

## **APPENDIX C**

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### **MATERIALS HANDLING FLOWCHARTS AND CALCULATIONS**

The following project files are available by request from the USEPA TOCOR and include backup calculations used in the development of tables and figures in this report.

1. Recon Samples Table.xlsx
2. RAES T033 Bulk Feed XRF Analyzer.xlsx
3. CR Fractionation XRF Analyzer.xlsx
4. CTS Fractionation XRF Analyzer.xlsx
5. QV Fractionation XRF Analyzer.xlsx
6. Treatability Study XRF Analyzer Summary.xlsx
7. CR Mass Balance.xlsx
8. QV Mass Balance.xlsx
9. Pace Sample Compositing Ra 226.xlsx
10. CR Water Results Summary.xlsx
11. CTS Water Results Summary.xlsx
12. QV Water Results Summary.xlsx
13. CR SPLP Summary.xlsx
14. CTS SPLP Summary.xlsx
15. QV SPLP Summary.xlsx
16. CR Fractionation Summary.xlsx
17. CTS Fractionation Summary.xlsx
18. QV Fractionation Summary.xlsx
19. Water and SPLP Comparison.xlsx
20. Disa PSD QAQC.xlsx
21. Process Water QAQC.xlsx
22. RAES T033 Sample Weight Tracking.xlsx

**APPENDIX C-1**  
**OLD CHURCH ROCK MINE SAMPLE TRACKING SHEETS**

**Church Rock Low Concentration Sample Tracking**

**1**

Collected Bulk Material			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-L-Unscreened-01	2.2	51.8	49.6
CR-L-Unscreened-02	2.2	48.8	46.6
<b>Totals</b>	<b>4.4</b>	<b>100.6</b>	<b>96.2</b>

Referenced Documents:  
Attachment B-7

Sample Screening Over 1/4-inch sieve

Material Retained on 1/4-inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-L->1/4-inch-01	2.2	2.6	0.4
<b>Totals</b>	<b>2.2</b>	<b>2.6</b>	<b>0.4</b>

Referenced Documents:  
Attachment B-7

Material Passing 1/4 inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-L-<1/4-inch-01	2.2	45.8	43.6
CR-L-<1/4-inch-02	2.2	54.2	52
<b>Totals</b>	<b>4.4</b>	<b>100</b>	<b>95.6</b>

Referenced Documents:  
Attachment B-7

+1/4-inch Material Crushed

Material Recombined

Continued on Church Rock Low Concentration Sample Tracking 2

Material Pre-Cutting Over 270-mesh 12-inch Screen

Material Passing 270-mesh 12-inch Screen Collected in Drum. Allowed to Settle for ~24 hours

Referenced Documents:  
Attachment B-7

Material Retained on 270-mesh Screen Placed in tin foil and stainless pans for quick drying and processing

Referenced Documents:  
Attachment B-7

Samples Collected from Drums			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-L-0-F-01	2.2	41.8	39.6
CR-L-0-F-02	2.2	39.8	37.6
CR-L-0-F-03	2.2	18.8	16.6
CR-L-0-F-WT	1.2	16.0	14.8
<b>Totals</b>	<b>7.8</b>	<b>116.4</b>	<b>108.6</b>

Referenced Documents:  
Attachment B-2A

HPSA Treatment

Referenced Documents:  
Attachment B-7

Continued on Church Rock Low Concentration Sample Tracking 2

Water Discharge into Troughs, Then Discharge On-Site

Fines Samples Dewatered and Dried for Total Mass.

Referenced Documents:  
Attachment B-7  
Attachment C-4

2 HPSA System Rinses with ~30 Gallons of Makeup Water Each

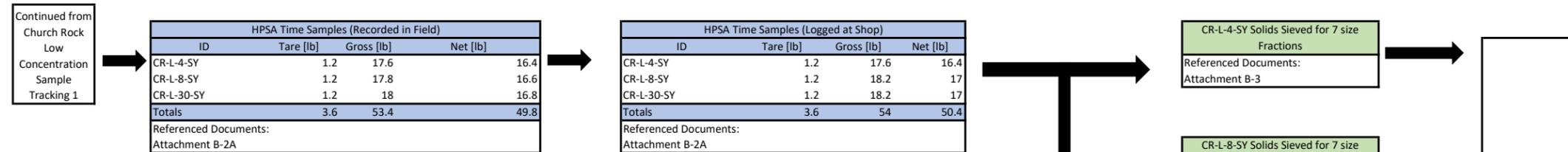
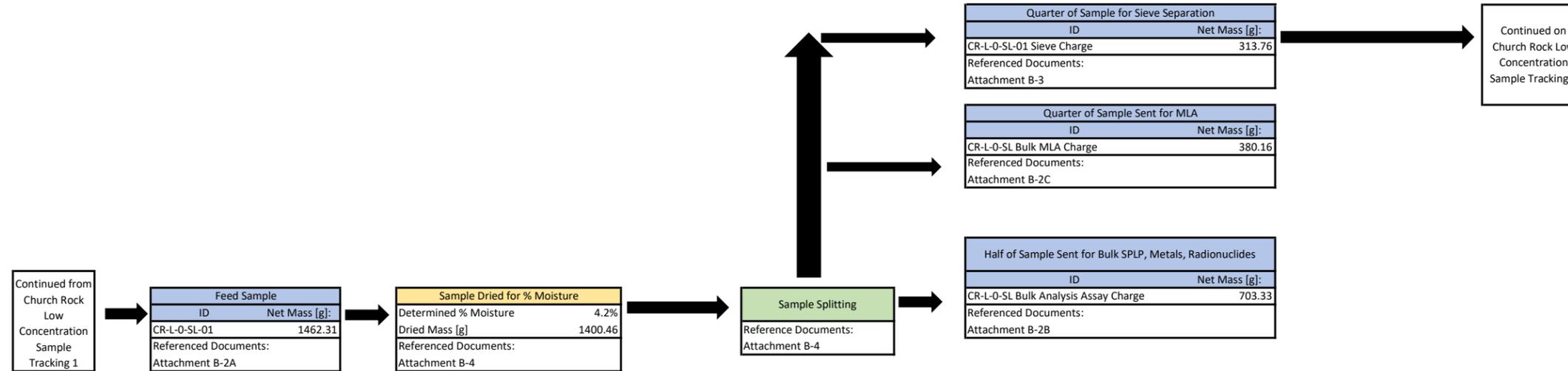
Samples Collected After Drying			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-L-0-F Dried Pans	-	-	14.4
CR-L-0-F Unsettled Water Mass	-	-	6.66 grams

- Notes:
- CoC Chain of Custody
  - CR Church Rock
  - CR-L Church Rock Low
  - HPSA High-Pressure Slurry Ablation
  - lb. Pound
  - PSD particle size distribution
  - SY slurry
  - XRF X-ray fluorescence

Mass Balance Calculated for Proper Mixing of Concentrate Fractions. Fine samples Analyzed with XRF prior to and after mixing with SY PSD -270 fractions.

Referenced Documents:  
Attachment B-7  
Attachment B-8  
Attachment C-4

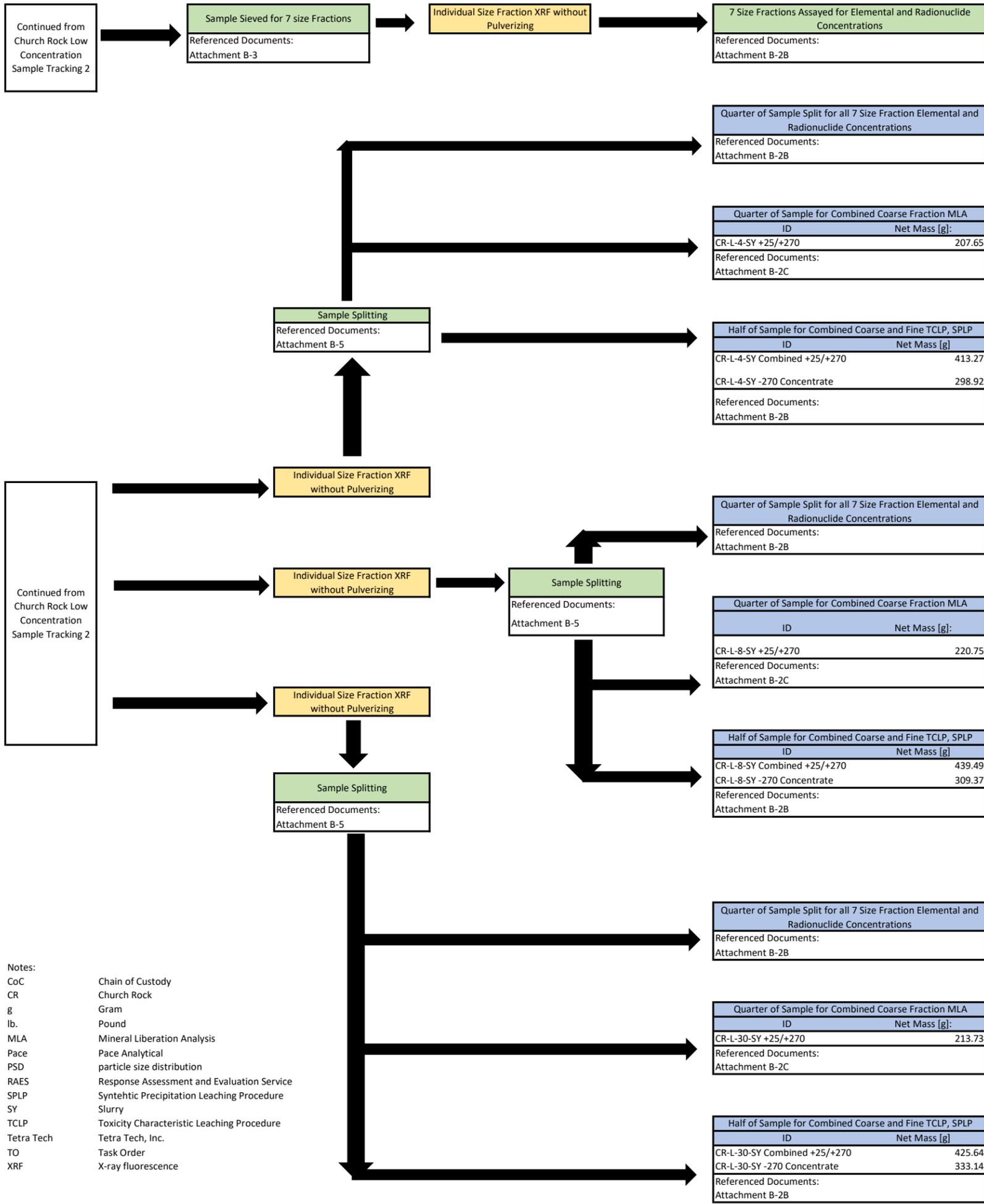
**Church Rock Low Concentration Sample Tracking**  
2



- Notes:
- CoC Chain of Custody
  - CR Church Rock
  - CR-L-WT Church Rock Low Concentration Water Sample
  - g Gram
  - HPSA High-Pressure Slurry Ablation
  - lb Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - QAQC Quality assurance quality control
  - Ra-226 Radium-226
  - RAES Response Assessment and Evaluation Services
  - SL Soil
  - SY Slurry
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - WT Water

Church Rock Low Concentration Sample Tracking

3



- Notes:
- CoC Chain of Custody
  - CR Church Rock
  - g Gram
  - lb. Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - RAES Response Assessment and Evaluation Service
  - SPLP Synthetic Precipitation Leaching Procedure
  - SY Slurry
  - TCLP Toxicity Characteristic Leaching Procedure
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - XRF X-ray fluorescence

**Church Rock Medium Concentration Sample Tracking**

**1**

Collected Bulk Material			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-M-Unscreened-01	2.2	61.2	59
CR-M-Unscreened-02	2.4	55.8	53.4
<b>Totals</b>	<b>4.6</b>	<b>117</b>	<b>112.4</b>

Referenced Documents:  
Attachment B-7

Sample Screening Over 1/4-inch sieve

Material Retained on 1/4-inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-M->1/4-inch-01	2.2	4.2	2
<b>Totals</b>	<b>2.2</b>	<b>4.2</b>	<b>2</b>

Referenced Documents:  
Attachment B-7

Material Passing 1/4 inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-M-<1/4-inch-01	2.2	54.2	52
CR-M-<1/4-inch-02	2.2	60	57.8
<b>Totals</b>	<b>4.4</b>	<b>114.2</b>	<b>109.8</b>

Referenced Documents:  
Attachment B-7

+1/4-inch Material Crushed

Material Recombined

Continued on Church Rock Medium Concentration Sample Tracking 2

Material Pre-Cutting Over 270-mesh 12-inch Screen

Material Passing 270-mesh 12-inch Screen Collected in Drum. Allowed to Settle for ~24 hours

Referenced Documents:  
Attachment B-7

Material Retained on 270-mesh Screen Placed in tin foil and stainless pans for quick drying and processing

Referenced Documents:  
Attachment B-7

Samples Collected from Drums			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-M-0-F-01	2.2	41.8	39.6
CR-M-0-F-02	2.2	39.8	37.6
CR-M-0-F-WT	2.2	18.8	16.6
<b>Totals</b>	<b>6.6</b>	<b>100.4</b>	<b>93.8</b>

Referenced Documents:  
Attachment B-2A

HPSA Treatment

Referenced Documents:  
Attachment B-7

Continued on Church Rock Medium Concentration Sample Tracking 2

Fines Samples Dewatered and Dried for Total Mass.

