	2.632687
6000-L	8	2.589443	1.877052	1.594269

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien(5)	0.8658	2	21	0.4352
Brown-Forsythe	0.7175	2	21	0.4996
Levene	1.0059	2	21	0.3827
Bartlett	2.5333	2	.	0.0794

Welch Anova testing Means Equal, allowing Std's Not Equal				
F Ratio	DF Num	DF Den	Prob > F	
1.0235	2	12.763	0.3870	

Exhibit 4. Sampler Contrasts for Densities by Tank Level and Mixer Speed

Densities (100% (H-G)/G) By Level x Speed

Means

Summary of Fit

Rsquare 0.024736
 Root Mean Square Error 1.23885
 Mean of Response -0.11353
 Observations (or Sum Wgts) 24

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	2	0.817453	0.40873	0.2663	
Error	21	32.229737	1.53475		Prob > F
C Total	23	33.047189		0.7687	

Mean Estimates

Level	number	Mean	Std Error
2000-L	8	0.050293	0.43800
6000-H	8	-0.3714	0.43800
6000-L	8	-0.01947	0.43800

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	8	1.608040	1.142949	1.125185
6000-H	8	1.256942	1.042365	0.955281
6000-L	8	0.662233	0.492123	0.483441

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien[.5]	1.4831	2	21	0.2498
Brown-Forsythe	1.3216	2	21	0.2880
Levene	1.8495	2	21	0.1820
Bartlett	2.3103	2	21	0.0992

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob > F
0.2604	2	12.216	0.7749

Exhibit 5. Average Weight Percent Solids Measurements by Tank Level, Mixer Speed, and MFT Outlet

Means with confid. interval

Means

Summary of Fit

Regression 0.287572
 Root Mean Square Error 0.693409
 Mean of Response 42.64285
 Observations (or Sum Wgts) 72

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	17	10.480410	0.618495	1.2822	
Error	54	25.964031	0.480815		
C Total	71	36.444441			0.2983

Mean Estimates

Level	number	Mean	Std Error
2000-L-X	4	42.8925	0.34670
2000-L-Y	4	42.8413	0.34670
2500-L-X	4	42.7050	0.34670
2500-L-Y	4	43.0338	0.34670
3000-L-X	4	43.2963	0.34670
3000-L-Y	4	43.0213	0.34670
3500-L-X	4	42.7362	0.34670
3500-L-Y	4	42.6975	0.34670
4000-H-X	4	42.8438	0.34670
4000-H-Y	4	42.0812	0.34670
4500-H-X	4	42.9350	0.34670
4500-H-Y	4	42.7213	0.34670
5000-H-X	4	42.4212	0.34670
5000-H-Y	4	42.8950	0.34670
5500-H-X	4	42.8575	0.34670
5500-H-Y	4	42.0888	0.34670
6000-H-X	4	42.0300	0.34670
6000-H-Y	4	41.8737	0.34670

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L-X	4	0.846628	0.8187500	0.5250000
2000-L-Y	4	0.465135	0.3162500	0.3162500
2500-L-X	4	0.290316	0.2150000	0.1675000
2500-L-Y	4	0.677069	0.5837500	0.5837500
3000-L-X	4	0.629833	0.4718750	0.3337500
3000-L-Y	4	0.715478	0.5231250	0.4487500
3500-L-X	4	0.084200	0.0593750	0.0582500
3500-L-Y	4	0.626292	0.5150000	0.5150000
4000-H-X	4	0.734114	0.6212500	0.6212500
4000-H-Y	4	0.552017	0.4187500	0.4187500
4500-H-X	4	0.372044	0.2450000	0.2300000
4500-H-Y	4	0.983755	0.8237500	0.8237500
5000-H-X	4	0.403699	0.2862500	0.2862500
5000-H-Y	4	1.248753	0.8125000	0.7650000
5500-H-X	4	0.775806	0.5762500	0.4550000
5500-H-Y	4	1.069751	0.7781250	0.7512500
6000-H-X	4	0.302930	0.2150000	0.2150000
6000-H-Y	4	0.546373	0.3881250	0.3362500

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien S	0.9385	17	54	0.5360
Brown-Forsythe	0.8891	17	54	0.5889
Levene	1.5649	17	54	0.1076
Bartlett	1.3349	17	-	0.1595

Warning: Small sample sizes. Use Caution

Welch Anova testing Means Equal, allowing Std's Not Equal				
F Ratio	DF Num	DF Den	Prob > F	
1.7092	17	19.594	0.1272	

Exhibit 6. Average Calcine Measurements by Tank Level, Mixer Speed, and MFT Outlet

Values are weight percents.

Mean(Calcined (wt %)) By Level x Speed x Outlet

Means with confid. interval

Means

Summary of Fit

Require 0.330114
Root Mean Square Error 0.698652
Mean of Response 38.19181
Observations (or Sum Wgts) 72

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	17	12.989090	0.764064	1.5653
Error	54	26.358175	0.488114	Prob > F
C Total	71	39.347265		0.1074

Mean Estimates

Level	number	Mean	Std Error
2000-L-X	4	38.4250	0.34933
2000-L-Y	4	38.1037	0.34933
2500-L-X	4	38.3538	0.34933
2500-L-Y	4	38.4362	0.34933
3000-L-X	4	39.1875	0.34933
3000-L-Y	4	38.4575	0.34933
3500-L-X	4	38.2838	0.34933
3500-L-Y	4	38.2887	0.34933
4000-H-X	4	38.2450	0.34933
4000-H-Y	4	37.5613	0.34933
4500-H-X	4	38.5188	0.34933
4500-H-Y	4	38.1288	0.34933
5000-H-X	4	37.9762	0.34933
5000-H-Y	4	38.3950	0.34933
5500-H-X	4	38.4750	0.34933
5500-H-Y	4	37.7062	0.34933
6000-H-X	4	37.5513	0.34933
6000-H-Y	4	37.3587	0.34933

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L-X	4	0.615454	0.4450000	0.4450000
2000-L-Y	4	0.693654	0.4606250	0.4637500
2500-L-X	4	0.322526	0.2231250	0.2112500
2500-L-Y	4	0.685011	0.5437500	0.5437500
3000-L-X	4	0.959909	0.8275000	0.8275000
3000-L-Y	4	0.774946	0.5412500	0.4925000
3500-L-X	4	0.067004	0.0537500	0.0537500
3500-L-Y	4	0.610688	0.5137500	0.5137500
4000-H-X	4	0.657001	0.5350000	0.5350000
4000-H-Y	4	0.554277	0.4562500	0.4562500
4500-H-X	4	0.549657	0.3668750	0.3287500
4500-H-Y	4	1.136972	0.9087500	0.9087500
5000-H-X	4	0.530996	0.3818750	0.3537500
5000-H-Y	4	1.122519	0.7375000	0.7375000
5500-H-X	4	0.530283	0.3950000	0.2900000
5500-H-Y	4	0.867048	0.7087500	0.7087500
6000-H-X	4	0.373081	0.3112500	0.3112500
6000-H-Y	4	0.636859	0.4681250	0.3962500

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien[5]	1.0540	17	54	0.4200
Brown-Forsythe	1.2379	17	54	0.2687
Levene	1.6241	17	54	0.0901
Bartlett	1.1404	17		0.3068

Warning: Small sample sizes. Use Caution

Welch Anova testing Means Equal, allowing Std's Not Equal				
F Ratio	DF Num	DF Den	Prob > F	
1.4718	17	19.378	0.2054	

Exhibit 7. Average Density Measurements by Tank Level, Mixer Speed, and MFT Outlet

Unit is grams/milliliter.

Means with confid. interval

Means

Summary of Fit

R Square 0.148621
 Root Mean Square Error 0.018228
 Mean of Response 1.301294
 Observations (or Sum Wgts) 72

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	17	0.00313182	0.000184	0.5545	
Error	54	0.01794134	0.000332		
C Total	71	0.02107326			0.9099

Mean Estimates

Level	number	Mean	Std Error
2000-L-X	4	1.30034	0.00911
2000-L-Y	4	1.30348	0.00911
2500-L-X	4	1.29629	0.00911
2500-L-Y	4	1.30900	0.00911
3000-L-X	4	1.30438	0.00911
3000-L-Y	4	1.31142	0.00911
3500-L-X	4	1.30983	0.00911
3500-L-Y	4	1.30301	0.00911
4000-H-X	4	1.28174	0.00911
4000-H-Y	4	1.30017	0.00911
4500-H-X	4	1.30044	0.00911
4500-H-Y	4	1.29444	0.00911
5000-H-X	4	1.29824	0.00911
5000-H-Y	4	1.30070	0.00911
5500-H-X	4	1.30820	0.00911
5500-H-Y	4	1.30071	0.00911
6000-H-X	4	1.30316	0.00911
6000-H-Y	4	1.29777	0.00911

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDiff to Mean	MeanAbsDiff to Median
2000-L-X	4	0.0078819	0.0054375	0.0054375
2000-L-Y	4	0.0258940	0.0203125	0.0203125
2500-L-X	4	0.0167792	0.0103125	0.0103125
2500-L-Y	4	0.0186721	0.0133500	0.0119500
3000-L-X	4	0.0086159	0.0063750	0.0063750
3000-L-Y	4	0.0156278	0.0111250	0.0111250
3500-L-X	4	0.0069640	0.0048125	0.0046000
3500-L-Y	4	0.0238973	0.0184813	0.0158375
4000-H-X	4	0.0247644	0.0194125	0.0194125
4000-H-Y	4	0.0249250	0.0180000	0.0180000
4500-H-X	4	0.0097231	0.0082825	0.0082825
4500-H-Y	4	0.0182143	0.0141125	0.0141125
5000-H-X	4	0.0160707	0.0115063	0.0094125
5000-H-Y	4	0.0101390	0.0078750	0.0078750
5500-H-X	4	0.0175418	0.0123250	0.0123250
5500-H-Y	4	0.0187741	0.0131125	0.0131125
6000-H-X	4	0.0113396	0.0075937	0.0072875
6000-H-Y	4	0.0293899	0.0205875	0.0174500

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien [5]	0.7604	17	54	0.7276
Brown-Forsythe	0.7263	17	54	0.7627
Levene	1.0515	17	54	0.4223
Bartlett	0.9057	17	-	0.5669

Warning: Small sample sizes. Use Caution.

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob > F
0.4565	17	20.058	0.9463

Exhibit 8. Average Weight Percent Solids, Calcines, and Densities by Tank Level, Mixer Speed, Outlet and Sampler**Mean(Wt % Solids) By Level x Speed x Sampler/Outlet** **Mean(Calcined (wt %)) By Level x Speed x Sampler/Outlet** **Mean(Density (grams/milliliter) By Level x Speed x Sampler/Outlet**

Exhibit 9. Aluminum and Boron Concentrations for K and S Check Standards by Block

Symbols: K = • S = x

Al (wt %) By Block #

Means with confid. interval

Means**B (wt %) By Block #**

Means with confid. interval

Means

Exhibit 10. Calcium and Copper Concentrations for K and S Check Standards by Block

Symbols: K = • S = x

Ca (wt %) By Block #

Means with confid. interval

Means**Cu (wt %) By Block #**

Means with confid. interval

Means

Exhibit 11. Iron and Magnesium Concentrations for K and S Check Standards by Block

Symbols: K = • S = x

Fe (wt %) By Block #

Means with confid. interval

Means**Mg (wt %) By Block #**

Means with confid. interval

Means

Exhibit 12. Manganese and Nickel Concentrations for K and S Check Standards by Block

Symbols: K = • S = x

Mn (wt %) By Block # **Means****Ni (wt %) By Block #** **Means**

Exhibit 13.

