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**Project Title/Work Order**
WHC-SD-WM-DP-105, Rev. 0, "45-Day Safety Screen Results for Tank 241-B-112, Auger Samples 95-AUG-014 and 95-AUG-015"

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Document Title: 45-Day Safety Screen Results for Tank 241-B-112, Auger Samples 95-AUG-014 and 95-AUG-015

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WHC-SD-WM-DP-105, REV. 0

ANALYTICAL SERVICES

45-DAY SAFETY SCREEN RESULTS FOR TANK 241-B-112, AUGER SAMPLES, 95-AUG-014 AND 95-AUG-015

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This Document consists of pages 1 through 34.
NARRATIVE
ANALYTICAL SUMMARY

Two auger samples from tank 241-B-112 (B-112) were received in the 222-S Laboratories and underwent safety screening analyses, consisting of differential scanning calorimetry (DSC), thermogravimetric analysis (TGA), and total alpha activity. All results for all analyses (DSC, TGA, and total alpha) were within the safety screening notification limits specified in the Tank Characterization Plan (TCP). No notifications nor secondary analyses were required.

SCOPE

This document serves as the 45-day report deliverable for the tank B-112 auger samples collected on March 16, 1995 (95-AUG-014 and 95-AUG-015). The 222-S Laboratories received, extruded, and analyzed each sample in accordance with the TCP referenced below. Included in this report are the primary safety screening results obtained from the analyses and copies of all DSC and TGA raw data scans as requested per the TCP. Photographs of the auger samples were taken during extrusion and, although not included in this report, are available.

SAMPLE RECEIPT, EXTRUSION, AND SUBSAMPLING

Auger 95-AUG-014

Auger sample 95-AUG-014 was collected from riser 7 of tank B-112 using a 10 inch auger bit. It was received into the 222-S Laboratories on March 17, 1995 at 1145 and extruded on March 27, 1995. A small amount of drainable liquid dripped off the auger (less than 5 mL), but no liquid was recovered for analysis. A gray substance was noticed on flutes 2 and 3 at the top of the auger. These moist solids were subsampled as a possible crust sample (2.02 g recovered in vial #6499). Wet brown solids were subsampled from flutes 4 through 8 (5.70 g subsampled into vial #6633). A total of 7.72 g of material was recovered from this sample. All analyses required per the TCP were conducted. No archive sample was retained since so little material was collected.

Auger 95-AUG-015

Auger sample 95-AUG-015 was collected from riser 3 of tank B-112 using a 10 inch auger bit. It was received into the 222-S Laboratories on March 17, 1995 at 1145 and extruded on March 28, 1995. There was no drainable liquid, and only 2.70 g of material was recovered. This material (brown solids) was scraped from flutes 3 through 8 of the auger and subsampled into vial #6653. All analyses required per the TCP were conducted. No archive sample was retained since so little material was collected.
SAMPLE IDENTIFICATION INFORMATION

Table 1: Sample Identification

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<td>Total alpha</td>
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ANALYTICAL RESULTS

Analytical results are presented in Tables 2 and 3, with the applicable notification limits shaded.

DSC (Energetics Content)

DSC analyses were performed under a nitrogen atmosphere using procedure LA-514-113, Rev. B-1. For samples exhibiting exotherms, dry weight basis results were calculated from the wet weight basis results by using the average percent water by TGA for each sample. Both the wet and dry results are given in Tables 2 and 3.

Sample S95T000357 exhibited a small exotherm (in both sample and duplicate). The average value for the exotherm was 13.80 J/g with a relative percent difference (RPD) of 117%, which failed the precision criterion stated in the TCP. The large RPD is due to the presence of an exotherm near the detection limit and lack of homogenization (as explained below for TGA). The average exotherm is less than 3% of the limit of 481 J/g. A third sample was analyzed for S95T000357, resulting in an exotherm of 18.7 J/g. This result does not appear in Table 2, but is provided in the raw data. No other sample exhibited an exotherm.
TGA (Moisture Content)

Weight percent water was performed under a nitrogen atmosphere using procedure LA-560-112, Rev. A-2. Results for samples S95T000357, S95T000452, and S95T000454 and their duplicates ranged in value from 21% to 47% percent water by weight. These results are all above the safety screening action limit of 17% by weight.