Referenced Documents:  
Attachment B-7  
Attachment C-4

Water Discharge into Troughs, Then Discharge On-Site

2 HPSA System Rinses with ~30 Gallons of Makeup Water Each

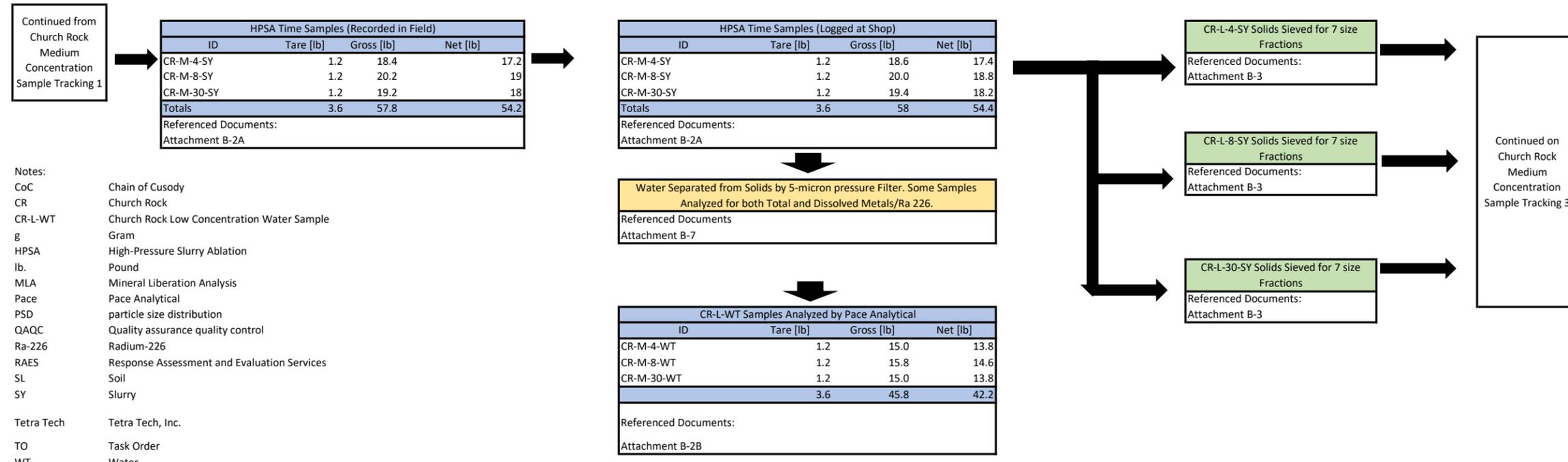
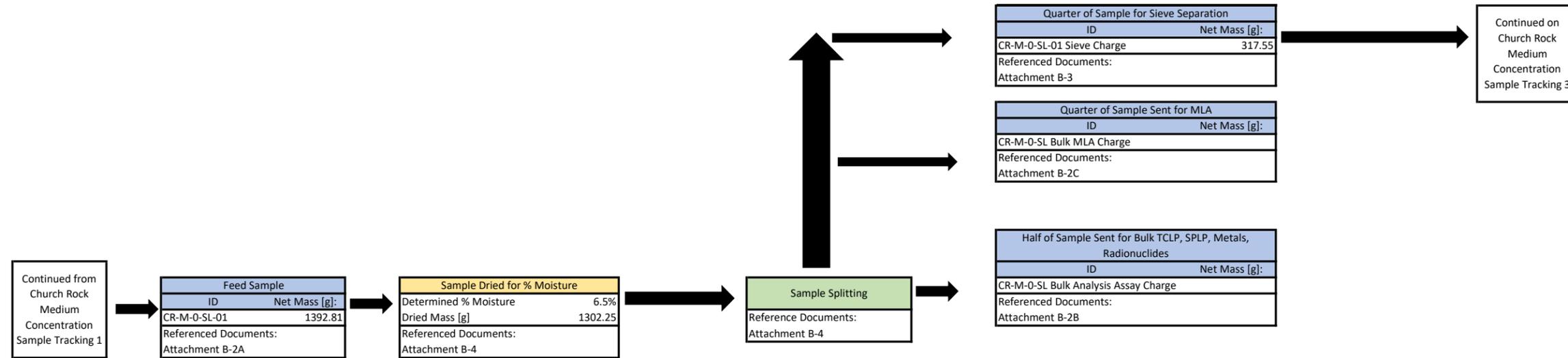
Samples Collected After Drying			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-M-0-F Dried Pans	-	-	12.8
CR-M-0-F Unsettled Water Mass	-	-	2.85 grams

- Notes:
- CoC Chain of Custody
  - CR Church Rock
  - CR-L Church Rock Low
  - HPSA High-Pressure Slurry Ablation
  - lb. Pound
  - PSD particle size distribution
  - SY slurry
  - XRF X-ray fluorescence

Mass Balance Calculated for Proper Mixing of Concentrate Fractions. Fine samples Analyzed with XRF prior to and after mixing with SY PSD -270 fractions.

Referenced Documents  
Attachment B-7  
Attachment B-8  
Attachment C-4

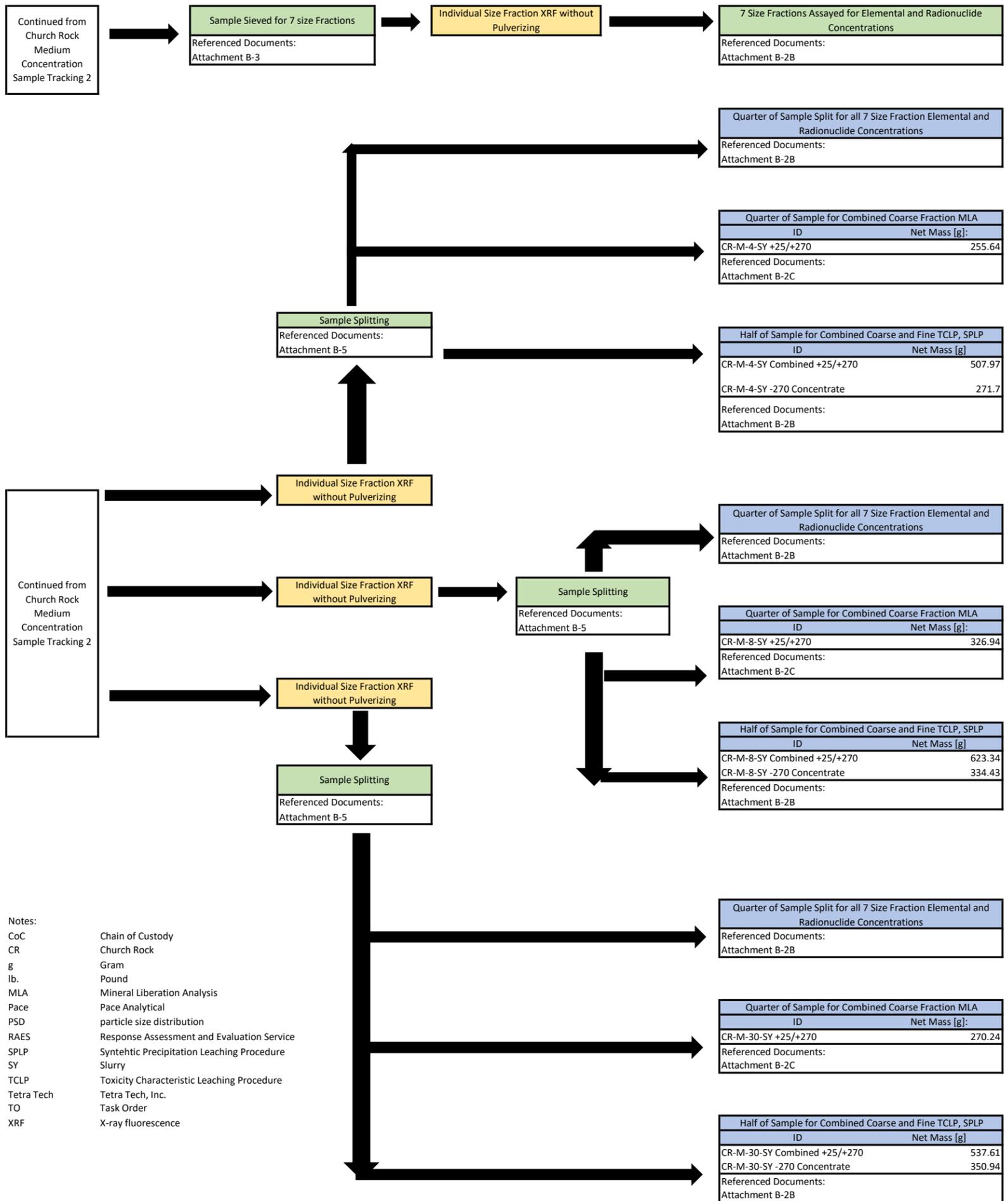
**Church Rock Medium Concentration Sample Tracking**  
2



- Notes:
- CoC Chain of Custody
  - CR Church Rock
  - CR-L-WT Church Rock Low Concentration Water Sample
  - g Gram
  - HPSA High-Pressure Slurry Ablation
  - lb. Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - QAQC Quality assurance quality control
  - Ra-226 Radium-226
  - RAES Response Assessment and Evaluation Services
  - SL Soil
  - SY Slurry
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - WT Water

Church Rock Medium Concentration Sample Tracking

3



- Notes:
- CoC Chain of Custody
  - CR Church Rock
  - g Gram
  - lb. Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - RAES Response Assessment and Evaluation Service
  - SPLP Synthetic Precipitation Leaching Procedure
  - SY Slurry
  - TCLP Toxicity Characteristic Leaching Procedure
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - XRF X-ray fluorescence

**Church Rock High Concentration Sample Tracking**

1

Collected Bulk Material			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-H-Unscreened-01	2.2	64.4	62.2
CR-H-Unscreened-02	2.4	60.2	57.8
<b>Totals</b>	<b>4.6</b>	<b>124.6</b>	<b>120</b>

Referenced Documents:  
Attachment B-7

Sample Screening Over 1/4-inch sieve

Material Retained on 1/4-inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-H->1/4-inch-01	2.2	3.8	1.6
<b>Totals</b>	<b>2.2</b>	<b>3.8</b>	<b>1.6</b>

Referenced Documents:  
Attachment B-7

Material Passing 1/4 inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-H-<1/4-inch-01	2.2	59.2	57
CR-H-<1/4-inch-02	2.2	63.6	61.4
<b>Totals</b>	<b>4.4</b>	<b>122.8</b>	<b>118.4</b>

Referenced Documents:  
Attachment B-7

+1/4-inch Material Crushed

Material Recombined

Material Pre-Cutting Over 270-mesh 12-inch Screen

Material Passing 270-mesh 12-inch Screen Collected in Drum. Allowed to Settle for ~24 hours

Referenced Documents:  
Attachment B-7

Material Retained on 270-mesh Screen Placed in tin foil and stainless pans for quick drying and processing

Referenced Documents:  
Attachment B-7

Samples Collected from Drums			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-H-0-F-01	2.2	41.8	39.6
CR-H-0-F-02	2.2	44.6	42.4
<b>Totals</b>	<b>4.4</b>	<b>86.4</b>	<b>82</b>

Referenced Documents:  
Attachment B-2A

HPSA Treatment

Referenced Documents:  
Attachment B-7

Fines Samples Dewatered and Dried for Total Mass.

Referenced Documents:  
Attachment B-7  
Attachment C-4

Water Discharge into Troughs, Then Discharge On-Site

2 HPSA System Rinses with 30 Gallons of Makeup Water Each

Samples Collected After Drying			
ID	Tare [lb]	Gross [lb]	Net [lb]
CR-H-0-F Dried Pans	-	-	14.0

Mass Balance Calculated for Proper Mixing of Concentrate Fractions. Fine samples Analyzed with XRF prior to and after mixing with SY PSD -270 fractions.

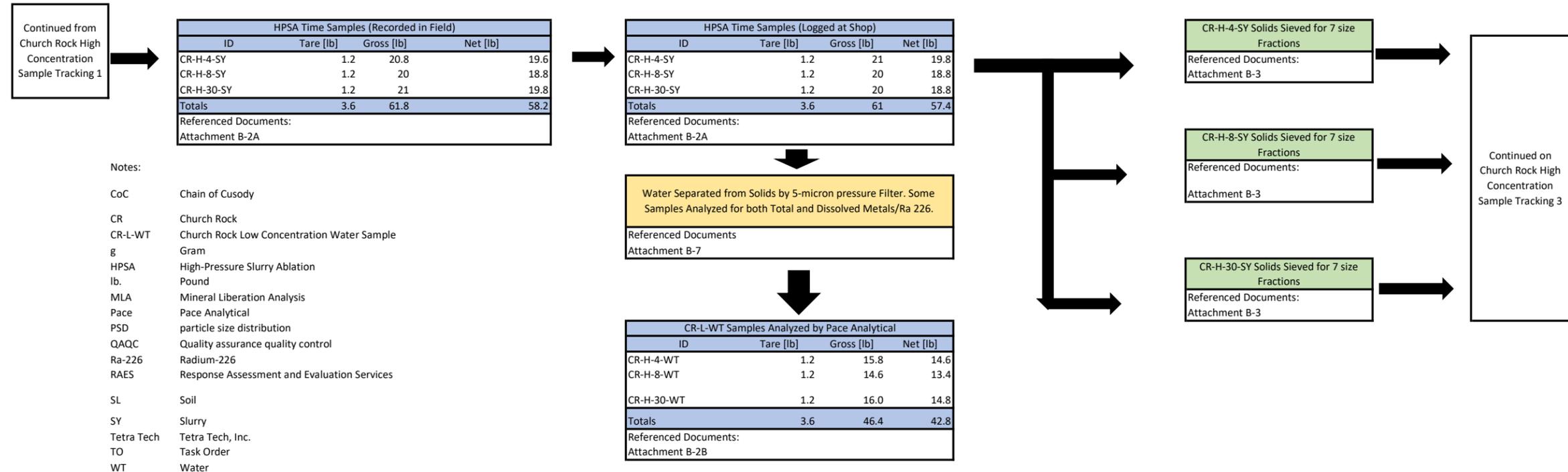
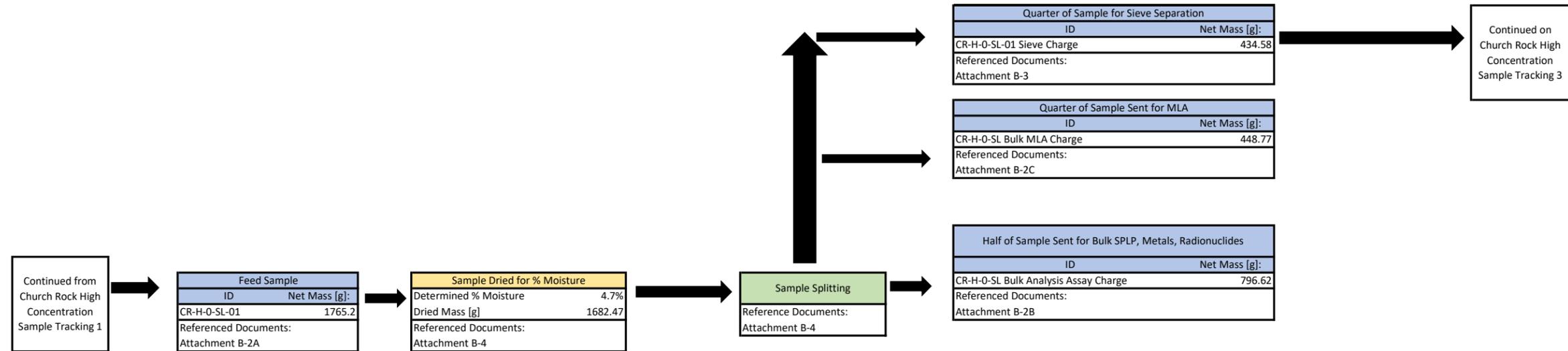
Referenced Documents:  
Attachment B-7  
Attachment B-8  
Attachment C-4