Potassium and Potassium (AA) Concentrations for K and S Check Standards by Block

Symbols: K = • S = x

K (wt %) By Block

Means with confid. interval

Means

K-AA (wt %) By Block

Means with confid. interval

Means

Exhibit 14. Sodium and Sodium (AA) Concentrations for K and S Check Standards by Block

Symbols: K = • S = x

Na (wt %) By Block #

Means with confid. interval

Means**Na-AA (wt %) By Block #**

Means with confid. interval

Means

Exhibit 15. Silicon and Titanium Concentrations (AA) for K and S Check Standards by Block

Symbols: K = • S = x

Si (wt %) By Block #

Means with confid. interval

Means**Ti (wt %) By Block #**

Means with confid. interval

Means

Exhibit 16. Blank Check Standards Descriptive Statistics by Element

Al (wt %)	B (wt %)	Ca (wt %)	Cu (wt %)	Fe (wt %)	Mg (wt %)																																																																																																																																																																																																																								
<table><tr><td colspan="3">Quantiles</td></tr><tr><td>maximum</td><td>100.0%</td><td>0.11700</td></tr><tr><td></td><td>99.5%</td><td>0.11700</td></tr><tr><td></td><td>97.5%</td><td>0.11700</td></tr><tr><td></td><td>90.0%</td><td>0.03510</td></tr><tr><td>quartile</td><td>75.0%</td><td>0.00000</td></tr><tr><td>median</td><td>50.0%</td><td>0.00000</td></tr><tr><td>quartile</td><td>25.0%</td><td>0.00000</td></tr><tr><td></td><td>10.0%</td><td>0.00000</td></tr><tr><td></td><td>2.5%</td><td>0.00000</td></tr><tr><td></td><td>0.5%</td><td>0.00000</td></tr><tr><td>minimum</td><td>0.0%</td><td>0.00000</td></tr></table>	Quantiles			maximum	100.0%	0.11700		99.5%	0.11700		97.5%	0.11700		90.0%	0.03510	quartile	75.0%	0.00000	median	50.0%	0.00000	quartile	25.0%	0.00000		10.0%	0.00000		2.5%	0.00000		0.5%	0.00000	minimum	0.0%	0.00000	<table><tr><td colspan="3">Quantiles</td></tr><tr><td>maximum</td><td>100.0%</td><td>0.27500</td></tr><tr><td></td><td>99.5%</td><td>0.27500</td></tr><tr><td></td><td>97.5%</td><td>0.27500</td></tr><tr><td></td><td>90.0%</td><td>0.08250</td></tr><tr><td>quartile</td><td>75.0%</td><td>0.00000</td></tr><tr><td>median</td><td>50.0%</td><td>0.00000</td></tr><tr><td>quartile</td><td>25.0%</td><td>0.00000</td></tr><tr><td></td><td>10.0%</td><td>0.00000</td></tr><tr><td></td><td>2.5%</td><td>0.00000</td></tr><tr><td></td><td>0.5%</td><td>0.00000</td></tr><tr><td>minimum</td><td>0.0%</td><td>0.00000</td></tr></table>	Quantiles			maximum	100.0%	0.27500		99.5%	0.27500		97.5%	0.27500		90.0%	0.08250	quartile	75.0%	0.00000	median	50.0%	0.00000	quartile	25.0%	0.00000		10.0%	0.00000		2.5%	0.00000		0.5%	0.00000	minimum	0.0%	0.00000	<table><tr><td colspan="3">Quantiles</td></tr><tr><td>maximum</td><td>100.0%</td><td>0.13500</td></tr><tr><td></td><td>99.5%</td><td>0.13500</td></tr><tr><td></td><td>97.5%</td><td>0.13500</td></tr><tr><td></td><td>90.0%</td><td>0.11470</td></tr><tr><td>quartile</td><td>75.0%</td><td>0.08600</td></tr><tr><td>median</td><td>50.0%</td><td>0.00000</td></tr><tr><td>quartile</td><td>25.0%</td><td>0.00000</td></tr><tr><td></td><td>10.0%</td><td>0.00000</td></tr><tr><td></td><td>2.5%</td><td>0.00000</td></tr><tr><td></td><td>0.5%</td><td>0.00000</td></tr><tr><td>minimum</td><td>0.0%</td><td>0.00000</td></tr></table>	Quantiles			maximum	100.0%	0.13500		99.5%	0.13500		97.5%	0.13500		90.0%	0.11470	quartile	75.0%	0.08600	median	50.0%	0.00000	quartile	25.0%	0.00000		10.0%	0.00000		2.5%	0.00000		0.5%	0.00000	minimum	0.0%	0.00000	<table><tr><td colspan="3">Quantiles</td></tr><tr><td>maximum</td><td>100.0%</td><td>0.01900</td></tr><tr><td></td><td>99.5%</td><td>0.01900</td></tr><tr><td></td><td>97.5%</td><td>0.01900</td></tr><tr><td></td><td>90.0%</td><td>0.00370</td></tr><tr><td>quartile</td><td>75.0%</td><td>0.00000</td></tr><tr><td>median</td><td>50.0%</td><td>0.00000</td></tr><tr><td>quartile</td><td>25.0%</td><td>0.00000</td></tr><tr><td></td><td>10.0%</td><td>0.00000</td></tr><tr><td></td><td>2.5%</td><td>0.00000</td></tr><tr><td></td><td>0.5%</td><td>0.00000</td></tr><tr><td>minimum</td><td>0.0%</td><td>0.00000</td></tr></table>	Quantiles			maximum	100.0%	0.01900		99.5%	0.01900		97.5%	0.01900		90.0%	0.00370	quartile	75.0%	0.00000	median	50.0%	0.00000	quartile	25.0%	0.00000		10.0%	0.00000		2.5%	0.00000		0.5%	0.00000	minimum	0.0%	0.00000	<table><tr><td colspan="3">Quantiles</td></tr><tr><td>maximum</td><td>100.0%</td><td>0.47700</td></tr><tr><td></td><td>99.5%</td><td>0.47700</td></tr><tr><td></td><td>97.5%</td><td>0.47700</td></tr><tr><td></td><td>90.0%</td><td>0.32510</td></tr><tr><td>quartile</td><td>75.0%</td><td>0.01725</td></tr><tr><td>median</td><td>50.0%</td><td>0.00000</td></tr><tr><td>quartile</td><td>25.0%</td><td>0.00000</td></tr><tr><td></td><td>10.0%</td><td>0.00000</td></tr><tr><td></td><td>2.5%</td><td>0.00000</td></tr><tr><td></td><td>0.5%</td><td>0.00000</td></tr><tr><td>minimum</td><td>0.0%</td><td>0.00000</td></tr></table>	Quantiles			maximum	100.0%	0.47700		99.5%	0.47700		97.5%	0.47700		90.0%	0.32510	quartile	75.0%	0.01725	median	50.0%	0.00000	quartile	25.0%	0.00000		10.0%	0.00000		2.5%	0.00000		0.5%	0.00000	minimum	0.0%	0.00000	<table><tr><td colspan="3">Quantiles</td></tr><tr><td>maximum</td><td>100.0%</td><td>0.10200</td></tr><tr><td></td><td>99.5%</td><td>0.10200</td></tr><tr><td></td><td>97.5%</td><td>0.10200</td></tr><tr><td></td><td>90.0%</td><td>0.06070</td></tr><tr><td>quartile</td><td>75.0%</td><td>0.00500</td></tr><tr><td>median</td><td>50.0%</td><td>0.00000</td></tr><tr><td>quartile</td><td>25.0%</td><td>0.00000</td></tr><tr><td></td><td>10.0%</td><td>0.00000</td></tr><tr><td></td><td>2.5%</td><td>0.00000</td></tr><tr><td></td><td>0.5%</td><td>0.00000</td></tr><tr><td>minimum</td><td>0.0%</td><td>0.00000</td></tr></table>	Quantiles			maximum	100.0%	0.10200		99.5%	0.10200		97.5%	0.10200		90.0%	0.06070	quartile	75.0%	0.00500	median	50.0%	0.00000	quartile	25.0%	0.00000		10.0%	0.00000		2.5%	0.00000		0.5%	0.00000	minimum	0.0%	0.00000
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Exhibit 17. K Check Standards Descriptive Statistics by Element

Exhibit 18. S Check Standards Descriptive Statistics by Element

Exhibit 19. Concentrations by Analytical Sequence Number for Aluminum, Boron, Calcium, and Copper

+ - sample value from tank heel;

x - other sample values

Aluminum vs Analytical Sequence Number **Boron vs Analytical Sequence Number** **Calcium vs Analytical Sequence Number** **Copper vs Analytical Sequence Number**

**Exhibit 20. Concentrations by Analytical Sequence Number for
Iron, Magnesium, Manganese, and Nickel**

+ - sample value from tank heel;

x - other sample values

Iron vs Analytical Sequence Number

Magnesium vs Analytical Sequence Number

Manganese vs Analytical Sequence Number

Nickel vs Analytical Sequence Number

Exhibit 21. Concentrations by Analytical Sequence Number for Potassium, Potassium (AA), Sodium, and Sodium (AA)

+ - sample value from tank heel;

x - other sample values

Potassium vs Analytical Sequence

Potassium (AA) vs Analytical Sequence Number

Sodium vs Analytical Sequence Number

Sodium (AA) vs Analytical Sequence Number

Exhibit 22. Concentrations by Analytical Sequence Number for Silicon and Titanium

+ - sample value from tank heel;

x - other sample values

Silicon vs Analytical Sequence Number **Titanium vs Analytical Sequence Number**

Exhibit 23. Percent Relative Difference Between Samplers for Aluminum Concentrations by Tank Level and Mixer Speed

Al 100% (H-G)/G By Tank Level-Mixer Speed

Means with confid. interval

Means

Summary of Fit

Rsquare	0.002163
Root Mean Square Error	1.499426
Mean of Response	0.020084
Observations (or Sum Wgts)	48

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	0.21927	0.10964	0.0488
Error	45	101.17246	2.24828	Prob>F
C Total	47	101.39174		0.9525

Mean Estimates

Level	number	Mean	Std Error
2000-L	16	-0.07433	0.37486
6000-H	16	0.080194	0.37486
6000-L	16	0.054390	0.37486

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	16	0.660321	0.524518	0.524518
6000-H	16	1.785404	1.370887	1.370887
6000-L	16	1.766674	1.364118	1.357319

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.1441	2	45	0.1290
Brown-Forsythe	4.4187	2	45	0.0177
Levene	4.6186	2	45	0.0150
Bartlett	7.0151	2	.	0.0009

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
0.0783	2	24.432	0.9249

Exhibit 24. Percent Relative Difference Between Samplers for Boron Concentrations by Tank Level and Mixer Speed