The RPD for sample S95T000357 was 62.4% (results were 40.19 and 21.08). This disparity is most likely due to the fact that the sample was not homogenized. Due to the very small amount of sample available, the material was subsampled directly from the auger into a 20 mL vial without homogenization, which would have resulted in unacceptable sample loss.

A third sample was analyzed for sample S95T000357, yielding a result of 32.75% water by weight. A third sample was also analyzed for S95T000452, yielding a result of 46.96% water by weight. These results do not appear in Table 2, but are provided in the raw data.

Total Alpha Activity

Analyses for total alpha activity were performed on samples S95T000481, S95T000864, and S95T000865. Samples were prepared by fusion using procedure LA-549-141, Rev. C-2, and analyses were performed using procedure LA-508-101, Rev. D-2. A sample duplicate was performed on each sample and a spike was performed on sample S95T000481.

The spike recovery was 71.6%, but no rerun was deemed necessary since the samples were near detection limits and far below the safety screening action limit of 41 uCi/g.

REFERENCE

SAMPLE DATA SUMMARY
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<tr>
<td>S95T000357</td>
<td></td>
<td></td>
<td>DSC Exotherm using Mettler</td>
<td>Joules/g</td>
<td>110.4</td>
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<td>5.7</td>
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<td>117</td>
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<tr>
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<td></td>
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<td>uCi/g</td>
<td>98.65</td>
<td>&lt;6.54e-04</td>
<td>&lt;1.07e-3</td>
<td>&lt;5.04e-4</td>
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<td>n/a</td>
<td>1.00e-03</td>
<td>226.3</td>
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<table>
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<tr>
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<th>R</th>
<th>A#</th>
<th>Analyte</th>
<th>Unit</th>
<th>Standard %</th>
<th>Blank</th>
<th>Result</th>
<th>Duplicate</th>
<th>Average</th>
<th>RPD %</th>
<th>Spk Rec %</th>
<th>Det Limit</th>
<th>Count</th>
<th>Err%</th>
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<tbody>
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<td>% Water by TGA using Mettler</td>
<td>%</td>
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<td>41.65</td>
<td>7.73</td>
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<td>Joules/g</td>
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<td>n/a</td>
<td>0</td>
<td>0</td>
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<td>n/a</td>
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<tr>
<td>S95T000452</td>
<td></td>
<td></td>
<td>DSC Exotherm using Mettler</td>
<td>Joules/g</td>
<td>110.4</td>
<td>n/a</td>
<td>0</td>
<td>0</td>
<td>0.000</td>
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<td>S95T000481</td>
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<td></td>
<td>F Alpha of Digested Solid</td>
<td>uCi/g</td>
<td>98.65</td>
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SEGMENT PORTION: U Upper Half of Segment

SEGMENT PORTION: L Lower Half of Segment
### TABLE 3

<table>
<thead>
<tr>
<th>Sample#</th>
<th>R #</th>
<th>Analyte</th>
<th>Unit</th>
<th>Standard %</th>
<th>Blank</th>
<th>Result</th>
<th>Duplicate</th>
<th>Average</th>
<th>RPD %</th>
<th>Spk Rec %</th>
<th>Det Limit</th>
<th>Count</th>
<th>Err %</th>
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<tr>
<td>S95T000654</td>
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<td>% Water by TGA using Mettler</td>
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<td>99.61</td>
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<td>45.57</td>
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<td>Joules/g Dry</td>
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45 Day Safety Screen Results for B-112

RISER: 3
SEGMENT #: 95-AUG-015
SEGMENT PORTION: W Whole Segment
UNDIGESTED SAMPLE ANALYSES - DIRECT
LABCORE Data Entry Template for Worklist# 922

Analyst: [Signature] Instrument: DSC01 Book #: [ZN14-A]