- Notes:
- CoC Chain of Custody
  - CR Church Rock
  - CR-L Church Rock Low
  - HPSA High-Pressure Slurry Ablation
  - lb. Pound
  - PSD particle size distribution
  - SY slurry
  - XRF X-ray fluorescence

Continued on Church Rock High Concentration Sample Tracking 2

Continued on Church Rock High Concentration Sample Tracking 2

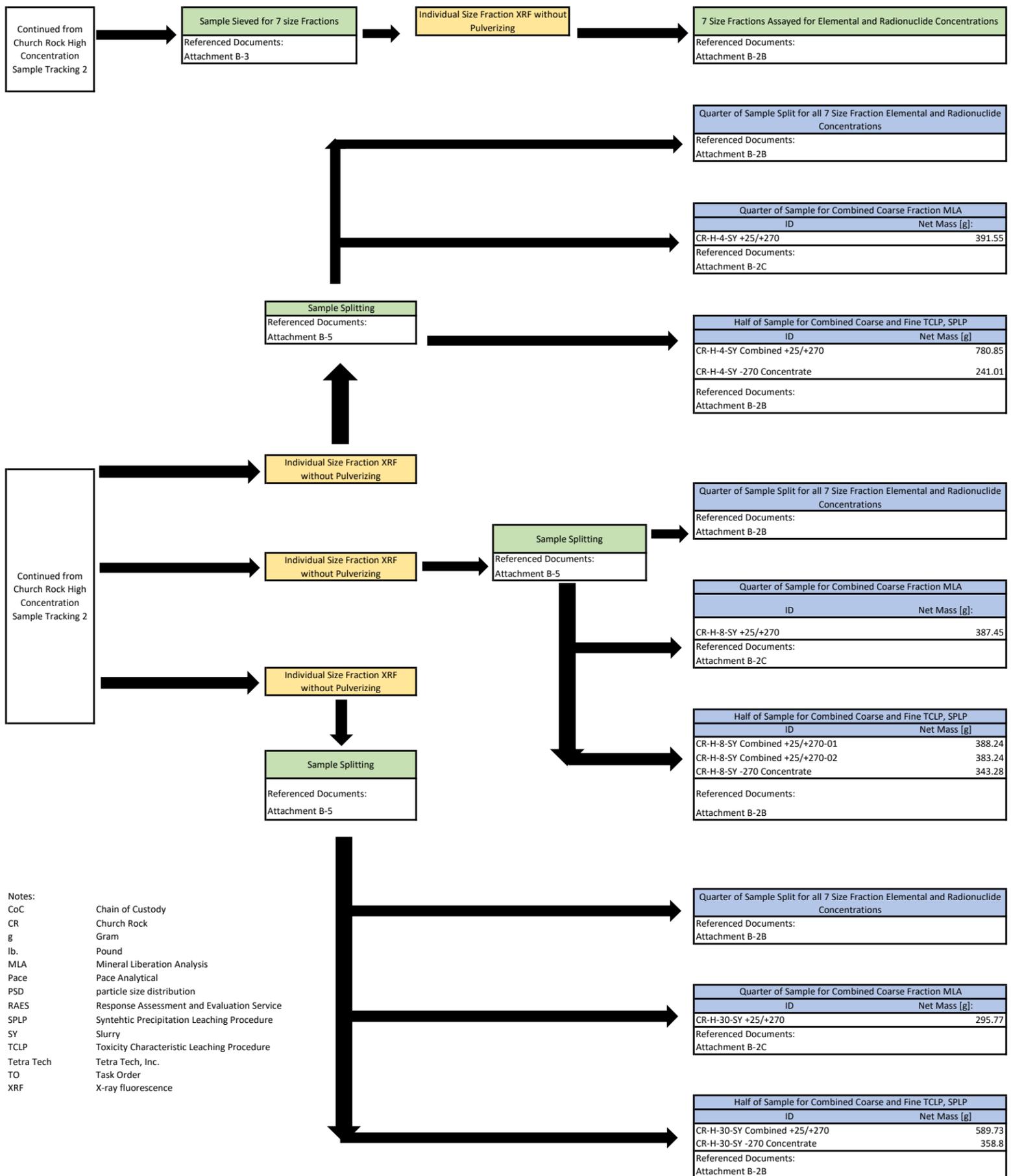
**Church Rock High Concentration Sample Tracking**  
2



Notes:

- CoC Chain of Custody
- CR Church Rock
- CR-L-WT Church Rock Low Concentration Water Sample
- g Gram
- HPSA High-Pressure Slurry Ablation
- lb. Pound
- MLA Mineral Liberation Analysis
- Pace Pace Analytical
- PSD particle size distribution
- QAQC Quality assurance quality control
- Ra-226 Radium-226
- RAES Response Assessment and Evaluation Services
- SL Soil
- SY Slurry
- Tetra Tech Tetra Tech, Inc.
- TO Task Order
- WT Water

Church Rock High Concentration Sample Tracking  
3



**APPENDIX C-2**  
**COVE TRANSFER STATION 2 SAMPLE TRACKING SHEETS**

**Cove Transfer Station Low Concentration Sample Tracking**

1

Collected Bulk Material			
ID	Tare [lb]	Gross [lb]	Net [lb]
CTS-L-Unscreened-01	2.2	54.2	52
CTS-L-Unscreened-02	2.2	58.8	56.6
CTS-L-Unscreened-03	2.2	58.4	56.2
<b>Totals</b>	<b>6.6</b>	<b>171.4</b>	<b>164.8</b>

Referenced Documents:  
Attachment B-7

Sample Screening Over 1/4-inch sieve

Material Retained on 1/4-inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
CTS-L->1/4-inch-01	2.2	7.4	5.2
<b>Totals</b>	<b>2.2</b>	<b>7.4</b>	<b>5.2</b>

Referenced Documents:  
Attachment B-7

Material Passing 1/4 inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
CTS-L-<1/4-inch-01	2.2	55.2	53
CTS-L-<1/4-inch-02	2.4	56.8	54.4
CTS-L-<1/4-inch-03	2.4	52.4	50
<b>Totals</b>	<b>7</b>	<b>164.4</b>	<b>157.4</b>

Referenced Documents:  
Attachment B-7

+1/4-inch Material Crushed

Oversize Sample Collected From Crushed Material			
ID	Tare [g]	Gross [g]	Net [g]
CTS-L-0-+1/4" (As Received)	-	-	1370.14
CTS-L-0-+1/4" (Dried)	-	-	1347.91

Referenced Documents:  
Attachment B-2A  
Attachment B-7

Some of Originally Collected Processed in HPSA. Remainder returned to sample point.			
ID	Tare [lb]	Gross [lb]	Net [lb]
CTS-L-0-SL-01	2.4	53.80	51.40
CTS-L-0-SL-02	2.4	51.00	48.60
<b>Totals</b>	<b>0.00</b>	<b>104.80</b>	<b>100.00</b>

Referenced Documents:  
Attachment B-7

Mass Split 3/4 for Bulk Analysis and 1/4 for PSD and XRF. PSD Sample Not Assayed			
ID	Tare [g]	Gross [g]	Net [g]
CTS-L-0-+1/4" Bulk Assay Charge	-	-	1014.94
CTS-L-0-+1/4" Sieve Charge	-	-	327.21
<b>Totals</b>	<b>-</b>	<b>-</b>	<b>1342.15</b>

Referenced Documents:  
Attachment B-2A  
Attachment B-3  
Attachment B-7

HPSA Treatment

Referenced Documents:  
Attachment B-7

Water Discharge On-Site

2 HPSA System Rinses with ~30 Gallons of Makeup Water Each

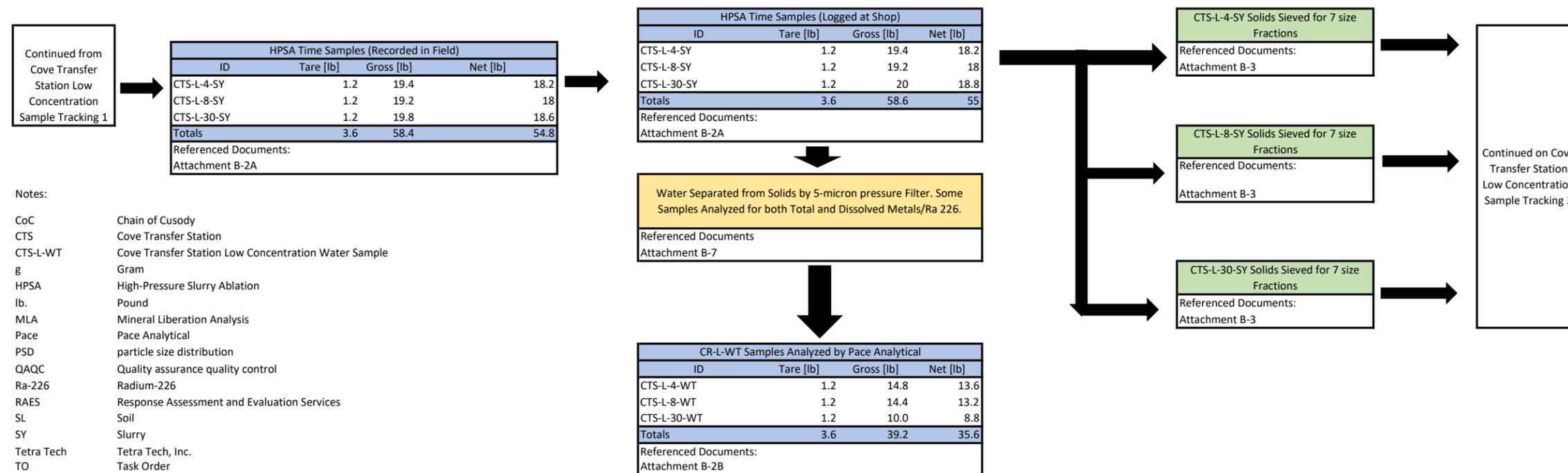
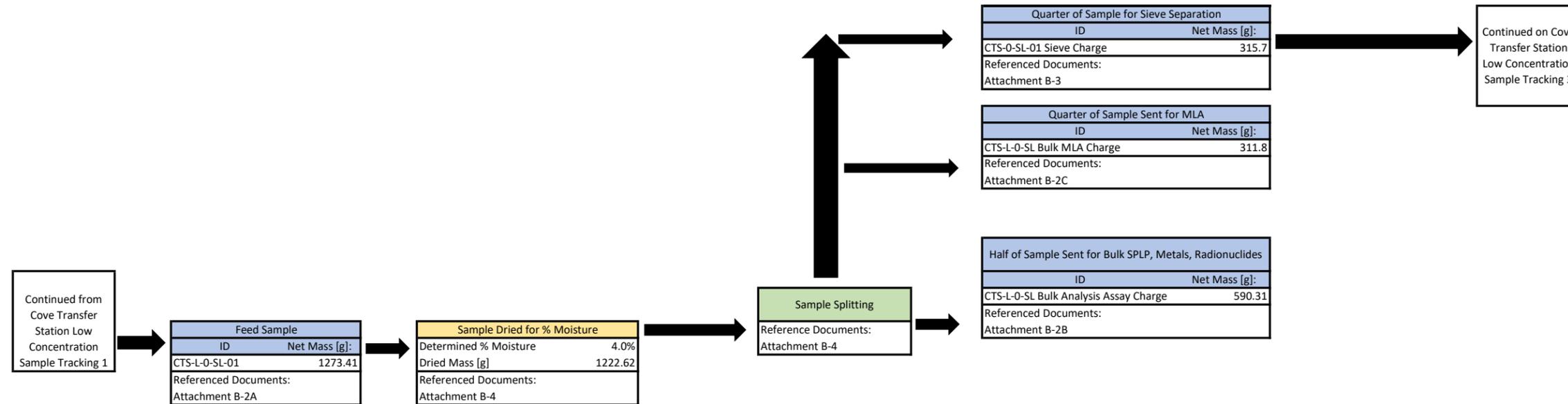
Continued on  
Cove Transfer  
Station Low  
Concentration  
Sample Tracking  
2