B 100% (H-G)/G By Tank Level-Mixer Speed

Means with confid. interval

Means

Summary of Fit

Rsquare 0.12101
 Root Mean Square Error 1.301751
 Mean of Response -0.1176
 Observations (or Sum Wgts) 48

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	10.497953	5.24898	3.0976
Error	45	76.254985	1.69456	Prob>F
C Total	47	86.752939		0.0549

Mean Estimates

Level	number	Mean	Std Error
2000-L	16	0.536738	0.32544
6000-H	16	-0.36148	0.32544
6000-L	16	-0.52807	0.32544

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	16	1.441095	1.010419	0.9799660
6000-H	16	1.131079	0.818293	0.8032133
6000-L	16	1.314371	0.979620	0.9521604

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.3290	2	45	0.7214
Brown-Forsythe	0.1702	2	45	0.8440
Levene	0.2265	2	45	0.7982
Bartlett	0.4253	2	.	0.6535

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
2.6856	2	29.692	0.0847

Exhibit 25. Percent Relative Difference Between Samplers for Calcium Concentrations by Tank Level and Mixer Speed

Ca 100% (H-G)/G By Tank Level-Mixer Speed

Means

Summary of Fit

Rsquare	0.067148
Root Mean Square Error	2.989945
Mean of Response	0.50962
Observations (or Sum Wgts)	48

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	28.95740	14.4787	1.6196
Error	45	402.28964	8.9398	Prob>F
C Total	47	431.24704		0.2093

Mean Estimates

Level	number	Mean	Std Error
2000-L	16	-0.56668	0.74749
6000-H	16	1.23777	0.74749
6000-L	16	0.85777	0.74749

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	16	3.628422	2.275443	2.215462
6000-H	16	2.292007	1.618747	1.613627
6000-L	16	2.898373	2.354315	2.315785

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.6246	2	45	0.5401
Brown-Forsythe	0.5083	2	45	0.6049
Levene	0.6218	2	45	0.5415
Bartlett	1.5062	2	.	0.2217

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
1.3941	2	29.021	0.2642

2 of 2

Exhibit 26. Percent Relative Difference Between Samplers for Copper Concentrations by Tank Level and Mixer Speed

Cu 100% (H-G)/G By Tank Level-Mixer Speed

Means with confid. interval

Means

Summary of Fit

Rsquare	0.096483
Root Mean Square Error	1.68305
Mean of Response	0.113152
Observations (or Sum Wgts)	48

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	13.61192	6.80596	2.4027
Error	45	127.46952	2.83266	Prob>F
C Total	47	141.08144		0.1020

Mean Estimates

Level	number	Mean	Std Error
2000-L	16	-0.53568	0.42076
6000-H	16	0.768682	0.42076
6000-L	16	0.106450	0.42076

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	16	1.811321	1.141573	1.102851
6000-H	16	1.760776	1.292072	1.292072
6000-L	16	1.454906	1.244487	1.231181

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.2106	2	45	0.8109
Brown-Forsythe	0.1105	2	45	0.8956
Levene	0.0773	2	45	0.9257
Bartlett	0.3944	2		0.6741

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
2.0878	2	29.688	0.1418

Exhibit 27. Percent Relative Difference Between Samplers for Iron Concentrations by Tank Level and Mixer Speed

Fe 100% (H-G)/G By Tank Level-Mixer Speed

Means

Summary of Fit

Rsquare 0.021038
 Root Mean Square Error 1.78673
 Mean of Response 0.217694
 Observations (or Sum Wgts) 48

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	3.08723	1.54362	0.4835
Error	45	143.65818	3.19240	Prob>F
C Total	47	146.74541		0.6198

Mean Estimates

Level	number	Mean	Std Error
2000-L	16	0.001594	0.44668
6000-H	16	0.573738	0.44668
6000-L	16	0.077849	0.44668

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	16	1.018244	0.779384	0.728333
6000-H	16	1.999705	1.754608	1.738606
6000-L	16	2.131096	1.703634	1.703634

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	3.3196	2	45	0.0452
Brown-Forsythe	5.6043	2	45	0.0067
Levene	5.6729	2	45	0.0064
Bartlett	3.9836	2		0.0186

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
0.5096	2	26.563	0.6065

Exhibit 28. Percent Relative Difference Between Samplers for Magnesium Concentrations by Tank Level and Mixer Speed

Mg 100% (H-G)/G By Tank Level-Mixer Speed

Means with confid. interval

Means**Summary of Fit**

Rsquare	0.081993
Root Mean Square Error	1.188295
Mean of Response	-0.03003
Observations (or Sum Wgts)	48

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	5.675327	2.83766	2.0096
Error	45	63.542037	1.41205	Prob>F
C Total	47	69.217364		0.1459

Mean Estimates

Level	number	Mean	Std Error
2000-L	16	0.447221	0.29707
6000-H	16	-0.18785	0.29707
6000-L	16	-0.34946	0.29707

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	16	1.632639	1.071730	1.029969
6000-H	16	0.826463	0.666408	0.642927
6000-L	16	0.942117	0.716997	0.715977

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1.6792	2	45	0.1980
Brown-Forsythe	0.8760	2	45	0.4234
Levene	1.1773	2	45	0.3174
Bartlett	4.0440	2	.	0.0175

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
1.4045	2	28.49	0.2620

Exhibit 29. Percent Relative Difference Between Samplers for Manganese Concentrations by Tank Level and Mixer Speed

Mn 100% (H-G)/G By Tank Level-Mixer Speed

Means with confid. interval

Means

Summary of Fit

Rsquare	0.059612
Root Mean Square Error	2.344137
Mean of Response	0.239718
Observations (or Sum Wgts)	48

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob>F
Model	2	15.67493	7.83747	1.4263	
Error	45	247.27393	5.49498		
C Total	47	262.94886			0.2508

Mean Estimates

Level	number	Mean	Std Error
2000-L	16	-0.46761	0.58603
6000-H	16	0.931920	0.58603
6000-L	16	0.254842	0.58603

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	16	2.583179	1.624102	1.539104
6000-H	16	1.863508	1.309788	1.306446
6000-L	16	2.517826	2.149517	2.117662

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.4013	2	45	0.6718
Brown-Forsythe	1.0670	2	45	0.3526
Levene	1.2498	2	45	0.2963
Bartlett	0.8868	2	.	0.4120

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
1.5456	2	29.256	0.2301

Exhibit 30. Percent Relative Difference Between Samplers for Sodium Concentrations by Tank Level and Mixer Speed

Na 100% (H-G)/G By Tank Level-Mixer Speed

Means with confid. interval

Means

Summary of Fit

Rsquare	0.115081
Root Mean Square Error	1.300232
Mean of Response	-0.00913
Observations (or Sum Wgts)	48

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	9.893611	4.94681	2.9261
Error	45	76.077148	1.69060	Prob>F
C Total	47	85.970759		0.0639

Mean Estimates

Level	number	Mean	Std Error
2000-L	16	-0.50585	0.32506
6000-H	16	0.591550	0.32506
6000-L	16	-0.11308	0.32506

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	16	1.700364	1.201842	1.142979
6000-H	16	1.288931	1.054185	1.033672
6000-L	16	0.720576	0.589692	0.589692

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1.8920	2	45	0.1626
Brown-Forsythe	1.7078	2	45	0.1928
Levene	2.4804	2	45	0.0951
Bartlett	4.8174	2	.	0.0081

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
2.5230	2	26.534	0.0993

Exhibit 31. Percent Relative Difference Between Samplers for Sodium (AA) Concentrations by Tank Level and Mixer Speed

Na-AA 100% (H-G)/G By Tank Level-Mixer Speed

Means with confid. interval

Means

Summary of Fit

Rsquare	0.004734
Root Mean Square Error	2.534043
Mean of Response	-0.19964
Observations (or Sum Wgts)	48

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	1.37438	0.68719	0.1070
Error	45	288.96172	6.42137	Prob>F
C Total	47	290.33610		0.8987

Mean Estimates

Level	number	Mean	Std Error
2000-L	16	-0.42476	0.63351
6000-H	16	-0.01679	0.63351
6000-L	16	-0.15738	0.63351

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	16	2.108009	1.640576	1.603138
6000-H	16	3.415440	2.434771	2.434771
6000-L	16	1.776284	1.366154	1.353296

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	2.1170	2	45	0.1322
Brown-Forsythe	1.7967	2	45	0.1775
Levene	1.8299	2	45	0.1722
Bartlett	3.5091	2	.	0.0299

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
0.1102	2	28.528	0.8961

Exhibit 32. Percent Relative Difference Between Samplers for Nickel Concentrations by Tank Level and Mixer Speed

NI 100% (H-G)/G By Tank Level-Mixer Speed

Means with confid. interval

Means

Summary of Fit

Rsquare	0.075899
Root Mean Square Error	2.420055
Mean of Response	0.338872
Observations (or Sum Wgts)	48

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob>F
Model	2	21.64595	10.8230	1.8480	
Error	45	263.54996	5.8567		
C Total	47	285.19591			0.1693

Mean Estimates

Level	number	Mean	Std Error
2000-L	16	-0.59001	0.60501
6000-H	16	0.974537	0.60501
6000-L	16	0.632091	0.60501

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	16	2.780487	2.122786	2.052709
6000-H	16	1.719384	1.297784	1.267542
6000-L	16	2.623472	2.166466	2.124704

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1.0860	2	45	0.3462
Brown-Forsythe	1.4719	2	45	0.2403
Levene	1.9289	2	45	0.1571
Bartlett	1.7814	2	.	0.1684

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
1.7974	2	28.463	0.1840

Exhibit 33. Percent Relative Difference Between Samplers for Potassium Concentrations by Tank Level and Mixer Speed

K 100% (H-G)/G By Tank Level-Mixer Speed

Means**Summary of Fit**

Rsquare 0.11636
 Root Mean Square Error 4.642412
 Mean of Response -0.64578
 Observations (or Sum Wgts) 48

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	127.7105	63.8553	2.9628
Error	45	969.8397	21.5520	Prob>F
C Total	47	1097.5502		0.0618

Mean Estimates

Level	number	Mean	Std Error
2000-L	16	-0.43583	1.1606
6000-H	16	1.23869	1.1606
6000-L	16	-2.74020	1.1606

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	16	3.272810	2.117927	2.083239
6000-H	16	2.344718	1.715401	1.676912
6000-L	16	6.960387	4.262080	3.876934

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	1.5915	2	45	0.2149
Brown-Forsythe	1.5344	2	45	0.2267
Levene	2.4082	2	45	0.1015
Bartlett	9.1439	2	.	0.0001

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
3.0946	2	26.985	0.0617

Exhibit 34. Percent Relative Difference Between Samplers for Potassium (AA) Concentrations by Tank Level and Mixer Speed

K-AA 100% (H-G)/G By Tank Level-Mixer Speed

Means with confid. interval

Means

Summary of Fit

Rsquare	0.131017
Root Mean Square Error	2.495268
Mean of Response	0.184326
Observations (or Sum Wgts)	48

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob>F
Model	2	42.24374	21.1219	3.3923	
Error	45	280.18630	6.2264		
C Total	47	322.43005			0.0424