Method: LA-514-113 Rev/Mod B - 1

Worklist Comment: Please run B-112 DSC under N2. bdv

<table>
<thead>
<tr>
<th>GROUP</th>
<th>PROJECT</th>
<th>S TYPE</th>
<th>SAMPLE#</th>
<th>R A</th>
<th>MATRIX</th>
<th>ACTUAL</th>
<th>FOUND</th>
<th>DL</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
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<td>B-112</td>
<td>1 STD</td>
<td>DSC-01</td>
<td>SOLID</td>
<td>28.45</td>
<td>28.2</td>
<td>N/A</td>
<td>Joules/g</td>
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<tr>
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<td>B-112</td>
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<td>S95T000454 0</td>
<td>DSC-01</td>
<td>SOLID</td>
<td>N/A</td>
<td>D</td>
<td>Joules/g</td>
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</tr>
<tr>
<td>95000036</td>
<td>B-112</td>
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<td>S95T000454 0</td>
<td>DSC-01</td>
<td>SOLID</td>
<td>0</td>
<td>0</td>
<td>N/A</td>
<td>Joules/g</td>
</tr>
</tbody>
</table>

Final page for worklist # 922

Analyst Signature: [Signature] Date: 4/21/95

Verified by: Blandina Valverde 4/24/95

Data Entry Comments: Sample S95T000454 produced two endothermic events at 121.3°C with a delta H of 117.6 J/g and the second at 211.0°C with a delta H of 4.5 J/g.
DSC STD 12N14-A

6.340 mg  Rate: 10.0 °C/min

Integration
Delta H 179 mJ
28.2 J/g
Peak 158.6°C
-12.0 mW

File: 00206.001 DSC METTLER 19-Apr-95
Ident: 0.0 222-S Laboratory
Integration
Delta H 171 mJ
7.4 J/g
Peak 210.9°C
-1.9 mW

Integration
Delta H25092 mJ
1091.7 J/g
Peak 117.3°C
-79.6 mW
LABCORE Data Entry Template for Worklist# 921

Analyst: DWS  Instrument: DSC01  Book #: 12N14-A

Method: LA-514-113 Rev/Mod B-1

Worklist Comment: Please run B-112 DSC under N2. bdv

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<thead>
<tr>
<th>GROUP</th>
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<th>S TYPE</th>
<th>SAMPLE#</th>
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<th>TEST</th>
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<td>STD</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Joules/g</td>
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<tr>
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<td>B-112</td>
<td>2 SAMPLE</td>
<td>S95T000357 0</td>
<td>DSC-01</td>
<td>SOLID</td>
<td>21.9</td>
<td></td>
<td></td>
<td></td>
<td>Joules/g</td>
</tr>
<tr>
<td>95000032</td>
<td>B-112</td>
<td>3 DUP</td>
<td>S95T000357 0</td>
<td>DSC-01</td>
<td>SOLID</td>
<td>5.7</td>
<td>N/A</td>
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<td></td>
<td>Joules/g</td>
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<tr>
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<td>B-112</td>
<td>4 STD</td>
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<td>DSC-01</td>
<td>SOLID</td>
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<td>Joules/g</td>
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<tr>
<td>95000032</td>
<td>B-112</td>
<td>5 DUP2</td>
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<td></td>
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<td>Joules/g</td>
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</table>

Data Entry Comments: S95T000357 produced two endotherms, one at 115.3°C with a delta H of 883.0 J/g, and the second at 258.1°C with a delta H of 96.9 J/g. The Std and Dup2 for S95T000357 was performed later, once the chemist was able to look at the results. Units shown for QC (SPK & STD) may not reflect the actual units, DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code. S95T000452 produced an endotherm of 947.4 J/g with at 115.3°C.
LABCORE Data Entry Template for Worklist# 921

Analyst: M.K. Instrument: DSC01 Book # 12N/14-A

Method: LA-514-113 Rev/Mod B - 

Worklist Comment: Please run B-112 DSC under N2. bdv

<table>
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<th>SAMPLE#</th>
<th>R</th>
<th>A</th>
<th>TEST</th>
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<td>DSC-01</td>
<td>SOLID</td>
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<td>21.9</td>
<td>N/A</td>
<td>Joules/g</td>
</tr>
<tr>
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<td>B-112</td>
<td>3 DUP</td>
<td>S95T000357</td>
<td>0</td>
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<td>DSC-01</td>
<td>SOLID</td>
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<td>N/A</td>
<td>N/A</td>
<td>Joules/g</td>
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<tr>
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<td>B-112</td>
<td>4 SAMPLE</td>
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<td>SOLID</td>
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<td>$8</td>
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<td>Joules/g</td>
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<td>B-112</td>
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<td>SOLID</td>
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<td>$8</td>
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<td>Joules/g</td>
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</tbody>
</table>