Continued on  
Cove Transfer  
Station Low  
Concentration  
Sample Tracking  
2

Notes:

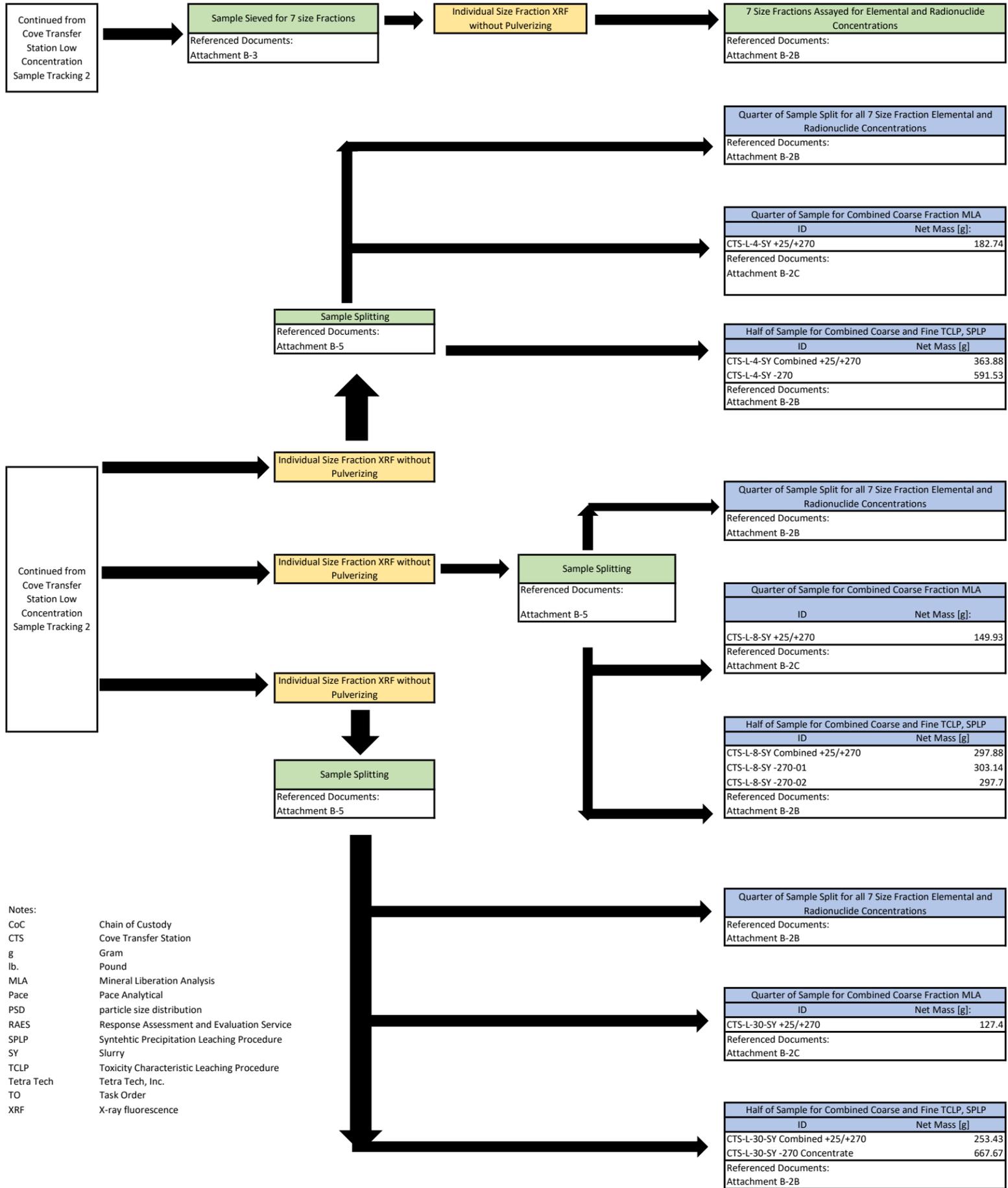
- CoC Chain of Custody
- CTS Cove Transfer Station
- CTS-L Cove Transfer Station Low Concentration
- HPSA High-Pressure Slurry Ablation
- lb. Pound
- PSD particle size distribution
- SY slurry
- XRF X-ray fluorescence

**Cove Transfer Station Low Concentration Sample Tracking**  
2



- Notes:
- CoC Chain of Custody
  - CTS Cove Transfer Station
  - CTS-L-WT Cove Transfer Station Low Concentration Water Sample
  - g Gram
  - HPSA High-Pressure Slurry Ablation
  - lb. Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - QAQC Quality assurance quality control
  - Ra-226 Radium-226
  - RAES Response Assessment and Evaluation Services
  - SL Soil
  - SY Slurry
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - WT Water

Cove Transfer Station Low Concentration Sample Tracking  
3



- Notes:
- CoC Chain of Custody
  - CTS Cove Transfer Station
  - g Gram
  - lb. Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - RAES Response Assessment and Evaluation Service
  - SPLP Synthetic Precipitation Leaching Procedure
  - SY Slurry
  - TCLP Toxicity Characteristic Leaching Procedure
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - XRF X-ray fluorescence

**Cove Transfer Station Medium Concentration Sample Tracking**

1

Collected Bulk Material			
ID	Tare [lb]	Gross [lb]	Net [lb]
CTS-M-Unscreened-01	2.2	54	51.8
CTS-M Unscreened-02	2.2	51.4	49.2
CTS-M-Unscreened-03	2.2	50.2	48
<b>Totals</b>	<b>6.6</b>	<b>155.6</b>	<b>149</b>

Referenced Documents:  
Attachment B-7

Sample Screening Over 1/4-inch sieve

Material Retained on 1/4-inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
CTS-M->1/4-inch-01	2.2	6.2	4
<b>Totals</b>	<b>2.2</b>	<b>6.2</b>	<b>4</b>

Referenced Documents:  
Attachment B-7

Material Passing 1/4 inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
CTS-M-<1/4-inch-01	2.4	52.2	49.8
CTS-M-<1/4-inch-02	2.2	54.6	52.4
CTS-M-<1/4-inch-03	2.4	44.8	42.4
<b>Totals</b>	<b>7</b>	<b>151.6</b>	<b>144.6</b>

Referenced Documents:  
Attachment B-7

+1/4-inch Material Crushed

Oversize Sample Collected From Crushed Material			
ID	Tare [g]	Gross [g]	Net [g]
CTS-M-0+1/4" (As Received)	-	-	1519.86
CTS-M-0+1/4" (Dried)	-	-	1496.6

Referenced Documents:  
Attachment B-2A  
Attachment B-7

Some of Originally Collected Processed in HPSA			
ID	Tare [lb]	Gross [lb]	Net [lb]
CTS-M-0-SL-01	2.2	50.8	48.6
CTS-M-0-SL-02	2.4	49.4	47.0
<b>Totals</b>	<b>4.6</b>	<b>100.2</b>	<b>95.6</b>

Referenced Documents:  
Attachment B-7

Continued on Cove Transfer Station Medium Concentration Sample Tracking 2

Mass Split 3/4 for Bulk Analysis and 1/4 for PSD and XRF. PSD Sample Not Assayed			
ID	Tare [g]	Gross [g]	Net [g]
CTS-M-0+1/4" Bulk Assay Charge	-	-	1088.29
CTS-M-0+1/4" Sieve Charge	-	-	400.96
<b>Totals</b>	<b>-</b>	<b>-</b>	<b>-</b>

Referenced Documents:  
Attachment B-2A  
Attachment B-3  
Attachment B-7

HPSA Treatment

Referenced Documents:  
Attachment B-7

Continued on Cove Transfer Station Medium Concentration Sample Tracking 2

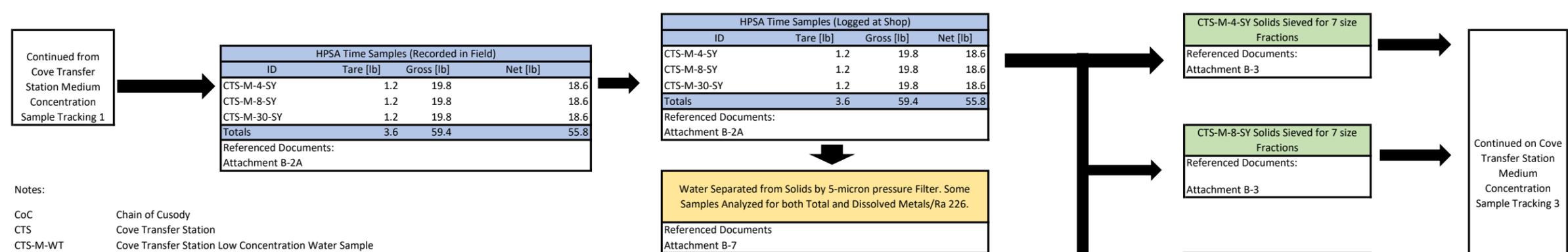
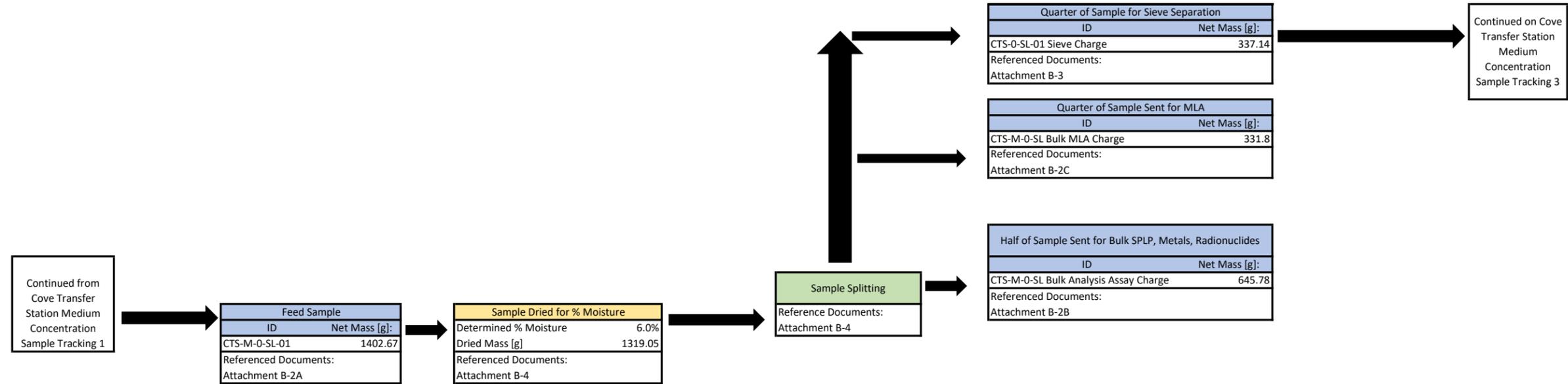
Water Discharge On-Site

2 HPSA System Rinses with ~30 Gallons of Makeup Water Each

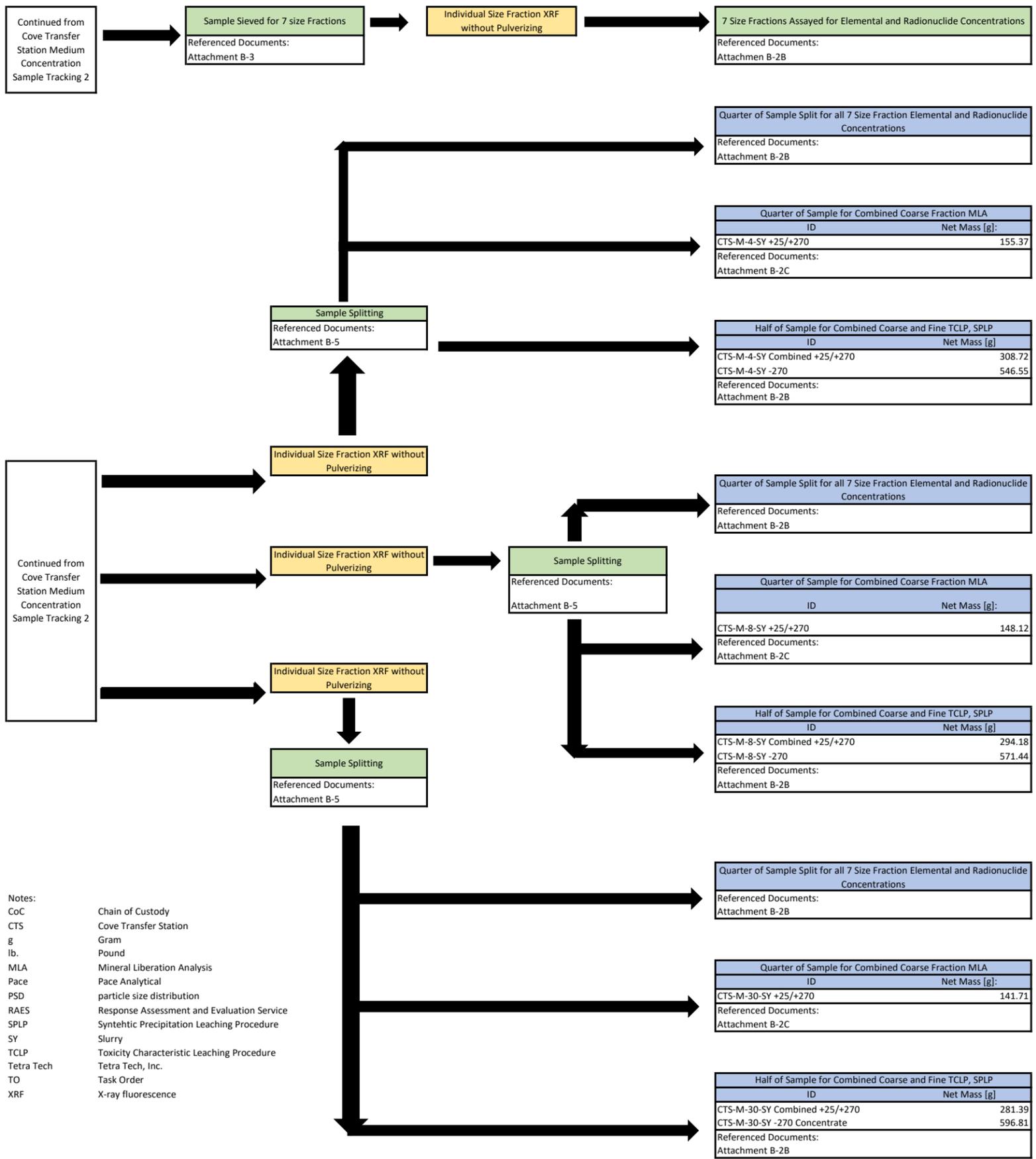
Notes:

- CoC Chain of Custody
- CTS Cove Transfer Station
- CTS-L Cove Transfer Station Low Concentration
- HPSA High-Pressure Slurry Ablation
- lb. Pound
- PSD particle size distribution
- SY slurry
- XRF X-ray fluorescence

**Cove Transfer Station Medium Concentration Sample Tracking**  
2



- Notes:
- CoC Chain of Custody
  - CTS Cove Transfer Station
  - CTS-M-WT Cove Transfer Station Low Concentration Water Sample
  - g Gram
  - HPSA High-Pressure Slurry Ablation
  - lb. Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - QAQC Quality assurance quality control
  - Ra-226 Radium-226
  - RAES Response Assessment and Evaluation Services
  - SL Soil
  - SY Slurry
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - WT Water



- Notes:
- CoC Chain of Custody
  - CTS Cove Transfer Station
  - g Gram
  - lb. Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - RAES Response Assessment and Evaluation Service
  - SPLP Synthetic Precipitation Leaching Procedure
  - SY Slurry
  - TCLP Toxicity Characteristic Leaching Procedure
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - XRF X-ray fluorescence

**Cove Transfer Station High Concentration Sample Tracking**

1

Collected Bulk Material			
ID	Tare [lb]	Gross [lb]	Net [lb]
CTS-H-Unscreened-01	2.2	54.2	52
CTS-H Unscreened-02	2.2	53.4	51.2
CTS-H-Unscreened-03	2.2	56.2	54
<b>Totals</b>	<b>6.6</b>	<b>163.8</b>	<b>157.2</b>
Referenced Documents: Attachment B-7			

Sample Screening Over 1/4-inch sieve

Material Retained on 1/4-inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
CTS-H->1/4-inch-01	2.2	9	6.8
<b>Totals</b>	<b>2.2</b>	<b>9</b>	<b>6.8</b>
Referenced Documents: Attachment B-7			

Material Passing 1/4 inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
CTS-H-<1/4-inch-01	2.2	58.2	56
CTS-H-<1/4-inch-02	2.2	55.8	53.6
CTS-H-<1/4-inch-03	2.2	42.6	40.4
<b>Totals</b>	<b>6.6</b>	<b>156.6</b>	<b>150</b>
Referenced Documents: Attachment B-7			

+1/4-inch Material Crushed

Oversize Sample Collected From Crushed Material			
ID	Tare [g]	Gross [g]	Net [g]
CTS-H-0->1/4" (As Received)	-	-	1384.78
CTS-H-0->1/4" (Dried)	-	-	1377.05
Referenced Documents: Attachment B-2A Attachment B-7			

Some of Originally Collected Processed in HPSA			
ID	Tare [lb]	Gross [lb]	Net [lb]
CTS-H-0-SL-01	2.2	58.4	56.2
CTS-H-0-SL-02	2.2	60.8	58.6
<b>Totals</b>	<b>4.4</b>	<b>119.2</b>	<b>114.8</b>
Referenced Documents: Attachment B-7			

Continued on Cove Transfer Station High Concentration Sample Tracking 2

Mass Split 3/4 for Bulk Analysis and 1/4 for PSD and XRF. PSD Sample Not Assayed			
ID	Tare [g]	Gross [g]	Net [g]
CTS-H-0->1/4" Bulk Assay Charge	-	-	1016.11
CTS-H-0->1/4" Sieve Charge	-	-	353.03
<b>Totals</b>	<b>-</b>	<b>-</b>	<b>1369.14</b>
Referenced Documents: Attachment B-2A Attachment B-3 Attachment B-7			

HPSA Treatment

Continued on Cove Transfer Station High Concentration Sample Tracking 2

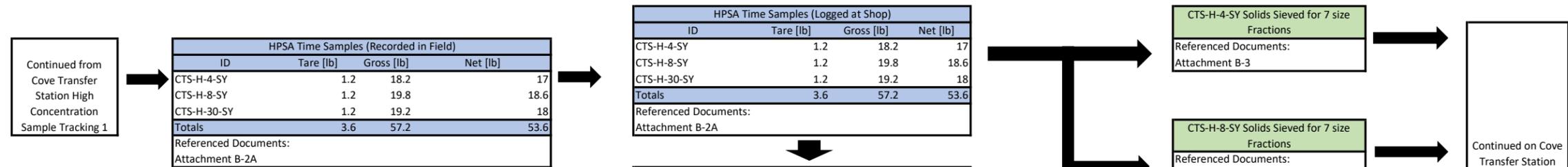
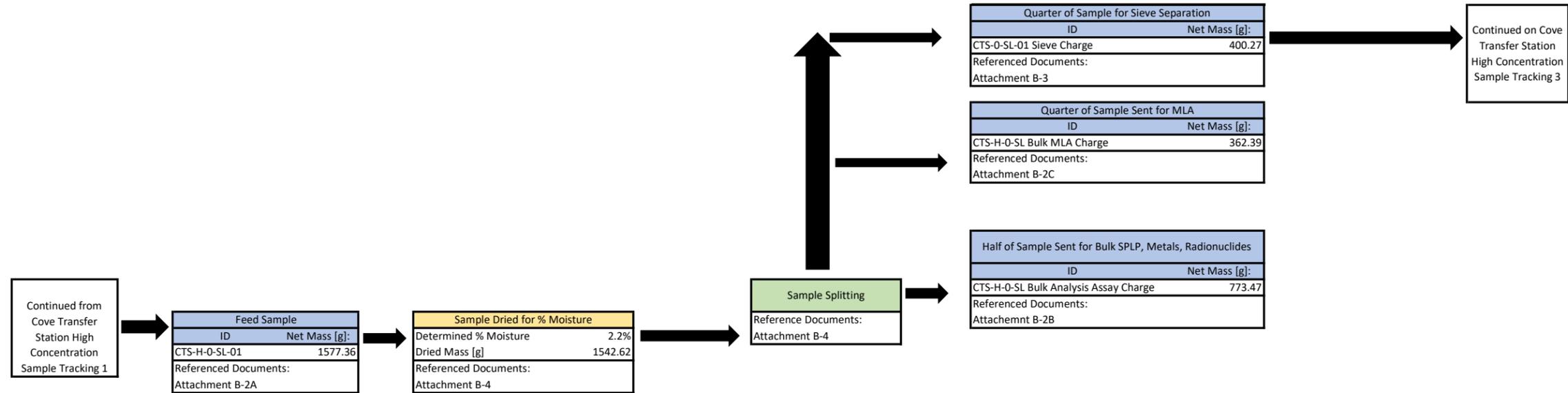
Water Discharge On-Site

2 HPSA System Rinses with ~30 Gallons of Makeup Water Each

Notes:

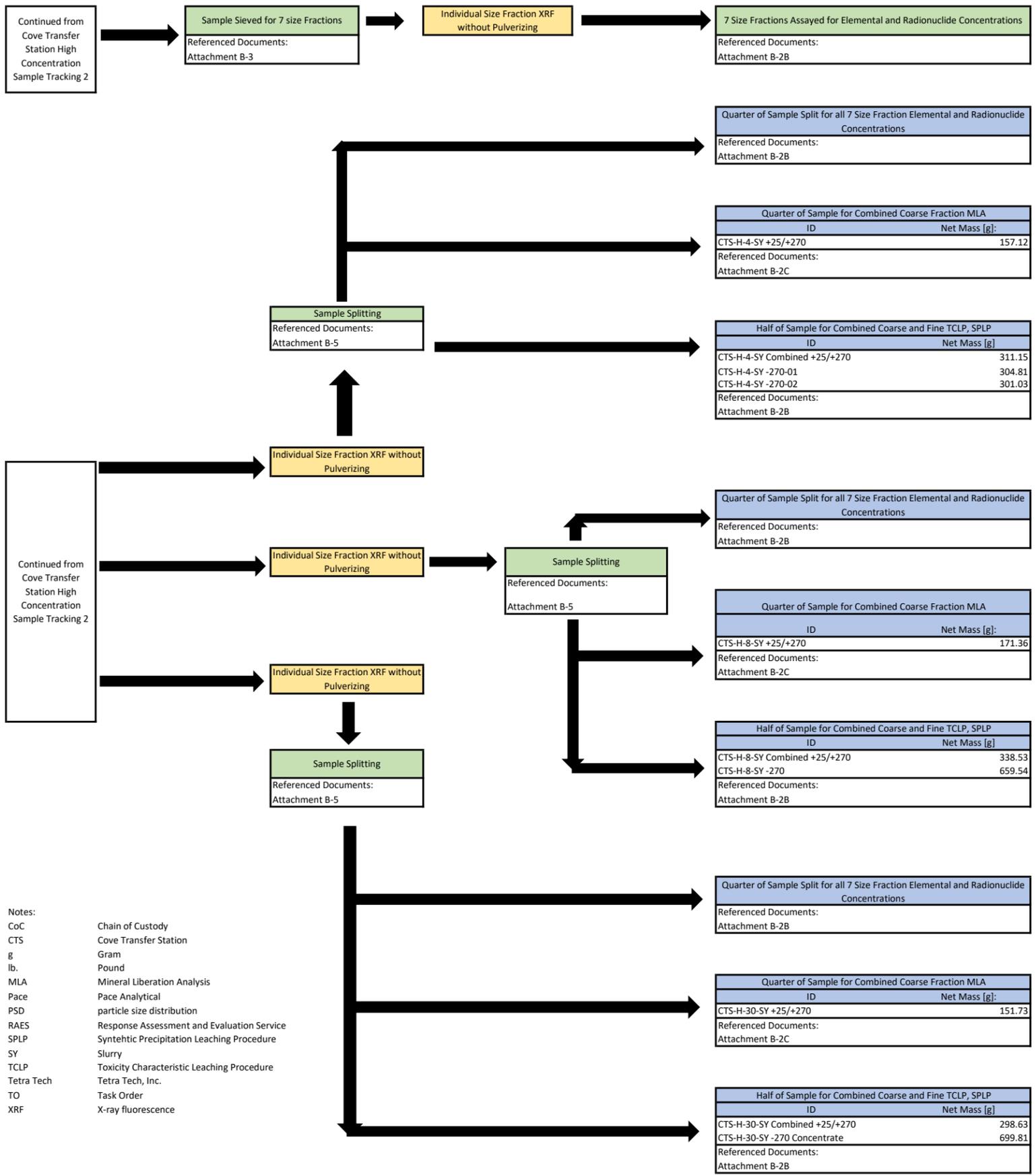
- CoC Chain of Custody
- CTS Cove Transfer Station
- CTS-L Cove Transfer Station Low Concentration
- HPSA High-Pressure Slurry Ablation
- lb. Pound
- PSD particle size distribution
- SY slurry
- XRF X-ray fluorescence

Cove Transfer Station High Concentration Sample Tracking  
2



- Notes:
- CoC Chain of Custody
  - CTS Cove Transfer Station
  - CTS-H-WT Cove Transfer Station Low Concentration Water Sample
  - g Gram
  - HPSA High-Pressure Slurry Ablation
  - lb. Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - QAQC Quality assurance quality control
  - Ra-226 Radium-226
  - RAES Response Assessment and Evaluation Services
  - SL Soil
  - SY Slurry
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - WT Water

Cove Transfer Station High Concentration Sample Tracking  
3



- Notes:
- CoC Chain of Custody
  - CTS Cove Transfer Station
  - g Gram
  - lb. Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - RAES Response Assessment and Evaluation Service
  - SPLP Synthetic Precipitation Leaching Procedure
  - SY Slurry
  - TCLP Toxicity Characteristic Leaching Procedure
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - XRF X-ray fluorescence

**APPENDIX C-3**  
**QUIVIRA CHURCH ROCK 1 MINE SAMPLE TRACKING SHEETS**

**Quivira Low Concentration Sample Tracking**

1

Collected Bulk Material			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-L-Unscreened-01	2.2	61	58.8
QV-L-Unscreened-02	2.2	58.4	56.2
<b>Totals</b>	<b>4.4</b>	<b>119.4</b>	<b>115</b>

Referenced Documents:  
Attachment B-7

Sample Screening Over 1/4-inch sieve

Material Retained on 1/4-inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-L->1/4-inch-01	2.2	6.8	4.6
<b>Totals</b>	<b>2.2</b>	<b>6.8</b>	<b>4.6</b>

Referenced Documents:  
Attachment B-7

Material Passing 1/4 inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-L-<1/4-inch-01	2.2	59.8	57.6
QV-L-<1/4-inch-02	2.2	54.6	52.4
<b>Totals</b>	<b>4.4</b>	<b>114.4</b>	<b>110</b>

Referenced Documents:  
Attachment B-7

+1/4-inch Material Crushed

Material Recombined

Material Pre-Cutting Over 270-mesh 12-inch Screen

Material Passing 270-mesh 12-inch Screen Collected in Drum. Allowed to Settle for ~24 hours

Referenced Documents:  
Attachment B-7

Material Retained on 270-mesh Screen Placed in tin foil and stainless pans for quick drying and processing

Referenced Documents:  
Attachment B-7

Samples Collected from Drums			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-L-0-F-01	2.2	47	44.8
QV-L-0-F-WT	1.2	15.6	14.4
<b>Totals</b>	<b>3.4</b>	<b>62.6</b>	<b>59.2</b>

Referenced Documents:  
Attachment B-2A

HPSA Processing

Referenced Documents:  
Attachment B-7

Fines Samples Dewatered and Dried for Total Mass.