Mean Estimates

Level	number	Mean	Std Error
2000-L	16	-1.05443	0.62382
6000-H	16	1.21508	0.62382
6000-L	16	0.39232	0.62382

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	16	3.211381	1.932762	1.932762
6000-H	16	1.849241	1.450209	1.433501
6000-L	16	2.224056	1.853744	1.807231

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[5]	0.9392	2	45	0.3985
Brown-Forsythe	0.3485	2	45	0.7076
Levene	0.3660	2	45	0.6956
Bartlett	2.3656	2	.	0.0939

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
3.0018	2	28.818	0.0654

Exhibit 35. Percent Relative Difference Between Samplers for Silicon Concentrations by Tank Level and Mixer Speed

SI 100% (H-G)/G By Tank Level-Mixer Speed

Means

Summary of Fit

Rsquare	0.012223
Root Mean Square Error	1.383124
Mean of Response	-0.22914
Observations (or Sum Wgts)	48

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	1.065293	0.53265	0.2784
Error	45	86.086395	1.91303	Prob>F
C Total	47	87.151688		0.7583

Mean Estimates

Level	number	Mean	Std Error
2000-L	16	-0.0258	0.34578
6000-H	16	-0.28307	0.34578
6000-L	16	-0.37856	0.34578

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	16	1.342759	1.106062	0.896897
6000-H	16	1.506437	1.128632	1.125139
6000-L	16	1.291023	1.057113	1.057113

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	0.2184	2	45	0.8047
Brown-Forsythe	0.2414	2	45	0.7865
Levene	0.0341	2	45	0.9665
Bartlett	0.1912	2	-	0.8260

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
0.2943	2	29.881	0.7472

Exhibit 36. Percent Relative Difference Between Samplers for Titanium Concentrations by Tank Level and Mixer Speed

TI 100% (H-G)/G By Tank Level-Mixer Speed

Means with confid. interval

Means

Summary of Fit

Rsquare 0.002463
Root Mean Square Error 1.605556
Mean of Response 0.223347
Observations (or Sum Wgts) 48

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob>F
Model	2	0.28642	0.14321	0.0556	
Error	45	116.00140	2.57781		
C Total	47	116.28782			0.9460

Mean Estimates

Level	number	Mean	Std Error
2000-L	16	0.315815	0.40139
6000-H	16	0.227493	0.40139
6000-L	16	0.126735	0.40139

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L	16	0.915496	0.754397	0.734350
6000-H	16	1.784031	1.470929	1.442493
6000-L	16	1.926792	1.563506	1.563506

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[.5]	3.0756	2	45	0.0560
Brown-Forsythe	3.9233	2	45	0.0269
Levene	4.2575	2	45	0.0203
Bartlett	3.9912	2	.	0.0185

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
0.0671	2	26.574	0.9353

Exhibit 37. Aluminum Concentrations by Outlet by Tank Level

Al (wt %) By Level-Mixer-Outlet

Means with confid. interval.

Means

Summary of Fit

Require 0.048423
 Root Mean Square Error 0.094334
 Mean of Response 1.563146
 Observations (or Sum Wgts) 144

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	17	0.0570573	0.003356	0.3772
Error	126	1.1212508	0.008899	Prob > F
C Total	143	1.1783079		0.9880

Mean Estimates

Level	number	Mean	Std. Error
2000-L-X	8	1.56588	0.03335
2000-L-Y	8	1.54183	0.03335
2500-L-X	8	1.57275	0.03335
2500-L-Y	8	1.52575	0.03335
3000-L-X	8	1.55888	0.03335
3000-L-Y	8	1.53113	0.03335
3500-L-X	8	1.58012	0.03335
3500-L-Y	8	1.57000	0.03335
4000-H-X	8	1.56862	0.03335
4000-H-Y	8	1.54713	0.03335
4500-H-X	8	1.56800	0.03335
4500-H-Y	8	1.53875	0.03335
5000-H-X	8	1.57425	0.03335
5000-H-Y	8	1.55850	0.03335
5500-H-X	8	1.57413	0.03335
5500-H-Y	8	1.58567	0.03335
6000-H-X	8	1.59588	0.03335
6000-H-Y	8	1.59838	0.03335

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L-X	8	0.0986704	0.0590938	0.0586250
2000-L-Y	8	0.0959448	0.0743750	0.0743750
2500-L-X	8	0.0942822	0.0567500	0.0567500
2500-L-Y	8	0.0867340	0.0668125	0.0662500
3000-L-X	8	0.1102470	0.0715937	0.0703750
3000-L-Y	8	0.0875795	0.0515937	0.0508250
3500-L-X	8	0.1280183	0.0888437	0.0841250
3500-L-Y	8	0.0847854	0.0645000	0.0645000
4000-H-X	8	0.1200094	0.0710313	0.0701250
4000-H-Y	8	0.0785085	0.0628750	0.0628750
4500-H-X	8	0.1077988	0.0832500	0.0832500
4500-H-Y	8	0.0751033	0.0615000	0.0615000
5000-H-X	8	0.1052857	0.0713125	0.0675000
5000-H-Y	8	0.0982482	0.0802500	0.0802500
5500-H-X	8	0.0920271	0.0566562	0.0548750
5500-H-Y	8	0.0814990	0.0548562	0.0473750
6000-H-X	8	0.0998127	0.0808250	0.0808250
6000-H-Y	8	0.0846838	0.0511250	0.0511250

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien [5]	0.3405	17	126	0.9932
Brown-Forsythe	0.1809	17	126	0.9999
Levene	0.1912	17	126	0.9998
Bartlett	0.5373	17	-	0.9360

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob > F
0.4667	17	46.911	0.9559

Exhibit 38. Boron Concentrations by Outlet by Tank Level

Means

Summary of Fit

Requires 0.112128
 Root Mean Square Error 0.049094
 Mean of Response 2.3815
 Observations (or Sum Wgts) 144

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	17	0.03835300	0.002256	0.9360	
Error	126	0.30389300	0.002410		0.5340
C Total	143	0.34204600			

Mean Estimates

Level	number	Mean	Std Error
2000-L-X	8	2.39825	0.01736
2000-L-Y	8	2.38225	0.01736
2500-L-X	8	2.40338	0.01736
2500-L-Y	8	2.38988	0.01736
3000-L-X	8	2.39875	0.01736
3000-L-Y	8	2.37175	0.01736
3500-L-X	8	2.35662	0.01736
3500-L-Y	8	2.37712	0.01736
4000-H-X	8	2.39138	0.01736
4000-H-Y	8	2.35963	0.01736
4500-H-X	8	2.40188	0.01736
4500-H-Y	8	2.35500	0.01736
5000-H-X	8	2.39213	0.01736
5000-H-Y	8	2.35875	0.01736
5500-H-X	8	2.39837	0.01736
5500-H-Y	8	2.38038	0.01736
6000-H-X	8	2.39413	0.01736
6000-H-Y	8	2.37937	0.01736

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDiff to Mean	MeanAbsDiff to Median
2000-L-X	8	0.0241784	0.0177500	0.0177500
2000-L-Y	8	0.0594204	0.0467500	0.0467500
2500-L-X	8	0.0259336	0.0201250	0.0201250
2500-L-Y	8	0.0558608	0.0413437	0.0408250
3000-L-X	8	0.0329317	0.0276875	0.0280000
3000-L-Y	8	0.0263842	0.0201875	0.0197500
3500-L-X	8	0.1020951	0.0643125	0.0531250
3500-L-Y	8	0.0547682	0.0423437	0.0386250
4000-H-X	8	0.0538095	0.0351875	0.0323750
4000-H-Y	8	0.0424787	0.0299687	0.0286250
4500-H-X	8	0.0284627	0.0228750	0.0228750
4500-H-Y	8	0.0352947	0.0262500	0.0232500
5000-H-X	8	0.0444376	0.0293750	0.0293750
5000-H-Y	8	0.0578983	0.0494375	0.0452500
5500-H-X	8	0.0328144	0.0222188	0.0221250
5500-H-Y	8	0.0659024	0.0518250	0.0518250
6000-H-X	8	0.0284326	0.0223438	0.0208750
6000-H-Y	8	0.048956	0.0371250	0.0371250

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien[5]	0.9718	17	126	0.4940
Brown-Forsythe	0.8891	17	126	0.5878
Levene	1.5010	17	126	0.1045
Bartlett	2.2170	17	-	0.0027

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob > F
1.2737	17	46.87	0.2508

Exhibit 39. Calcium Concentrations by Outlet by Tank Level

Ca (wt %) By Level-Mixer-Outlet

Means with confid. interval

Means

Summary of Fit

Require 0.31477
 Root Mean Square Error 0.021414
 Mean of Response 0.777382
 Observations (or Sum Wgts) 144

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	17	0.02654137	0.001561	3.4047	
Error	126	0.05777862	0.000458		
C Total	143	0.08431999			0.0000

Mean Estimates

Level	number	Mean	Std Error
2000-L-X	8	0.753375	0.00757
2000-L-Y	8	0.774000	0.00757
2500-L-X	8	0.760000	0.00757
2500-L-Y	8	0.773625	0.00757
3000-L-X	8	0.762625	0.00757
3000-L-Y	8	0.764000	0.00757
3500-L-X	8	0.777500	0.00757
3500-L-Y	8	0.791625	0.00757
4000-H-X	8	0.768500	0.00757
4000-H-Y	8	0.768125	0.00757
4500-H-X	8	0.771125	0.00757
4500-H-Y	8	0.777000	0.00757
5000-H-X	8	0.775500	0.00757
5000-H-Y	8	0.782500	0.00757
5500-H-X	8	0.782500	0.00757
5500-H-Y	8	0.789625	0.00757
6000-H-X	8	0.788500	0.00757
6000-H-Y	8	0.812750	0.00757

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L-X	8	0.0181575	0.0122187	0.0121250
2000-L-Y	8	0.0198782	0.0162500	0.0162500
2500-L-X	8	0.0216201	0.0142500	0.0142500
2500-L-Y	8	0.0231081	0.0178875	0.0158250
3000-L-X	8	0.0192498	0.0154687	0.0143750
3000-L-Y	8	0.0182287	0.0145000	0.0145000
3500-L-X	8	0.0149284	0.0103750	0.0100000
3500-L-Y	8	0.0172704	0.0138250	0.0136250
4000-H-X	8	0.0157299	0.0118250	0.0112500
4000-H-Y	8	0.0189242	0.0158750	0.0158750
4500-H-X	8	0.0188719	0.0151562	0.0151250
4500-H-Y	8	0.0194422	0.0122500	0.0122500
5000-H-X	8	0.0188377	0.0150000	0.0150000
5000-H-Y	8	0.0228473	0.0151250	0.0150000
5500-H-X	8	0.0258623	0.0190000	0.0155000
5500-H-Y	8	0.0289430	0.0208250	0.0208250
6000-H-X	8	0.0186394	0.0151250	0.0130000
6000-H-Y	8	0.0346771	0.0262500	0.0262500

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien[5]	0.7238	17	126	0.7737
Brown-Forsythe	0.5109	17	126	0.9436
Levene	0.6459	17	126	0.8490
Bartlett	0.6563	17		0.8456