Final page for worklist # 921

Analyst Signature Date 4-18-95

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.
DSC STD 12N14-A
6.340 mg
6.0°C/min
Rate: 0.0 °C/min
File: 00195.001
Ident: 0.0
222-S Laboratory

Integration
Delta H 197.0 mj
Peak 158.5°C
-13.4 mW

Signature: [Signature]
Date: 11-18-95
**S95T000357 (DUP) N2**

27.607 mg  
Rate: 10.0 °C/min  
Ident: 0.0  
222-S Laboratory

**Integration**

Delta H 159 mJ  
5.7 J/g  
Peak 443.2°C  
0.8 mW

Delta H 2308 mJ  
83.6 J/g  
Peak 262.3°C  
-12.0 mW

Delta H 22121 mJ  
801.3 J/g  
Peak 115.3°C  
-83.6 mW
S95T000357 (DUP2) N2

24.827 mg

Rate: 10.0 °C/min

File: 00034.001 DSC METTLER 24-Apr-95

Ident: 0.0 222-S Laboratory

Integration
Delta H 2872 mJ

Integration
Delta H 137 mJ

Peak 268.3°C

-11.6 mW

Integration

Delta H 27550 mJ

Peak 123.3°C

-81.3 mW
Integration
Delta H25850 mJ
947.4 J/g
Peak 115.3°C
-84.1 mW
**LABCORE Data Entry Template for Worklist# 929**

**Analyst:** DWS  **Instrument:** TGA01  **Book #** 4218A

**Method:** LA-560-112 Rev/Mod  A-2

**Worklist Comment:** Please run B-112 TGA under N2. bdv

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<th>DL</th>
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<td>TGA-01</td>
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</tr>
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<td>2 SAMPLE</td>
<td>B-112</td>
<td>95T0000357</td>
<td>0</td>
<td>TGA-01</td>
<td>SOLID</td>
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<td>57.62</td>
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<td>%</td>
</tr>
<tr>
<td>3 DUP</td>
<td>B-112</td>
<td>95T0000357</td>
<td>0</td>
<td>TGA-01</td>
<td>SOLID</td>
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<td>21.09</td>
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<td>95T0000452</td>
<td>0</td>
<td>TGA-01</td>
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<td>43.36</td>
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<td>7 DUP2</td>
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<td>8 DUP2</td>
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<td>SOLID</td>
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<td>46.96</td>
<td>N/A</td>
<td>%</td>
</tr>
</tbody>
</table>

**Final page for worklist # 929**

See attached for signatures.

Analyst Signature: [Signature]  Date: 4/25/95

Verified by Blanca Valenzuela  4/25/95

**Data Entry Comments:**

The DUP2 for samples 95T0000357 and 95T0000452 were run first on the day after the other samples. Once the chemist was able to look at the results.

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.
LABCORE Data Entry Template for Worklist# 929

**Analyst:** Ms S  
**Instrument:** TGA01  
**Book #:** 42W8-A

**Method:** LA-560-112 Rev/Mod 4-2

**Worklist Comment:** Please run B-112 TGA under N2. bdv

<table>
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<th>PROJECT</th>
<th>S TYPE</th>
<th>SAMPLE#</th>
<th>R</th>
<th>A</th>
<th>TEST</th>
<th>MATRIX</th>
<th>ACTUAL</th>
<th>FOUND</th>
<th>DL</th>
<th>UNIT</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>STD</td>
<td>TGA-01</td>
<td>SOLID</td>
<td>59.19</td>
<td>57.67</td>
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<td>91%</td>
<td>41%</td>
<td></td>
<td></td>
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<tr>
<td>95000032 B-112</td>
<td>2 SAMPLE</td>
<td>S95T000357</td>
<td>0</td>
<td>TGA-01</td>
<td>SOLID</td>
<td>N/A</td>
<td>40.19</td>
<td>91%</td>
<td>41%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>95000032 B-112</td>
<td>3 DUP</td>
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<td>SOLID</td>
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<td>0</td>
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<td>SOLID</td>
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<td>40.04</td>
<td>43.26</td>
<td>N/A</td>
<td></td>
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</tr>
<tr>
<td>95000032 B-112</td>
<td>5 DUP</td>
<td>S95T000452</td>
<td>0</td>
<td>TGA-01</td>
<td>SOLID</td>
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<td>40.04</td>
<td>43.26</td>
<td>N/A</td>
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<td></td>
</tr>
</tbody>
</table>