Referenced Documents:  
Attachment B-7  
Attachment C-5

Water Discharge into Troughs, Then Discharge On-Site

2 HPSA System Rinses with ~30 Gallons of Makeup Water Each

Samples Collected After Drying			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-L-0-F Dried Pans	-	-	12.0
QV-L-0-F Unsettled Water Mass	-	-	35.19 grams

Mass Balance Calculated for Proper Mixing of Concentrate Fractions. Fine samples Analyzed with XRF prior to and after mixing with SY PSD -270 fractions.

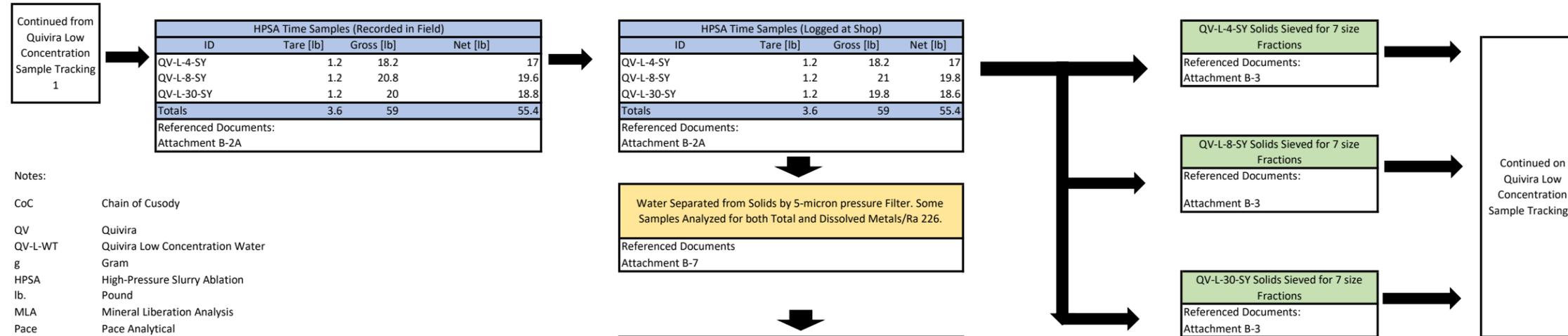
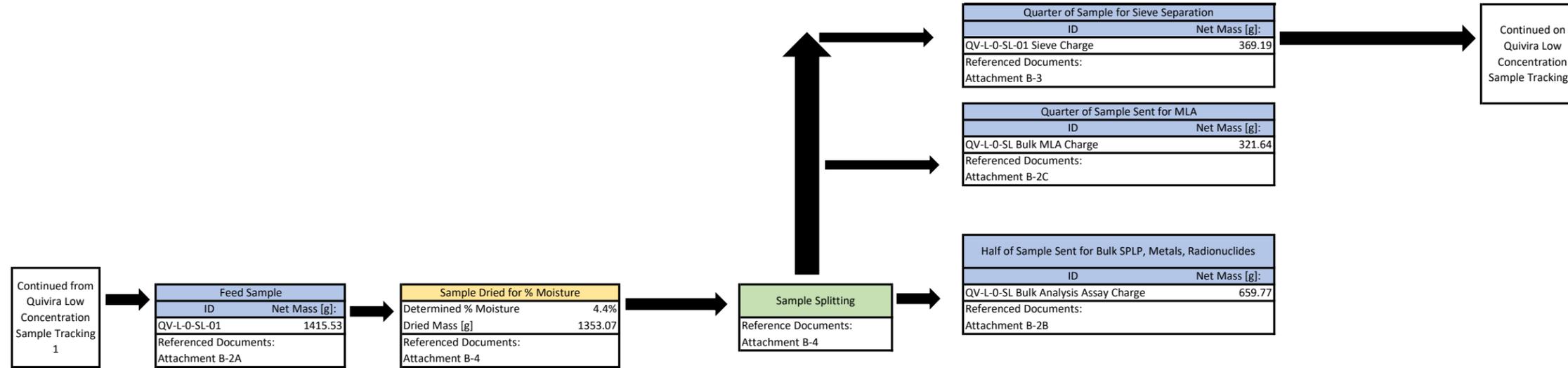
Referenced Documents  
Attachment B-7  
Attachment B-8  
Attachment C-5

- Notes:
- CoC Chain of Custody
  - QV Quivira
  - QV-L Quivira Low Concentration
  - HPSA High-Pressure Slurry Ablation
  - lb. Pound
  - PSD particle size distribution
  - SY slurry
  - XRF X-ray fluorescence

Continued on Quivira Low Concentration Sample Tracking 2

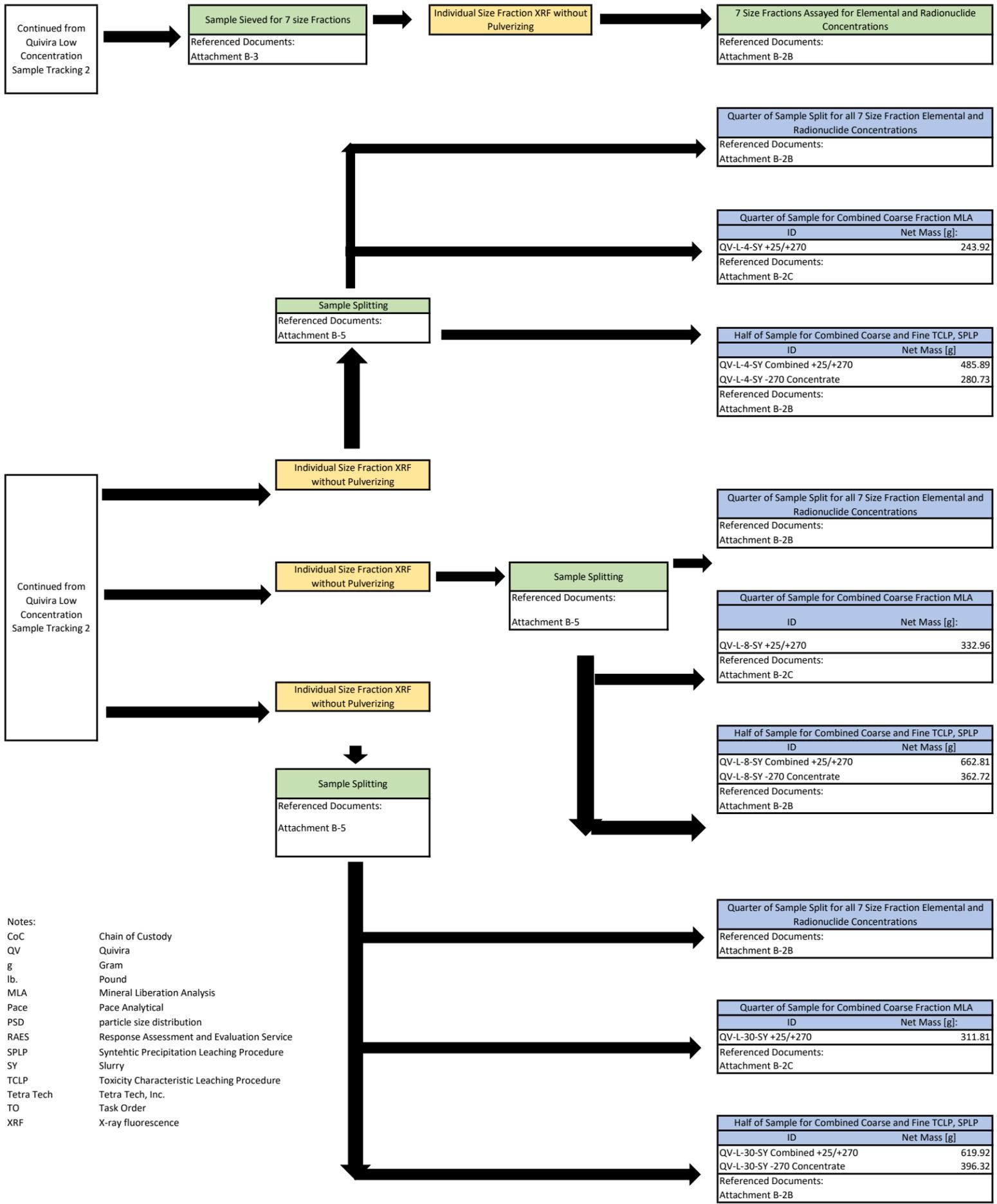
Continued on Quivira Low Concentration Sample Tracking 2

**Quivira Low Concentration Sample Tracking**  
2



- Notes:
- CoC Chain of Custody
  - QV Quivira
  - QV-L-WT Quivira Low Concentration Water
  - g Gram
  - HPSA High-Pressure Slurry Ablation
  - lb. Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - QAQC Quality assurance quality control
  - Ra-226 Radium-226
  - RAES Response Assessment and Evaluation Services
  - SL Soil
  - SY Slurry
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - WT Water

Quivira Low Concentration Sample Tracking  
3



- Notes:
- CoC Chain of Custody
  - QV Quivira
  - g Gram
  - lb. Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - RAES Response Assessment and Evaluation Service
  - SPLP Syntehtic Precipitation Leaching Procedure
  - SY Slurry
  - TCLP Toxicity Characteristic Leaching Procedure
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - XRF X-ray fluorecence

**Quivira Medium Concentration Sample Tracking**

1

Collected Bulk Material			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-M-Unscreened-01	2.2	56.8	54.6
QV-M-Unscreened-02	2.2	55.6	53.4
<b>Totals</b>	<b>4.4</b>	<b>112.4</b>	<b>108</b>

Referenced Documents:  
Attachment B-7

Sample Screening Over 1/4-inch sieve

Material Retained on 1/4-inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-M->1/4-inch-01	2.2	4.6	2.4
<b>Totals</b>	<b>2.2</b>	<b>4.6</b>	<b>2.4</b>

Referenced Documents:  
Attachment B-7

Material Passing 1/4 inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-M-<1/4-inch-01	2.2	58	55.8
QV-M-<1/4-inch-02	2.2	51.8	49.6
<b>Totals</b>	<b>4.4</b>	<b>109.8</b>	<b>105.4</b>

Referenced Documents:  
Attachment B-7

+1/4-inch Material Crushed

Material Recombined

Material Pre-Cutting Over 270-mesh 12-inch Screen

Continued on Quivira Medium Concentration Sample Tracking 2

Material Passing 270-mesh 12-inch Screen Collected in Drum. Allowed to Settle for ~24 hours

Referenced Documents:  
Attachment B-7

Material Retained on 270-mesh Screen Placed in tin foil and stainless pans for quick drying and processing

Referenced Documents:  
Attachment B-7

Samples Collected from Drums			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-M-0-F-01	2.2	49.4	47.2
QV-M-0-F-02	2.2	18	15.8
QV-M-0-F-WT	1.2	18.6	17.4
<b>Totals</b>	<b>5.6</b>	<b>86</b>	<b>80.4</b>

Referenced Documents:  
Attachment B-7

HPSA Processing

Referenced Documents:  
Attachment B-7

Continued on Quivira Medium Concentration Sample Tracking 2

Water Discharge into Troughs, Then Discharge On-Site

Fines Samples Dewatered and Dried for Total Mass.

Referenced Documents:  
Attachment B-7  
Attachment C-5

2 HPSA System Rinses with ~30 Gallons of Makeup Water Each

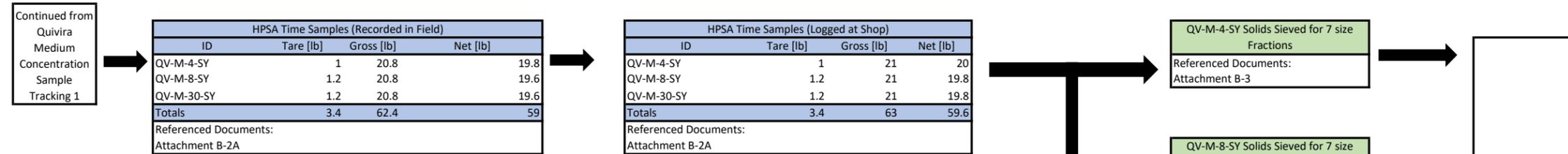
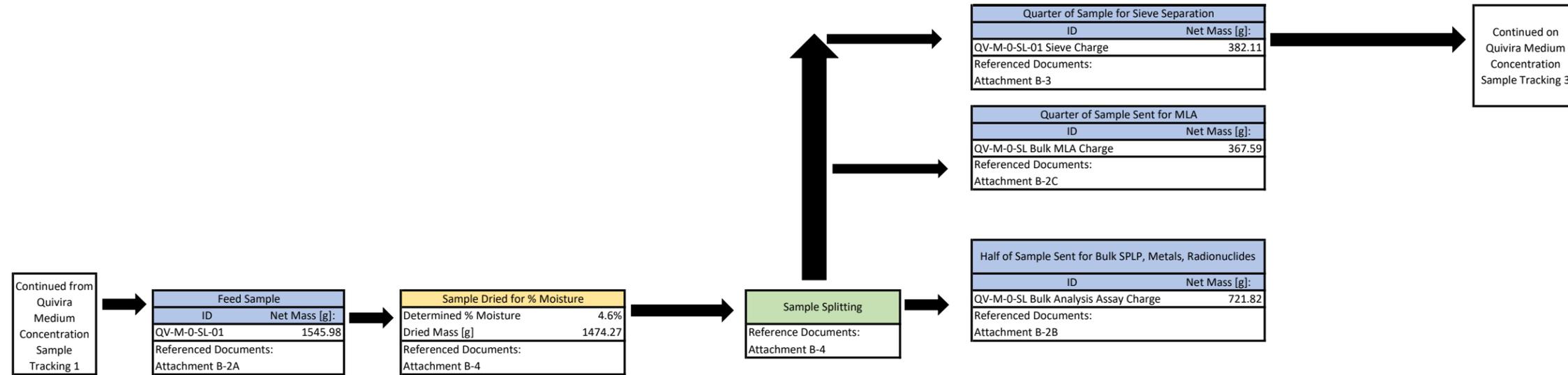
Samples Collected After Drying			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-M-0-F Dried Pans	-	-	13.0
QV-M-0-F Unsettled Water Mass	-	-	74.39 grams

Mass Balance Calculated for Proper Mixing of Concentrate Fractions. Fine samples Analyzed with XRF prior to and after mixing with SY PSD -270 fractions.