Welch Anova testing Means Equal, allowing Stds Not Equal				
F Ratio	DF Num	DF Den	Prob > F	
2.4883	17	46.922	0.0071	

Exhibit 40. Copper Concentrations by Outlet by Tank Level

Cu (wt %) By Level-Mixer-Outlet

Means with confid. interval

Means

Summary of Fit

R-square 0.165845
 Root Mean Square Error 0.009538
 Mean of Response 0.337792
 Observations (or Sum Wgts) 144

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	17	0.00227900	0.000134	1.4736	
Error	126	0.01146275	0.000091		
C Total	143	0.01374175			0.1148

Mean Estimates

Level	number	Mean	Std. Error
2000-L-X	8	0.333875	0.00337
2000-L-Y	8	0.338875	0.00337
2500-L-X	8	0.334250	0.00337
2500-L-Y	8	0.334125	0.00337
3000-L-X	8	0.334500	0.00337
3000-L-Y	8	0.337375	0.00337
3500-L-X	8	0.337625	0.00337
3500-L-Y	8	0.343000	0.00337
4000-H-X	8	0.334250	0.00337
4000-H-Y	8	0.339750	0.00337
4500-H-X	8	0.334375	0.00337
4500-H-Y	8	0.339875	0.00337
5000-H-X	8	0.334500	0.00337
5000-H-Y	8	0.338250	0.00337
5500-H-X	8	0.335125	0.00337
5500-H-Y	8	0.342000	0.00337
6000-H-X	8	0.339125	0.00337
6000-H-Y	8	0.349375	0.00337

Tests that the Variances are Equal

Level	Count	Std. Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L-X	8	0.0166556	0.0106250	0.0106250
2000-L-Y	8	0.0085124	0.0051562	0.0048750
2500-L-X	8	0.0104300	0.0085000	0.0085000
2500-L-Y	8	0.0090780	0.0074063	0.0088750
3000-L-X	8	0.0059522	0.0043750	0.0042500
3000-L-Y	8	0.0045962	0.0036250	0.0036250
3500-L-X	8	0.0087821	0.0066250	0.0066250
3500-L-Y	8	0.0039279	0.0027500	0.0027500
4000-H-X	8	0.0093159	0.0067500	0.0067500
4000-H-Y	8	0.0069230	0.0052500	0.0052500
4500-H-X	8	0.0091486	0.0062188	0.0058750
4500-H-Y	8	0.0099633	0.0071250	0.0071250
5000-H-X	8	0.0102400	0.0068750	0.0067500
5000-H-Y	8	0.0105661	0.0083125	0.0082500
5500-H-X	8	0.0109732	0.0081562	0.0081250
5500-H-Y	8	0.0052915	0.0040000	0.0037500
6000-H-X	8	0.0107894	0.0083750	0.0083750
6000-H-Y	8	0.0133190	0.0102812	0.0101250

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien (5)	0.8505	17	126	0.6325
Brown-Forsythe	0.9792	17	126	0.4856
Levene	1.1172	17	126	0.3449
Bartlett	1.6578	17	-	0.0429

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob > F
1.5760	17	46.823	0.1102

Exhibit 41. Iron Concentrations by Outlet by Tank Level

Fe (wt %) By Level-Mixer-Outlet

Means with confid interval

Means

Summary of Fit

Require 0.243848
 Root Mean Square Error 0.176113
 Mean of Response 8.465507
 Observations (or Sum Wgts) 144

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	17	1.2902706	0.074134	2.3902	
Error	126	3.9079934	0.031016		0.0031
C Total	143	5.1982640			

Mean Estimates

Level	number	Mean	Std Error
2000-L-X	8	8.38068	0.06227
2000-L-Y	8	8.42425	0.06227
2500-L-X	8	8.44738	0.06227
2500-L-Y	8	8.35828	0.06227
3000-L-X	8	8.38300	0.06227
3000-L-Y	8	8.37200	0.06227
3500-L-X	8	8.38775	0.06227
3500-L-Y	8	8.56125	0.06227
4000-H-X	8	8.39625	0.06227
4000-H-Y	8	8.49600	0.06227
4500-H-X	8	8.42362	0.06227
4500-H-Y	8	8.44025	0.06227
5000-H-X	8	8.44100	0.06227
5000-H-Y	8	8.53525	0.06227
5500-H-X	8	8.45312	0.06227
5500-H-Y	8	8.60125	0.06227
6000-H-X	8	8.55962	0.06227
6000-H-Y	8	8.72200	0.06227

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L-X	8	0.0986473	0.0754062	0.0736250
2000-L-Y	8	0.2084794	0.1692500	0.1692500
2500-L-X	8	0.1423125	0.1029687	0.1011250
2500-L-Y	8	0.2448872	0.2047500	0.2047500
3000-L-X	8	0.1442121	0.1100000	0.1075000
3000-L-Y	8	0.1367876	0.1202500	0.1040000
3500-L-X	8	0.3580248	0.2153750	0.1977500
3500-L-Y	8	0.1876747	0.1566675	0.1377500
4000-H-X	8	0.1767151	0.1262500	0.1262500
4000-H-Y	8	0.1585326	0.1375000	0.1375000
4500-H-X	8	0.0764104	0.0531250	0.0531250
4500-H-Y	8	0.1266161	0.0775000	0.0775000
5000-H-X	8	0.1364876	0.1125000	0.1082500
5000-H-Y	8	0.1710720	0.1372500	0.1372500
5500-H-X	8	0.0713491	0.0566563	0.0513750
5500-H-Y	8	0.1098606	0.0843125	0.0790000
6000-H-X	8	0.1414849	0.0927188	0.0861250
6000-H-Y	8	0.2456990	0.1760000	0.1712500

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien's	0.9767	17	126	0.4884
Brown-Forsythe	1.1143	17	126	0.3476
Levene	1.6142	17	126	0.0698
Bartlett	2.2037	17		0.0029

Welch Anova testing Means Equal, allowing Stds Not Equal

F Ratio	DF Num	DF Den	Prob > F
2.2196	17	46.827	0.0161

Exhibit 42. Magnesium Concentrations by Outlet by Tank Level

Means

Summary of Fit

Resquare 0.278082
 Root Mean Square Error 0.017086
 Mean of Response 0.898875
 Observations (or Sum Wgts) 144

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	17	0.01416875	0.000833	2.8550	
Error	126	0.03678300	0.000292		
C Total	143	0.05095175			0.0004

Mean Estimates

Level	number	Mean	Std. Error
2000-L-X	8	0.913625	0.00604
2000-L-Y	8	0.896125	0.00604
2500-L-X	8	0.911000	0.00604
2500-L-Y	8	0.893125	0.00604
3000-L-X	8	0.909625	0.00604
3000-L-Y	8	0.892125	0.00604
3500-L-X	8	0.895500	0.00604
3500-L-Y	8	0.892000	0.00604
4000-L-X	8	0.906250	0.00604
4000-L-Y	8	0.884625	0.00604
4500-L-X	8	0.911125	0.00604
4500-L-Y	8	0.884000	0.00604
5000-L-X	8	0.912875	0.00604
5000-L-Y	8	0.887125	0.00604
5500-L-X	8	0.906375	0.00604
5500-L-Y	8	0.897000	0.00604
6000-L-X	8	0.906875	0.00604
6000-L-Y	8	0.883375	0.00604

Tests that the Variances are Equal

Level	Count	Std. Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L-X	8	0.0095458	0.0077187	0.0076250
2000-L-Y	8	0.0189884	0.0158583	0.0151250
2500-L-X	8	0.0084853	0.0070000	0.0070000
2500-L-Y	8	0.0197849	0.0166250	0.0166250
3000-L-X	8	0.0147158	0.0123750	0.0123750
3000-L-Y	8	0.0150584	0.0116250	0.0116250
3500-L-X	8	0.0325049	0.0192500	0.0175000
3500-L-Y	8	0.0142328	0.0122500	0.0115000
4000-L-X	8	0.0104437	0.0085000	0.0085000
4000-L-Y	8	0.0188448	0.0156250	0.0156250
4500-L-X	8	0.0117648	0.0086437	0.0086250
4500-L-Y	8	0.0178635	0.0140000	0.0140000
5000-L-X	8	0.0118427	0.0098750	0.0098750
5000-L-Y	8	0.0229000	0.0191250	0.0191250
5500-L-X	8	0.0098274	0.0069887	0.0068750
5500-L-Y	8	0.0172544	0.0130000	0.0130000
6000-L-X	8	0.0101198	0.0080937	0.0078750
6000-L-Y	8	0.0237543	0.0181250	0.0181250

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien[5]	0.9777	17	126	0.4873
Brown-Forsythe	1.0423	17	126	0.4182
Levene	1.3370	17	126	0.1806
Bartlett	1.8802	17	-	0.0152

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob > F
3.0887	17	46.873	0.0012

Exhibit 43. Manganese Concentrations by Outlet by Tank Level

Means

Summary of Fit

Requires 0.260915
 Root Mean Square Error 0.040481
 Mean of Response 1.697535
 Observations (or Sum Wgts) 144

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	17	0.07289120	0.004288	2.6165	
Error	126	0.20647863	0.001639		
C Total	143	0.27936983			0.0012

Mean Estimates

Level	number	Mean	Std Error
2000-L-X	8	1.66637	0.01431
2000-L-Y	8	1.69663	0.01431
2500-L-X	8	1.67250	0.01431
2500-L-Y	8	1.68925	0.01431
3000-L-X	8	1.67100	0.01431
3000-L-Y	8	1.68462	0.01431
3500-L-X	8	1.69262	0.01431
3500-L-Y	8	1.72075	0.01431
4000-H-X	8	1.68112	0.01431
4000-H-Y	8	1.71463	0.01431
4500-H-X	8	1.68038	0.01431
4500-H-Y	8	1.69713	0.01431
5000-H-X	8	1.69137	0.01431
5000-H-Y	8	1.70550	0.01431
5500-H-X	8	1.69012	0.01431
5500-H-Y	8	1.72713	0.01431
6000-H-X	8	1.71526	0.01431
6000-H-Y	8	1.75926	0.01431

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L-X	8	0.0409457	0.0256750	0.0256750
2000-L-Y	8	0.0319550	0.0218750	0.0218750
2500-L-X	8	0.0470360	0.0327500	0.0310000
2500-L-Y	8	0.0477398	0.0357500	0.0357500
3000-L-X	8	0.0214210	0.0160000	0.0157500
3000-L-Y	8	0.0262621	0.0227612	0.0218750
3500-L-X	8	0.0363517	0.0311250	0.0311250
3500-L-Y	8	0.0275823	0.0181875	0.0180000
4000-H-X	8	0.0337530	0.0268750	0.0268750
4000-H-Y	8	0.0302503	0.0215313	0.0208750
4500-H-X	8	0.0376676	0.0288750	0.0288750
4500-H-Y	8	0.0369108	0.0291250	0.0291250
5000-H-X	8	0.0356528	0.0259688	0.0236250
5000-H-Y	8	0.0431310	0.0288750	0.0287500
5500-H-X	8	0.0533437	0.0361563	0.0356250
5500-H-Y	8	0.0375668	0.0256875	0.0246250
6000-H-X	8	0.0456676	0.0315625	0.0297500
6000-H-Y	8	0.0661162	0.0522500	0.0522500