**Final page for worklist # 929**

**Analyst Signature** Ms S  
**Date** 4-18-95

Data Entry Comments:

S95T000357 has a second weight loss step of 3.11% at 269°C, duplicate has 4.49% at 270°C. The sample must be non-homogeneous.

---

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.
TGA STD 42N8-A
18.076 mg
Rate: 10.0 °C/min

Step Analysis
Height: 10.42 mg
-57.62%
ResiC: 7.66 mg
42.38%
Dpeak: 89.2°C

File: 00197.001
TG METTLER 18-Apr-95
Ident: 0.0
222-S Laboratory
Step Analysis
Height: 11.72 mg
-40.19 %
Residual: 17.45 mg
59.81 %
Dpeak: 115.0°C

Step Analysis
Height: -1.00 mg
-3.41 %
Residual: 16.44 mg
56.33 %
Dpeak: 269.0°C
S95T000357 (DUP) N2
37.286 mg  Rate: 10.0 °C/min
Ident: 0.0 222-S Laboratory

Step Analysis
Height -7.86 mg
-21.08 %
ResiC. 29.43 mg
78.92 %
Dpeak 97.0°C

Step Analysis
Height -1.67 mg
-4.49 %
ResiC. 27.75 mg
74.43 %

TG METTLER 18-Apr-95
File: 00201.001
Step Analysis
Height -4.26 mg
-32.75 %
ResiC. 8.75 mg
67.25 %

Step Analysis
Height -1.07 mg
-8.20 %
ResiC. 7.69 mg
59.04 %
Step Analysis
Height: 13.30 mg
ResiC: 19.92 mg
Dpeak: 133.0°C

S95T000452 N2
33.221 mg
Rate: 10.0 °C/min
Ident: 0.0
222-S Laboratory

File: 00203.001 TG METTLER 18-Apr-95
S95T000452 (DUP) N2
36.008 mg
Rate: 10.0 °C/min
Ident: 0.0
222-S Laboratory

Step Analysis
Height: 15.58 mg
-43.26 %
ResiC: 20.43 mg
56.74 %
Dpeak 143.0°C
TGA STD 42NB-A
15.915 mg
Rate: 10.0 °C/min
Ident: 0.0
222-S Laboratory

Step Analysis
Height -9.38 mg
-58.96 %
ResiC. 6.53 mg
41.04 %
Dpeak 78.3 °C

File: 00207.001 TG METTLER 19-Apr-95
S95T000452 (DUP2) N2
17.737 mg Rate: 10.0 °C/min
Ident: 0.0 222-S Laboratory

Step Analysis
Height -8.33 mg
-46.96 %
ResiC. 9.41 mg
53.04 %
Dpeak 103.0°C

File: 00209.001 TG METTLER 19-Apr-95
LABCORE Data Entry Template for Worklist# 930

Analyst: [Signature]  Instrument: TGA01  Book #: 42N8-A

Method: LA-560-112 Rev/Mod A.2

Worklist Comment: Please run B-112 TGA under N2. bdv

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<th>S TYPE</th>
<th>SAMPLE#</th>
<th>R</th>
<th>A</th>
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<th>ACTUAL</th>
<th>FOUND</th>
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<td>TGA-01</td>
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<td>TGA-01</td>
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Final page for worklist # 930

Susie M. Sutton 4-19-95
Analyst Signature Date

Verified by Blandina Valenzuela

Data Entry Comments:

Units shown for QC (SPK & STD) may not reflect the actual units. DL = Detection Limit, S = Worklist Slot Number, R = Replicate Number, A = Aliquot Code.
Step Analysis
Height -9.38 mg
-58.96 %
ResiC. 6.53 mg
41.04 %
Dpeak 78.3°C
Step Analysis
Height: 12.81 mg
- 45.57%
Residue: 15.31 mg
54.43%
Dpeak: 135.0°C