Referenced Documents:  
Attachment B-7  
Attachment B-8  
Attachment C-5

- Notes:
- CoC Chain of Custody
  - QV Quivira
  - QV-M Quivira Medium Concentration
  - HPSA High-Pressure Slurry Ablation
  - lb. Pound
  - PSD particle size distribution
  - SY slurry
  - XRF X-ray fluorescence

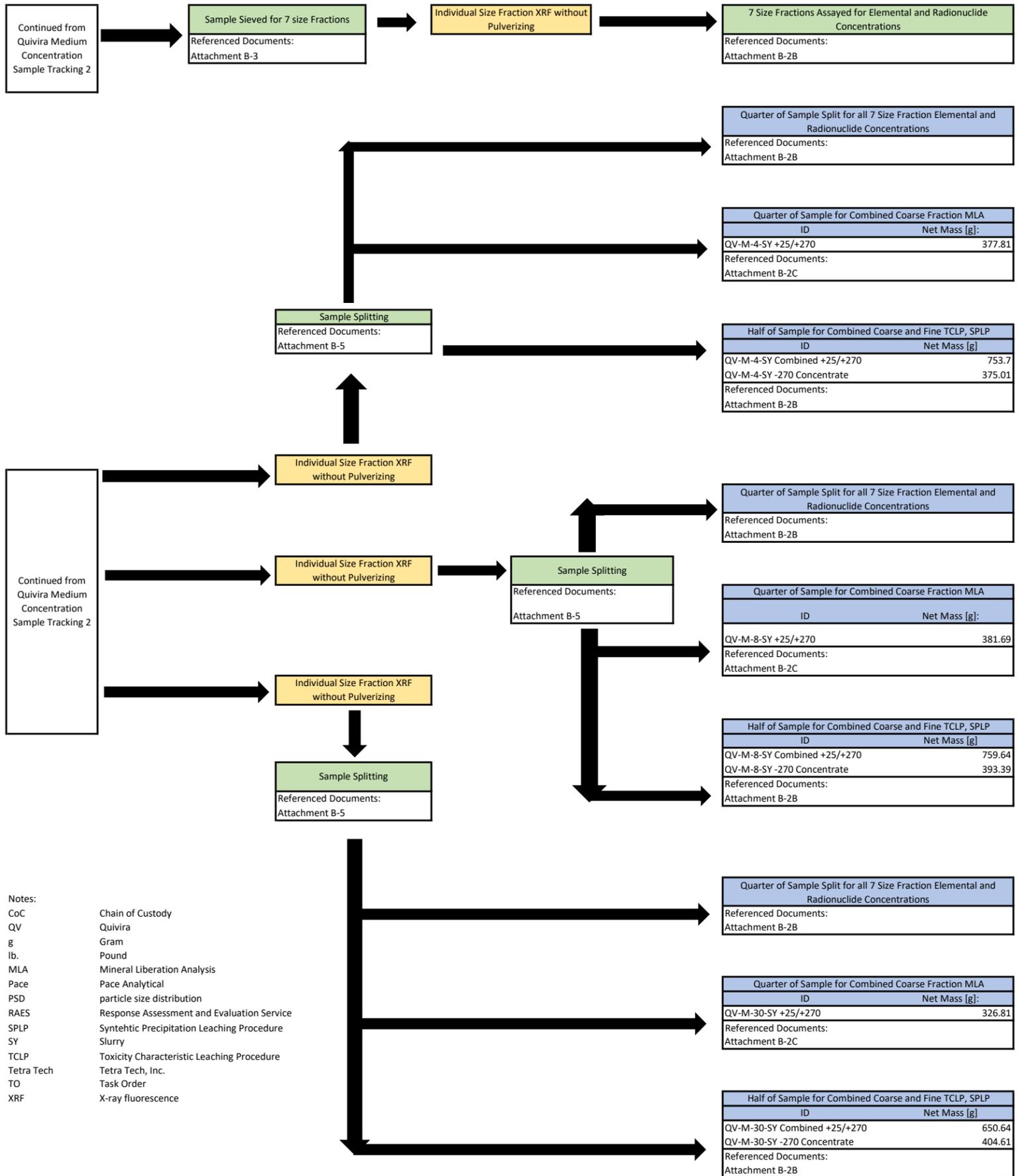
**Quivira Medium Concentration Sample Tracking**  
2



Notes:

- CoC Chain of Custody
- QV Quivira
- QV-M-WT Quivira Medium Concentration Water
- g Gram
- HPSA High-Pressure Slurry Ablation
- lb. Pound
- MLA Mineral Liberation Analysis
- Pace Pace Analytical
- PSD particle size distribution
- QAQC Quality assurance quality control
- Ra-226 Radium-226
- RAES Response Assessment and Evaluation Services
- SL Soil
- SY Slurry
- Tetra Tech Tetra Tech, Inc.
- TO Task Order
- WT Water

**Quivira Medium Concentration Sample Tracking**  
3



- Notes:
- CoC Chain of Custody
  - QV Quivira
  - g Gram
  - lb. Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - RAES Response Assessment and Evaluation Service
  - SPLP Synthetic Precipitation Leaching Procedure
  - SY Slurry
  - TCLP Toxicity Characteristic Leaching Procedure
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - XRF X-ray fluorescence

**Quivira High Sample Concentration Tracking**

**1**

Collected Bulk Material			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-H-Unscreened-01	2.2	68.6	66.4
QV-H-Unscreened-02	2.2	69.2	67
<b>Totals</b>	<b>4.4</b>	<b>137.8</b>	<b>133.4</b>

Referenced Documents:  
Attachment B-7

Sample Screening Over 1/4-inch sieve

Material Retained on 1/4-inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-H->1/4-inch-01	2.2	5.6	3.4
<b>Totals</b>	<b>2.2</b>	<b>5.6</b>	<b>3.4</b>

Referenced Documents:  
Attachment B-7

Material Passing 1/4 inch			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-H-<1/4-inch-01	2.2	62	59.8
QV-H-<1/4-inch-02	2.2	57.8	55.6
QV-H-<1/4-inch-03	2.2	15.6	13.4
<b>Totals</b>	<b>6.6</b>	<b>135.4</b>	<b>128.8</b>

Referenced Documents:  
Attachment B-7

+1/4-inch Material Crushed

Material Recombined

Material Pre-Cutting Over 270-mesh 12-inch Screen

Continued on Quivira High Concentration Sample Tracking 2

Material Passing 270-mesh 12-inch Screen Collected in Drum. Allowed to Settle for ~24 hours

Referenced Documents:  
Attachment B-7

Material Retained on 270-mesh Screen Placed in tin foil and stainless pans for quick drying and processing

Referenced Documents:  
Attachment B-7

Samples Collected from Drums			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-H-0-F-01	2.2	47	44.8
QV-H-0-F-02	2.2	21	18.8
QV-H-0-F-WT	1.2	17.2	16
<b>Totals</b>	<b>5.6</b>	<b>85.2</b>	<b>79.6</b>

Referenced Documents:  
Attachment B-2A

HPSA Processing

Referenced Documents:  
Attachment B-7

Continued on Quivira High Concentration Sample Tracking 2

Water Discharge into Troughs, Then Discharge On-Site

Fines Samples Dewatered and Dried for Total Mass.

Referenced Documents:  
Attachment B-7  
Attachment C-5

2 HPSA System Rinses with ~30 Gallons of Makeup Water Each

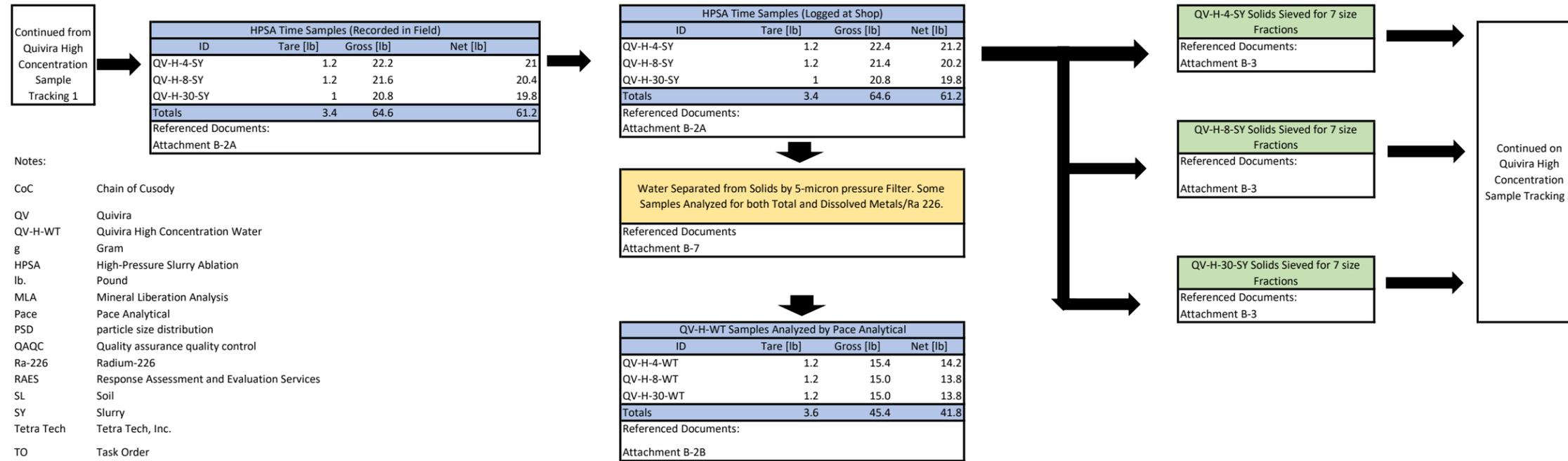
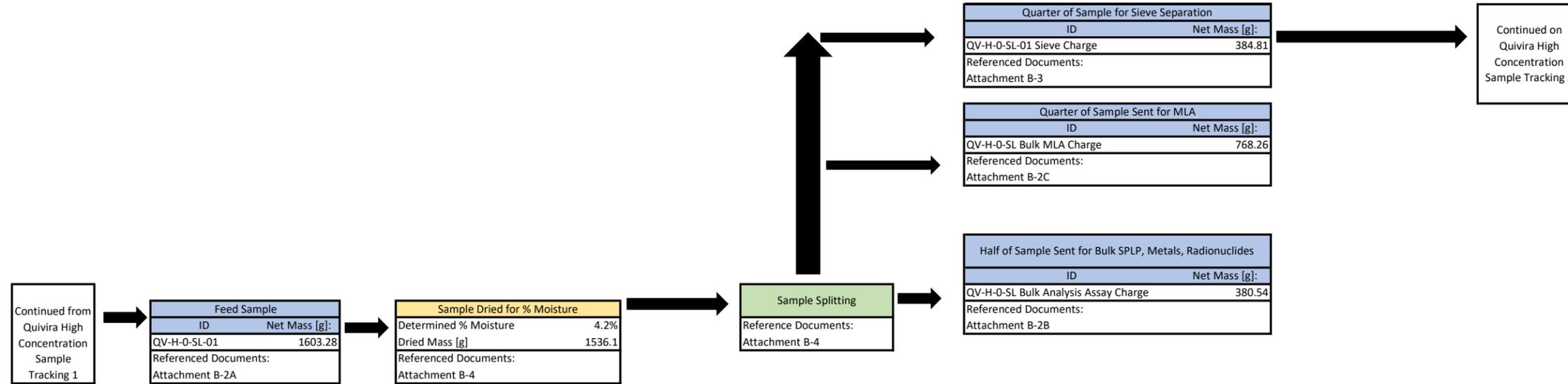
Samples Collected After Drying			
ID	Tare [lb]	Gross [lb]	Net [lb]
QV-H-0-F Dried Pans	-	-	13.0
QV-H-0-F Unsettled Water Mass	-	-	121.64 grams

- Notes:
- CoC Chain of Custody
  - QV Quivira
  - QV-H Quivira High Concentration
  - HPSA High-Pressure Slurry Ablation
  - lb. Pound
  - PSD particle size distribution
  - SY slurry
  - XRF X-ray fluorescence

Mass Balance Calculated for Proper Mixing of Concentrate Fractions. Fine samples Analyzed with XRF prior to and after mixing with SY PSD -270 fractions.