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien(5)	0.8710	17	126	0.6088
Brown-Forsythe	0.7196	17	126	0.7781
Levene	0.8177	17	126	0.6703
Bartlett	0.9182	17	-	0.5517

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob > F
2.1758	17	46.892	0.0184

Exhibit 44. Nickel Concentrations by Outlet by Tank Level

Ni (wt %) By Level-Mixer-Outlet

Means with confid interval

Means

Summary of Fit

Regression 0.183373
 Root Mean Square Error 0.025857
 Mean of Response 0.852521
 Observations (or Sum Wgts) 144

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	17	0.01881708	0.001113	1.6643	
Error	126	0.08424488	0.000669		
C Total	143	0.10316194			0.0581

Mean Estimates

Level	number	Mean	Std Error
2000-L-X	8	0.842250	0.00914
2000-L-Y	8	0.850000	0.00914
2500-L-X	8	0.843750	0.00914
2500-L-Y	8	0.837750	0.00914
3000-L-X	8	0.844500	0.00914
3000-L-Y	8	0.843375	0.00914
3500-L-X	8	0.880500	0.00914
3500-L-Y	8	0.888875	0.00914
4000-H-X	8	0.850250	0.00914
4000-H-Y	8	0.862000	0.00914
4500-H-X	8	0.841750	0.00914
4500-H-Y	8	0.847125	0.00914
5000-H-X	8	0.844750	0.00914
5000-H-Y	8	0.843125	0.00914
5500-H-X	8	0.856250	0.00914
5500-H-Y	8	0.864000	0.00914
6000-H-X	8	0.863500	0.00914
6000-H-Y	8	0.880625	0.00914

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDiff to Mean	MeanAbsDiff to Median
2000-L-X	8	0.0266873	0.0196250	0.0190000
2000-L-Y	8	0.0235008	0.0192500	0.0182500
2500-L-X	8	0.0257058	0.0197500	0.0197500
2500-L-Y	8	0.0267942	0.0198875	0.0182500
3000-L-X	8	0.0218729	0.0171250	0.0170000
3000-L-Y	8	0.0186523	0.0120625	0.0101250
3500-L-X	8	0.0230093	0.0160000	0.0160000
3500-L-Y	8	0.0277871	0.0198125	0.0178750
4000-H-X	8	0.0186332	0.0117500	0.0117500
4000-H-Y	8	0.0231332	0.0177500	0.0182500
4500-H-X	8	0.0220438	0.0154375	0.0150000
4500-H-Y	8	0.0336301	0.0226875	0.0201250
5000-H-X	8	0.0247025	0.0139375	0.0132500
5000-H-Y	8	0.0286926	0.0186582	0.0188750
5500-H-X	8	0.0283234	0.0215625	0.0187500
5500-H-Y	8	0.0245880	0.0157500	0.0147500
6000-H-X	8	0.0272816	0.0201250	0.0195000
6000-H-Y	8	0.0352863	0.0312813	0.0268750

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien[5]	0.3012	17	126	0.9987
Brown-Forsythe	0.2783	17	126	0.9980
Levene	0.5982	17	126	0.8883
Bartlett	0.4275	17	-	0.9798

Welch Anova testing Means Equal, allowing Std's Not Equal				
F Ratio	DF Num	DF Den	Prob > F	
1.1895	17	46.918	0.3092	

Exhibit 45. Potassium Concentrations by Outlet by Tank Level

Means

Summary of Fit

Rsquare 0.131678
 Root Mean Square Error 0.155995
 Mean of Response 1.861903
 Observations (or Sum Wgts) 144

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	17	0.4649684	0.027351	1.1240	
Error	126	3.0661263	0.024334		
C Total	143	3.5310946			0.3387

Mean Estimates

Level	number	Mean	Std Error
2000-L-X	8	1.77638	0.05515
2000-L-Y	8	1.90175	0.05515
2500-L-X	8	1.79563	0.05515
2500-L-Y	8	1.91825	0.05515
3000-L-X	8	1.82150	0.05515
3000-L-Y	8	1.87875	0.05515
3500-L-X	8	1.83025	0.05515
3500-L-Y	8	1.90725	0.05515
4000-H-X	8	1.82912	0.05515
4000-H-Y	8	1.92150	0.05515
4500-H-X	8	1.77238	0.05515
4500-H-Y	8	1.88325	0.05515
5000-H-X	8	1.80783	0.05515
5000-H-Y	8	1.90712	0.05515
5500-H-X	8	1.81800	0.05515
5500-H-Y	8	1.91400	0.05515
6000-H-X	8	1.85460	0.05515
6000-H-Y	8	1.97900	0.05515

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L-X	8	0.1463820	0.0865312	0.0841250
2000-L-Y	8	0.1464306	0.0906250	0.0807500
2500-L-X	8	0.1672858	0.1148562	0.0848750
2500-L-Y	8	0.1453486	0.0886875	0.0890000
3000-L-X	8	0.1080833	0.0733750	0.0880000
3000-L-Y	8	0.1249180	0.0798250	0.0712500
3500-L-X	8	0.1583845	0.0940625	0.0820000
3500-L-Y	8	0.1219283	0.0781250	0.0745000
4000-H-X	8	0.1019782	0.0873750	0.0873750
4000-H-Y	8	0.0933916	0.0802500	0.0590000
4500-H-X	8	0.2682496	0.1806437	0.1288250
4500-H-Y	8	0.1086580	0.0745825	0.0637500
5000-H-X	8	0.1829399	0.1094887	0.1018750
5000-H-Y	8	0.1810576	0.1249062	0.1148750
5500-H-X	8	0.2187858	0.1320000	0.1042500
5500-H-Y	8	0.1535843	0.0947500	0.0860000
6000-H-X	8	0.1587190	0.0982500	0.0842500
6000-H-Y	8	0.1234064	0.0892500	0.0872500

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien[5]	0.4001	17	126	0.9834
Brown-Forsythe	0.1455	17	126	1.0000
Levene	0.3605	17	126	0.9906
Bartlett	1.0428	17	.	0.4063

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob > F
1.0803	17	46.902	0.3993

Exhibit 46. Potassium (AA) Concentrations by Outlet by Tank Level

Means with confid. interval

Means

Summary of Fit

Rsquare 0.029691
 Root Mean Square Error 0.189499
 Mean of Response 1.341667
 Observations (or Sum Wgts) 144

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	17	0.1384537	0.008144	0.2268
Error	126	4.5246362	0.035910	Prob>F
C Total	143	4.6630900		0.9995

Mean Estimates

Level	number	Mean	Std. Error
2000-L-X	8	1.33625	0.06700
2000-L-Y	8	1.30013	0.06700
2500-L-X	8	1.35638	0.06700
2500-L-Y	8	1.29488	0.06700
3000-L-X	8	1.35860	0.06700
3000-L-Y	8	1.29860	0.06700
3500-L-X	8	1.37888	0.06700
3500-L-Y	8	1.33262	0.06700
4000-H-X	8	1.35963	0.06700
4000-H-Y	8	1.31188	0.06700
4500-H-X	8	1.36725	0.06700
4500-H-Y	8	1.30560	0.06700
5000-H-X	8	1.36560	0.06700
5000-H-Y	8	1.30838	0.06700
5500-H-X	8	1.37787	0.06700
5500-H-Y	8	1.32976	0.06700
6000-H-X	8	1.39060	0.06700
6000-H-Y	8	1.37183	0.06700

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDiff to Mean	MeanAbsDiff to Median
2000-L-X	8	0.1694384	0.1339375	0.1162500
2000-L-Y	8	0.2050664	0.1805937	0.1573750
2500-L-X	8	0.1812822	0.1477813	0.1323750
2500-L-Y	8	0.2037053	0.1794063	0.1573750
3000-L-X	8	0.1847812	0.1312500	0.1080000
3000-L-Y	8	0.2060461	0.1818750	0.1597500
3500-L-X	8	0.1706881	0.1334375	0.1208750
3500-L-Y	8	0.2021875	0.1772187	0.1631250
4000-H-X	8	0.1696003	0.1329687	0.1158750
4000-H-Y	8	0.1992116	0.1704062	0.1703750
4500-H-X	8	0.1798589	0.1413750	0.1212500
4500-H-Y	8	0.2021364	0.1748750	0.1642500
5000-H-X	8	0.1736853	0.1368750	0.1160000
5000-H-Y	8	0.1946403	0.1671250	0.1671250
5500-H-X	8	0.1830894	0.1446563	0.1273750
5500-H-Y	8	0.2055513	0.1827500	0.1627500
6000-H-X	8	0.1666253	0.1343750	0.1205000
6000-H-Y	8	0.2200350	0.1934687	0.1708750

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[5]	0.2807	17	126	0.9979
Brown-Forsythe	0.2434	17	126	0.9991
Levene	0.5772	17	126	0.9036
Bartlett	0.1117	17		1.0000

Welch Anova testing Means Equal, allowing Stds Not Equal

F Ratio	DF Num	DF Den	Prob>F
0.1838	17	46.936	0.9998

Exhibit 47. Silicon Concentrations by Outlet by Tank Level

Means

Summary of Fit

Requires 0.087442
 Root Mean Square Error 1.491257
 Mean of Response 24.08408
 Observations (or Sum Wgts) 144

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	17	20.26423	1.19201	0.5360	
Error	126	280.20480	2.22385		
C Total	143	300.46903			0.9300

Mean Estimates

Level	number	Mean	Std. Error
2000-L-X	8	23.8839	0.52724
2000-L-Y	8	24.7113	0.52724
2500-L-X	8	23.7802	0.52724
2500-L-Y	8	24.8585	0.52724
3000-L-X	8	23.8909	0.52724
3000-L-Y	8	24.5896	0.52724
3500-L-X	8	23.4035	0.52724
3500-L-Y	8	24.4990	0.52724
4000-H-X	8	23.9138	0.52724
4000-H-Y	8	24.3330	0.52724
4500-H-X	8	23.7185	0.52724
4500-H-Y	8	24.2635	0.52724
5000-H-X	8	23.7177	0.52724
5000-H-Y	8	24.2591	0.52724
5500-H-X	8	23.8484	0.52724
5500-H-Y	8	24.2844	0.52724
6000-H-X	8	23.5822	0.52724
6000-H-Y	8	24.1900	0.52724

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDiff to Mean	MeanAbsDiff to Median
2000-L-X	8	1.304863	1.107825	1.107825
2000-L-Y	8	1.473509	1.182937	1.182937
2500-L-X	8	1.325596	0.981750	0.981750
2500-L-Y	8	1.588440	1.219250	1.219250
3000-L-X	8	1.307884	1.049825	1.049825
3000-L-Y	8	1.472895	1.198781	1.174125
3500-L-X	8	1.754429	1.441500	1.441500
3500-L-Y	8	1.518531	1.240250	1.207750
4000-H-X	8	1.480810	1.158875	1.158875
4000-H-Y	8	1.529901	1.255000	1.197250
4500-H-X	8	1.307849	1.100000	1.100000
4500-H-Y	8	1.519955	1.211375	1.207500
5000-H-X	8	1.831831	1.280688	1.157250
5000-H-Y	8	1.700380	1.380375	1.380375
5500-H-X	8	1.369481	1.127875	1.127875
5500-H-Y	8	1.589601	1.292489	1.236375
6000-H-X	8	1.091138	0.859000	0.859000
6000-H-Y	8	1.724543	1.383000	1.383000

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien [5]	0.3188	17	126	0.9954
Brown-Forsythe	0.2275	17	126	0.9995
Levene	0.2868	17	126	0.9978
Bartlett	0.1856	17	-	0.9999

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob > F
0.4528	17	48.93	0.9618

Exhibit 48. Sodium Concentrations by Outlet by Tank Level

Means

Summary of Fit

Resquare 0.028005
 Root Mean Square Error 0.188928
 Mean of Response 4.606521
 Observations (or Sum Wgts) 144

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	17	0.1295796	0.007622	0.2135
Error	126	4.4973254	0.035662	Prob > F
C Total	143	4.6269050		0.9996

Mean Estimates

Level	number	Mean	Std Error
2000-L-X	8	4.56083	0.06680
2000-L-Y	8	4.66525	0.06680
2500-L-X	8	4.58525	0.06680
2500-L-Y	8	4.63782	0.06680
3000-L-X	8	4.58183	0.06680
3000-L-Y	8	4.63400	0.06680
3500-L-X	8	4.57837	0.06680
3500-L-Y	8	4.61983	0.06680
4000-H-X	8	4.57850	0.06680
4000-H-Y	8	4.63575	0.06680
4500-H-X	8	4.57688	0.06680
4500-H-Y	8	4.59913	0.06680
5000-H-X	8	4.61125	0.06680
5000-H-Y	8	4.58825	0.06680
5500-H-X	8	4.57800	0.06680
5500-H-Y	8	4.63182	0.06680
6000-H-X	8	4.59980	0.06680
6000-H-Y	8	4.65612	0.06680

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L-X	8	0.2370919	0.1583125	0.1323750
2000-L-Y	8	0.0691453	0.0462500	0.0482500
2500-L-X	8	0.3145985	0.2021250	0.1480000
2500-L-Y	8	0.0597493	0.0443750	0.0443750
3000-L-X	8	0.2625844	0.1584062	0.1383750
3000-L-Y	8	0.0779322	0.0667500	0.0597500
3500-L-X	8	0.1975851	0.1325312	0.1171250
3500-L-Y	8	0.0704859	0.0506250	0.0506250
4000-H-X	8	0.2253575	0.1405000	0.1230000
4000-H-Y	8	0.0715097	0.0517500	0.0517500
4500-H-X	8	0.2812591	0.1736562	0.1486250
4500-H-Y	8	0.0999320	0.0750625	0.0701250
5000-H-X	8	0.2402729	0.1476250	0.1172500
5000-H-Y	8	0.0938506	0.0672500	0.0672500
5500-H-X	8	0.2833312	0.1850000	0.1525000
5500-H-Y	8	0.0738279	0.0548750	0.0548750
6000-H-X	8	0.2351498	0.1533750	0.1252500
6000-H-Y	8	0.0859043	0.0688437	0.0683750

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien[5]	0.6445	17	126	0.8503
Brown-Forsythe	0.4625	17	126	0.9649
Levene	1.3255	17	126	0.1873
Bartlett	4.3236	17	-	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob > F
0.4002	17	48.806	0.9789

Exhibit 49. Sodium (AA) Concentrations by Outlet by Tank Level

Means

Summary of Fit

Resquare 0.09692
 Root Mean Square Error 0.155117
 Mean of Response 4.531549
 Observations (or Sum Wgts) 144

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	17	0.3328213	0.019578	0.8137
Error	126	3.0317384	0.024081	Prob>F
C Total	143	3.3645597		0.6749

Mean Estimates

Level	number	Mean	Std Error
2000-L-X	8	4.49538	0.05484
2000-L-Y	8	4.68800	0.05484
2500-L-X	8	4.51500	0.05484
2500-L-Y	8	4.52213	0.05484
3000-L-X	8	4.50938	0.05484
3000-L-Y	8	4.52360	0.05484
3500-L-X	8	4.61800	0.05484
3500-L-Y	8	4.59875	0.05484
4000-H-X	8	4.48575	0.05484
4000-H-Y	8	4.54888	0.05484
4500-H-X	8	4.49513	0.05484
4500-H-Y	8	4.53837	0.05484
5000-H-X	8	4.46800	0.05484
5000-H-Y	8	4.52413	0.05484
5500-H-X	8	4.52800	0.05484
5500-H-Y	8	4.55412	0.05484
6000-H-X	8	4.50063	0.05484
6000-H-Y	8	4.60475	0.05484

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
2000-L-X	8	0.1092837	0.0912812	0.0908750
2000-L-Y	8	0.2438959	0.1892500	0.1677500
2500-L-X	8	0.1329812	0.1040000	0.0970000
2500-L-Y	8	0.2341303	0.1498750	0.1498750
3000-L-X	8	0.1121856	0.0982188	0.0918750
3000-L-Y	8	0.1367187	0.1140000	0.1140000
3500-L-X	8	0.1159359	0.0750000	0.0745000
3500-L-Y	8	0.1380323	0.1105625	0.1062500
4000-H-X	8	0.1190927	0.0960625	0.0877500
4000-H-Y	8	0.1989203	0.1621250	0.1621250
4500-H-X	8	0.1365885	0.1041563	0.0998250
4500-H-Y	8	0.1924919	0.1563750	0.1563750
5000-H-X	8	0.1194057	0.0895000	0.0840000
5000-H-Y	8	0.1721805	0.1405938	0.1313750
5500-H-X	8	0.1223379	0.1032500	0.1032500
5500-H-Y	8	0.1409189	0.1031563	0.1023750
6000-H-X	8	0.1194929	0.1016250	0.1016250
6000-H-Y	8	0.1536097	0.1233125	0.1147500

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[5]	1.0408	17	126	0.4198
Brown-Forsythe	0.6833	17	126	0.8145
Levene	0.7842	17	126	0.7082
Bartlett	0.9427	17	-	0.5220

Welch Anova testing Means Equal, allowing Stds Not Equal

F Ratio	DF Num	DF Den	Prob>F
0.6087	17	46.918	0.8679

Exhibit 50. Titanium Concentrations by Outlet by Tank Level

Means with confid interval

Means

Summary of Fit

Resquare 0.038732
 Root Mean Square Error 0.011487
 Mean of Response 0.179333
 Observations (or Sum Wgts) 144

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	17	0.00083400	0.000037	0.2826	
Error	126	0.01682600	0.000132		0.9978
C Total	143	0.01726000			

Mean Estimates

Level	number	Mean	Std Error
2000-L-X	8	0.179125	0.00406
2000-L-Y	8	0.178250	0.00406
2500-L-X	8	0.179825	0.00406
2500-L-Y	8	0.178750	0.00406
3000-L-X	8	0.177875	0.00406
3000-L-Y	8	0.176000	0.00406
3500-L-X	8	0.177500	0.00406
3500-L-Y	8	0.180000	0.00406
4000-H-X	8	0.178825	0.00406
4000-H-Y	8	0.178375	0.00406
4500-H-X	8	0.179000	0.00406
4500-H-Y	8	0.177875	0.00406
5000-H-X	8	0.179125	0.00406
5000-H-Y	8	0.180000	0.00406
5500-H-X	8	0.180250	0.00406
5500-H-Y	8	0.183000	0.00406
6000-H-X	8	0.181875	0.00406
6000-H-Y	8	0.184750	0.00406

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDiff to Mean	MeanAbsDiff to Median
2000-L-X	8	0.0127104	0.0089062	0.0083750
2000-L-Y	8	0.0099538	0.0073125	0.0072500
2500-L-X	8	0.0129186	0.0086250	0.0086250
2500-L-Y	8	0.0091768	0.0070625	0.0070000
3000-L-X	8	0.0139021	0.0101250	0.0101250
3000-L-Y	8	0.0076532	0.0057500	0.0055000
3500-L-X	8	0.0158825	0.0106250	0.0102500
3500-L-Y	8	0.0094415	0.0080000	0.0077500
4000-H-X	8	0.0153989	0.0102812	0.0098750
4000-H-Y	8	0.0077632	0.0058750	0.0058750
4500-H-X	8	0.0137737	0.0092500	0.0092500
4500-H-Y	8	0.0071201	0.0056250	0.0056250
5000-H-X	8	0.0137888	0.0098563	0.0093750
5000-H-Y	8	0.0099571	0.0077500	0.0077500
5500-H-X	8	0.0137295	0.0100625	0.0097500
5500-H-Y	8	0.0055032	0.0045000	0.0045000
6000-H-X	8	0.0128557	0.0081250	0.0081250
6000-H-Y	8	0.0078672	0.0067500	0.0067500

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien (5)	0.8175	17	126	0.8731
Brown-Forsythe	0.4004	17	126	0.9833
Levene	0.4871	17	126	0.9550
Bartlett	1.1301	17	-	0.3166

Welch Anova Testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob > F
0.5081	17	46.886	0.9357

Exhibit 51. Aluminum, Boron, and Calcium by Tank Level, Mixer Speed, Sampler, and Outlet

Al (wt %) By Level-Mixer-Sampler/Outlet

Means with confid. interval

B (wt %) By Level-Mixer-Sampler/Outlet

Means with confid. interval

Ca (wt %) By Level-Mixer-Sampler/Outlet

Means with confid. interval

Exhibit 52. Copper, Iron, and Magnesium by Tank Level, Mixer Speed, Sampler, and Outlet

Cu (wt %) By Level-Mixer-Sampler/Outlet

Means with confid. interval

Fe (wt %) By Level-Mixer-Sampler/Outlet

Means with confid. interval

Mg (wt %) By Level-Mixer-Sampler/Outlet

Means with confid. interval

Exhibit 53. Manganese, Potassium, and Potassium (AA) by Tank Level, Mixer Speed, Sampler, and Outlet

Mn (wt %) By Level-Mixer-Sampler/Outlet

Means with confid. interval

K (wt %) By Level-Mixer-Sampler/Outlet

Means with confid. interval

K-AA (wt %) By Level-Mixer-Sampler/Outlet

Means with confid. interval

Exhibit 54. Nickel, Sodium, and Sodium (AA) by Tank Level, Mixer Speed, Sampler, and Outlet

Ni (wt %) By Level-Mixer-Sampler/Outlet

Na (wt %) By Level-Mixer-Sampler/Outlet

Na-AA (wt %) By Level-Mixer-Sampler/Outlet

Exhibit 55. Silicon and Titanium by Tank Level, Mixer Speed, Sampler, and Outlet

Si (wt %) By Level-Mixer-Sampler/Outlet

Ti (wt %) By Level-Mixer-Sampler/Outlet

Means with confid. interval

Exhibit 56. Differences Between ICP and AA Results for Potassium for the K and S Standards by Block

Symbols: K = • S = x

Means

Summary of Fit

Resquare 0.727042
 Root Mean Square Error 0.028487
 Mean of Response -0.01242
 Observations (or Sum Wgts) 96

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Model	15	0.17268067	0.011512	14.2057	
Error	80	0.06483087	0.000810		
C Total	95	0.23751133			0.0000

Mean Estimates

Level	number	Mean	Std. Error
1	6	0.000000	0.01162
2	6	-0.17317	0.01162
3	6	-0.00733	0.01162
4	6	-0.025	0.01162
5	6	-0.0125	0.01162
6	6	-0.01383	0.01162
7	6	0.004333	0.01162
8	6	0.004167	0.01162
9	6	-0.001	0.01162
10	6	0.007500	0.01162
11	6	0.008333	0.01162
12	6	-0.0005	0.01162
13	6	-0.00183	0.01162
14	6	0.001000	0.01162
15	6	0.006000	0.01162
16	6	0.004667	0.01162

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDiff to Mean	MeanAbsDiff to Median
1	6	0.0000000	0.0000000	0.0000000
2	6	0.1108340	0.0815000	0.0815000
3	6	0.0037850	0.0048889	0.0043333
4	6	0.0184318	0.0130000	0.0100000
5	6	0.0084321	0.0083333	0.0058333
6	6	0.0120568	0.0087778	0.0078333
7	6	0.0030111	0.0020000	0.0020000
8	6	0.0020412	0.0015000	0.0015000
9	6	0.0008944	0.0006667	0.0006667
10	6	0.0032711	0.0026667	0.0021667
11	6	0.0031885	0.0022222	0.0021667
12	6	0.0005477	0.0005000	0.0005000
13	6	0.0024833	0.0018111	0.0015000
14	6	0.0026833	0.0016667	0.0016667
15	6	0.0014142	0.0010000	0.0010000
16	6	0.0019864	0.0012222	0.0010000

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien (5)	3.1012	15	80	0.0005
Brown-Forsythe	7.1567	15	80	0.0000
Levene	8.2666	15	80	0.0000
Bartlett	.	15	.	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob > F
.	15	.	.1

Exhibit 57.

Percent Relative Difference Between ICP and AA Results for Sodium for the K and S Standards by Block

Symbols: K = • S = x

Means				
Summary of Fit				
Resquare	0.005821			
Root Mean Square Error	3.386437			
Mean of Response	-3.71615			
Observations (or Sum Wgts)	96			
Analysis of Variance				
Source	DF	Sum of Squares	Mean Square	F Ratio
Model	15	1392.2556	92.8170	8.1901
Error	80	908.6320	11.3329	Prob>F
C Total	95	2298.8875		0.0000
Mean Estimates				
Level	number	Mean	Std Error	
1	6	-6.75489	1.3743	
2	6	-2.11724	1.3743	
3	6	-5.54622	1.3743	
4	6	-9.04874	1.3743	
5	6	-4.09425	1.3743	
6	6	-5.51547	1.3743	
7	6	-5.69218	1.3743	
8	6	-8.82130	1.3743	
9	6	-9.42177	1.3743	
10	6	-4.92462	1.3743	
11	6	-1.28084	1.3743	
12	6	0.91816	1.3743	
13	6	-1.43642	1.3743	
14	6	-0.99218	1.3743	
15	6	2.18398	1.3743	
16	6	3.08586	1.3743	

Na 100% (AA-ICP)/ICP By Block #

Means with confid. interval

Tests that the Variances are Equal

Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
1	6	3.439534	2.861818	2.861818
2	6	8.670975	5.744494	5.744494
3	6	0.773247	0.570263	0.542313
4	6	0.968992	0.704716	0.642541
5	6	2.363898	1.813623	1.813623
6	6	1.205975	0.959978	0.959978
7	6	2.690189	1.991982	1.704203
8	6	6.017683	4.726366	4.726366
9	6	5.209539	4.244378	3.703816
10	6	2.227666	1.720336	1.633621
11	6	1.241784	1.040230	1.040230
12	6	1.239823	0.832140	0.832140
13	6	1.313048	0.939110	0.884673
14	6	1.113577	0.886030	0.734854
15	6	1.410270	1.141405	1.078240
16	6	1.468379	1.159606	1.159606

Test	F Ratio	DF Num	DF Den	Prob>F
O'Brien[5]	1.6079	15	80	0.0901
Brown-Forsythe	2.7866	15	80	0.0017
Levene	3.9563	15	80	0.0000
Bartlett	5.2883	15	-	0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob>F
32.4702	15	30 114	0.0000

Exhibit 58. Percent Relative Difference Between ICP and AA Results for Potassium for Tank Samples by Block

Exhibit 59. Percent Relative Difference Between ICP and AA Results for Sodium for Tank Samples by Block

Means**Summary of Fit**

Resquare 0.845747
 Root Mean Square Error 1.73683
 Mean of Response -1.61108
 Observations (or Sum Wgts) 240

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	15	3712.5268	247.502	81.8775
Error	224	677.1146	3.023	Prob > F
C Total	239	4389.6433		0.0000

Mean Estimates

Level	number	Mean	Std. Error
1	15	9.24700	0.44891
2	15	-1.80727	0.44891
3	15	-0.83761	0.44891
4	15	-6.31932	0.44891
5	15	0.05823	0.44891
6	15	-2.40855	0.44891
7	15	-6.42218	0.44891
8	15	-7.92124	0.44891
9	15	-4.62183	0.44891
10	15	0.20363	0.44891
11	15	-3.06617	0.44891
12	15	-1.20953	0.44891
13	15	-2.71708	0.44891
14	15	-1.85141	0.44891
15	15	2.17177	0.44891
16	15	1.62510	0.44891

Tests that the Variances are Equal

Level	Count	Std. Dev	MeanAbsDiff to Mean	MeanAbsDiff to Median
1	15	2.508519	1.922089	1.818945
2	15	1.428782	0.978353	0.979517
3	15	3.239280	2.037029	1.985834
4	15	1.256132	0.981184	0.992508
5	15	1.453487	1.154623	1.098820
6	15	1.532500	1.134003	1.148989
7	15	1.418774	1.100905	1.089517
8	15	2.290818	1.853381	1.525200
9	15	1.193951	0.888761	0.888762
10	15	1.698003	1.240810	1.214801
11	15	0.976282	0.779686	0.774085
12	15	1.557606	1.223876	1.188748
13	15	1.498150	1.159959	1.160268
14	15	1.801917	1.350617	1.354611
15	15	0.968033	0.755630	0.788948
16	15	1.455730	1.214302	1.225345

Test	F Ratio	DF Num	DF Den	Prob > F
O'Brien(5)	1.1100	15	224	0.3483
Brown-Forsythe	1.1394	15	224	0.3223
Levene	1.5826	15	224	0.0798
Bartlett	3.1449	15		0.0000

Welch Anova testing Means Equal, allowing Std's Not Equal

F Ratio	DF Num	DF Den	Prob > F
74.8708	15	84.509	0.0000

Exhibit 60.

Average Weight Percent Solids, Calcines, and Densities by Tank Level, Mixer Speed, Outlet and Sampler for High Weight Percent Solids Test

Mean(Wt% Solids) By Tank Level-Mixer-Sampler/Outlet

Mean(Calcine wt%) By Tank Level-Mixer-Sampler/Outlet

Mean(Density) By Tank Level-Mixer-Sampler/Outlet

Exhibit 61. Aluminum, Boron, and Calcium by Tank Level, Mixer Speed, Sampler, and Outlet for High Weight Percent Solids Test

Al (wt %) By Tank Level-Speed-Sampler/Outlet

Means with confid. interval

B (wt %) By Tank Level-Speed-Sampler/Outlet

Means with confid. interval

Ca (wt %) By Tank Level-Speed-Sampler/Outlet

Means with confid. interval

Exhibit 62. Copper, Iron, and Magnesium by Tank Level, Mixer Speed, Sampler, and Outlet for High Weight Percent Solids Test

Cu (wt %) By Tank Level-Speed-Sampler/Outlet

Means with confid. interval

Fe (wt %) By Tank Level-Speed-Sampler/Outlet

Means with confid. interval

Mg (wt %) By Tank Level-Speed-Sampler/Outlet

Means with confid. interval

Exhibit 63. Manganese, Potassium, and Potassium (AA) by Tank Level, Mixer Speed, Sampler, and Outlet for High Weight Percent Solids Test

Mn (wt %) By Tank Level-Speed-Sampler/Outlet

Means with confid. interval

K (wt %) By Tank Level-Speed-Sampler/Outlet

Means with confid. interval

K-AA (wt %) By Tank Level-Speed-Sampler/Outlet

Means with confid. interval

Exhibit 64. Nickel, Sodium, and Sodium (AA) by Tank Level, Mixer Speed, Sampler, and Outlet for High Weight Percent Solids Test

Ni (wt %) By Tank Level-Speed-Sampler/Outlet

Means with confid. interval

Na (wt %) By Tank Level-Speed-Sampler/Outlet

Means with confid. interval

Na-AA (wt %) By Tank Level-Speed-Sampler/Outlet

Means with confid. interval

Exhibit 65. Silicon and Titanium by Tank Level, Mixer Speed, Sampler, and Outlet for High Weight Percent Solids Test

Si (wt %) By Tank Level-Speed-Sampler/Outlet

Means with confid. interval

Ti (wt %) By Tank Level-Speed-Sampler/Outlet

Means with confid. interval

8.2 Appendix B: Explanation of Smallest Significant Bias

The term smallest significant bias (SSB), introduced in SCS-ASG-93-0036 [7] and used in SCS-93-0062 [1], is the smallest measured bias in absolute value (or if given as a percent, the relative bias) which indicates that the underlying "true" bias between two population means is significantly different from zero.

Once the data representative of the two populations have been obtained, a decision is made regarding the bias between the two population means. This decision is based on the computation of a confidence interval for the "true" but unknown bias from the sample data. If the confidence interval overlaps zero then the "true" bias is said to be "not statistically significant."

The SSB is the radius of this confidence interval; its equation is given by

$$SSB = t_{1-\alpha/2, v} s_{\bar{d}}$$

where $t_{1-\alpha/2, v}$ = upper $(\alpha/2)$ percentile point of the Student's t distribution with v degrees of freedom,

$v = N - 1$ (for a paired comparison based on N pairs)

$v = n_1 + n_2 - 2$ (for non-paired comparison based upon samples of n_1 from population 1 and n_2 from population 2)

$s_{\bar{d}}$ = an estimate of the standard deviation for the estimated average difference between the two population means,

For the paired comparison case with sample pair differences $d_1, d_2, \dots, d_N$ (sample average given by $\bar{d}$),

$$s_{\bar{d}} = \frac{s_d}{\sqrt{N}}$$

where s_d is the sample standard deviation given by

$$s_d = \sqrt{\frac{\sum (d_i - \bar{d})^2}{N-1}}$$

For the non-paired comparison case,

$$s_d = s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

where s_p^2 is the pooled estimate of the common variance given by

$$s_p^2 = \frac{(n_1-1) s_1^2 + (n_2-1) s_2^2}{n_1+n_2-2}$$

s_1^2 and s_2^2 are the sample variances for samples 1 and 2, respectively.

The SSB is included in the 2-sample comparisons of means presented as part of the analyses in this report.

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