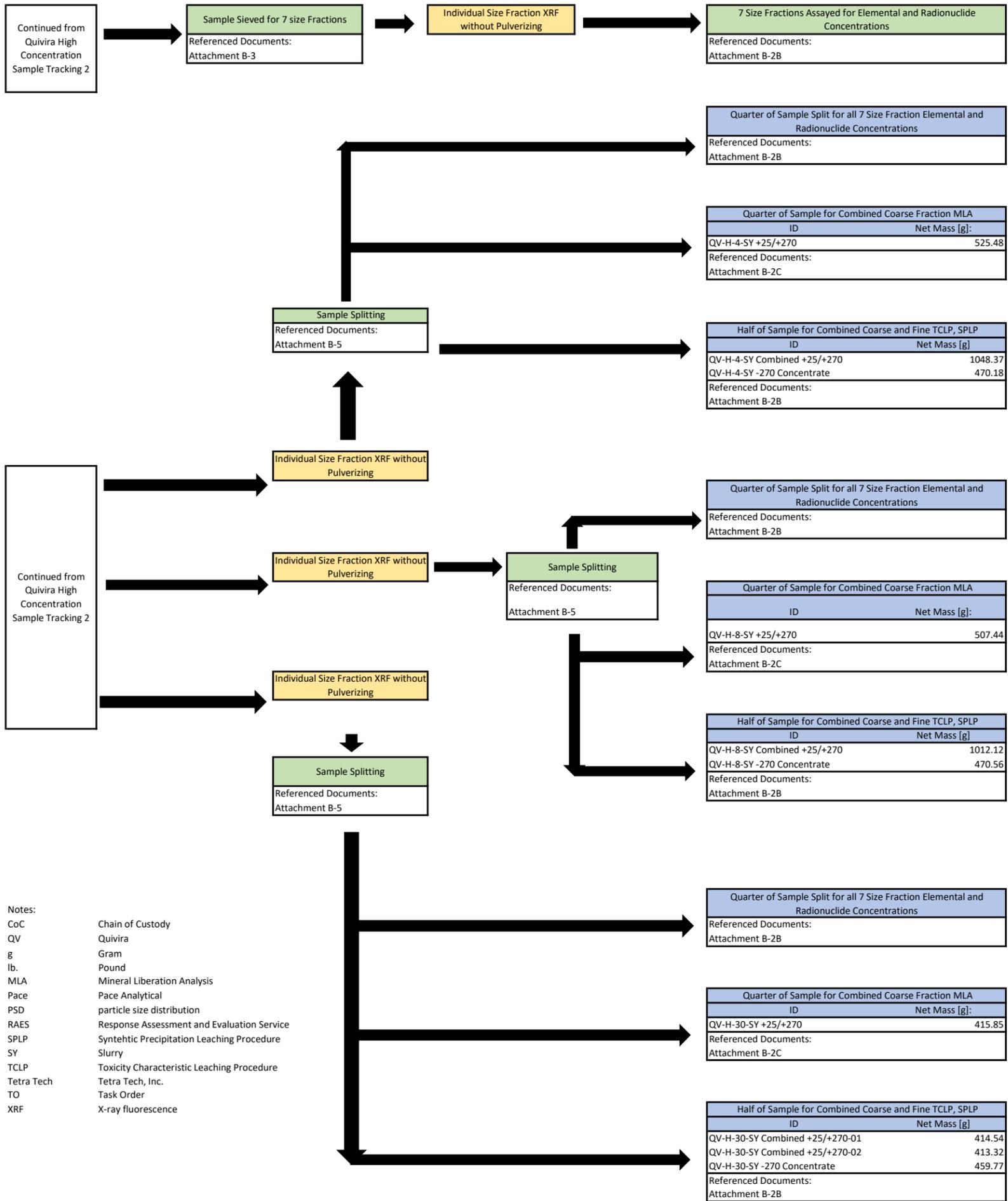
Referenced Documents:  
Attachment B-7  
Attachment B-8  
Attachment C-5

**Quivira High Sample Concentration Tracking**  
2



- Notes:
- CoC Chain of Custody
  - QV Quivira
  - QV-H-WT Quivira High Concentration Water
  - g Gram
  - HPSA High-Pressure Slurry Ablation
  - lb. Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - QAQC Quality assurance quality control
  - Ra-226 Radium-226
  - RAES Response Assessment and Evaluation Services
  - SL Soil
  - SY Slurry
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - WT Water

**Quivira High Sample Concentration Tracking**  
3



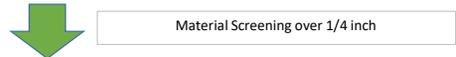
- Notes:
- CoC Chain of Custody
  - QV Quivira
  - g Gram
  - lb. Pound
  - MLA Mineral Liberation Analysis
  - Pace Pace Analytical
  - PSD particle size distribution
  - RAES Response Assessment and Evaluation Service
  - SPLP Syntehtic Precipitation Leaching Procedure
  - SY Slurry
  - TCLP Toxicity Characteristic Leaching Procedure
  - Tetra Tech Tetra Tech, Inc.
  - TO Task Order
  - XRF X-ray fluorescence

**APPENDIX C-4**  
**OLD CHURCH ROCK MINE MASS BALANCE SHEETS**

**Church Rock Low Concentration Mass Balance**

**1**

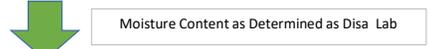
Original Mass Collected			
Bucket	Tare [lb]	Gross [lb]	Net [lb]
CR-L-Unscreened-01	2.2	51.8	49.6
CR-L-Unscreened-02	2.2	48.8	46.6
Totals	4.4	100.6	96.2



1/4" Screened Material				
Bucket	Tare [lb]	Gross [lb]	Net [lb]	Percent of Total
CR-L-0-SL +1/4 inch-01	2.2	2.6	0.4	0.4%
CR-L-0-SL -1/4 inch-01	2.2	45.8	43.6	99.6%
CR-L-0-SL -1/4 inch-02	2.2	54.2	52	
	6.6	102.6	96	



Subsample Taken	
Net Mass [g]	1462.31
Estimated Remaining Mass 8/26 [lb]	92.78



% Moisture	4.23%
Estimated True Dry Mass [lb]	88.9



Continued on Church Rock Low Concentration Mass Balance 2



-270 Feed Fines Brought Back to Shop and Dried

Dried Pan ID	Tare Mass [lb]	Gross Mass [lb]	Net Mass [lb]
CR-L-0-F-01	2.8	3	0.2
CR-L-0-F-02	2.8	8.2	5.4
CR-L-0-F-03	2.8	9.4	6.6
CR-L-0-F-04	2.8	5	2.2
			14.4

Unsettled Water Collection	
Depth Drum Total [in]	34
Volume Drum Total [gal]	55
Full Volume Used	
Collected Unsettled Water Bucket Net Mass [lb]	14.8
Collected Unsettled Water Volume [gal]	1.77
Sampled as % of Total	3.2%
Net Mass Unsettled Water Sample [g]	6.66
Approximate Unsettled Mass [lb]	0.46

Notes:  
 Refer to sample nomenclature in Section 4.1  
 lb                      pound  
 g                        gram

**Church Rock Low Concentration Mass Balance  
2**

Continued from  
Church Rock Low  
Concentration Mass  
Balance 2



Coarse Material Processed 8/28/2022



Samples Collected and Wet Sieved at Disa HQ

Dry Calculated Mass [lb]	74.0
Still Wet Mass Not Recorded	
Processed Mass % of Total	83.3%
Fines Mass % of Total	16.7%

Sample ID	Field CoC 8/25/22			Shop Receipt CoC 9/2/22 (True Value)			Solids Dry Mass [g]	Solids Dry Mass [lb]	Solids % by Mass
	Tare [lb]	Gross [lb]	Net [lb]	Tare [lb]	Gross [lb]	Net [lb]			
CR-L-4-SY	1.2	17.6	16.4	1.2	17.6	16.4	941.91	2.08	12.7%
CR-L-8-SY	1.2	17.8	16.6	1.2	18.2	17	994.84	2.19	12.9%
CR-L-30-SY	1.2	18	16.8	1.2	18.2	17	991.67	2.19	12.9%

Notes:  
Refer to sample nomenclature in Section 4.1  
CoC chain of custody  
g gram  
lb pound  
mg/kg milligrams per kilogram  
U Uranium

Mass Balance and Combination Goals							
Sample ID	RO-TAP Mass (-270-mesh) [g]	Mass % of RO-TAP Sample	Mass % TTL by Mass Balance	Proposed Mass Added of CR-L-0-F [g]	RO-TAP -270 XRF U mg/kg	Fines XRF U mg/kg	Proposed Combined Concentrate U mg/kg
CR-L-4-SY	111.20	11.8%	9.83%	189.09	168	192	183
CR-L-8-SY	112.07	11.3%	9.38%	199.72	111	192	163
CR-L-30-SY	137.04	13.8%	11.51%	199.08	93	192	152

Sample Mass Check				
Sample ID	Total RO-TAP Mass [g]	Total RO-TAP Mass Including Combined CR-L-0-F [g]	Concentrate Mass % of Total (Mass Calculated)	Concentrate Mass % of Total (Balance sum of Percents in this Sheet)
CR-L-4-SY	941.91	1131.00	26.55%	26.55%
CR-L-8-SY	994.84	1194.56	26.10%	26.10%
CR-L-30-SY	991.67	1190.75	28.23%	28.23%

**Church Rock Medium Concentration Mass Balance  
1**

Unscreened Mass			
Bucket	Tare [lb]	Gross [lb]	Net [lb]
CR-M-0-SL Unscreened-01	2.2	61.2	59
CR-M-0-SL Unscreened-02	2.4	55.8	53.4
<b>Totals</b>	<b>4.6</b>	<b>117</b>	<b>112.4</b>



Material Screening over 1/4 inch

Post-Screening				
Bucket	Tare [lb]	Gross [lb]	Net [lb]	Percent of Total
CR-M-0-SL +1/4 inch-01	2.2	4.2	2	1.8%
CR-M-0-SL -1/4 inch-01	2.2	54.2	52	98.2%
CR-M-0-SL -1/4 inch-02	2.2	60	57.8	
<b>Totals</b>	<b>6.6</b>	<b>118.4</b>	<b>111.8</b>	



Mixing and Subsampling

Subsample Taken	
Net Mass [g]	1392.81
Estimated Remaining Mass [lb]	108.7



Moisture Content as Determined as Disa Lab

% Moisture	6.50%
Estimated True Dry Mass [lb]	101.7



Material Pre-Cutting over 270-mesh screen at site 8/27/2022

Continued on Church Rock Medium Concentration Mass Balance 2



-270 Feed Fines Brought Back to Shop and Dried

Dried Pan ID	Tare Mass [lb]	Gross Mass [lb]	Net Mass [lb]
CR-M-0-F-01	2.8	10.6	7.8
CR-M-0-F-02	2.8	4	1.2
CR-M-0-F-03	3	6.8	3.8
			12.8

Unsettled Water Collection	
Depth Drum Total [in]	34
Volume Drum Total [gal]	55
Total Drum Volume Used	
Collected Unsettled Water Bucket Net Mass [lb]	15.8
Collected Unsettled Water Volume [gal]	1.89
Sampled as % of Total	3.4%
Net Mass Unsettled Water Sample [g]	2.85
Approximate Unsettled Mass [lb]	0.18

Notes:  
Refer to sample nomenclature in Section 4.1  
lb                      pound  
g                        gram

**Church Rock Medium Concentration Mass Balance**  
2

Continued from Church Rock Medium Concentration Mass Balance 2



Coarse Material Processed 8/28/2022



Samples Collected and RO-TAPPED at Disa HQ

Dry Calculated Mass [lb]	88.7		
Still Wet Mass Recorded in Field			
ID	Tare [lb]	Gross [lb]	Net [lb]
Bucket 1	-	-	53.2
Bucket 2	-	-	52
Total			105.2
% Moisture			15.7%

Only net mass recorded

Processed Mass % of Total	87.2%
Fines Mass % of Total	12.8%

Sample ID	Field CoC 8/28/22			Shop Receipt CoC 9/2/22 (True Value)			Solids Dry Mass [g]	Solids Dry Mass [lb]	Solids % by Mass
	Tare [lb]	Gross [lb]	Net [lb]	Tare [lb]	Gross [lb]	Net [lb]			
CR-M-4-SY	1.2	18.4	17.2	1.2	18.6	17.4	1130.23	2.5	14.3%
CR-M-8-SY	1.2	20.2	19.0	1.2	20.0	18.8	1408.47	3.1	16.5%
CR-M-30-SY	1.2	19.2	18.0	1.2	19.4	18.2	1251.94	2.8	15.2%

Mass Balance and Combination Goals							
Sample ID	RO-TAP Mass (-270-mesh) [g]	Mass % of RO-TAP Sample	Mass % TTL by Mass Balance	Proposed Mass Added of CR-M-0-F [g]	RO-TAP -270 XRF U mg/kg	Fines XRF U mg/kg	Proposed Combined Concentrate U mg/kg
CR-M-4-SY	109.17	9.7%	8.4%	165.47	735	1326	1091
CR-M-8-SY	131.25	9.3%	8.1%	206.20	671	1326	1071
CR-M-30-SY	171.24	13.7%	11.9%	183.29	391	1326	874

Notes:

Refer to sample nomenclature in Section 4.1

CoC chain of custody  
g gram  
  
lb pound  
  
mg/kg milligrams per kilogram  
  
U Uranium

Sample Mass Check				
Sample ID	Total RO-TAP Mass [g]	Total RO-TAP Mass Including Combined CR-M-0-F [g]	Concentrate Mass % of Total (Mass Calculated)	Concentrate Mass % of Total (Balance sum of Percents in this Sheet)
CR-M-4-SY	1130.23	1295.70	21.20%	21.20%
CR-M-8-SY	1408.47	1614.67	20.90%	20.90%
CR-M-30-SY	1251.94	1435.23	24.70%	24.70%

### Church Rock High Concentration Mass Balance

1

Unscreened Mass			
Bucket	Tare [lb]	Gross [lb]	Net [lb]
CR-H-0-SL Unscreened-01	2.2	64.4	62.2
CR-H-0-SL Unscreened-02	2.4	60.2	57.8
Totals	4.6	124.6	120



Material Screening over 1/4 inch

Post-Screening				
Bucket	Tare [lb]	Gross [lb]	Net [lb]	Percent of Total
CR-H-0-SL +1/4 inch-01	2.2	3.8	1.6	1.3%
CR-H-0-SL -1/4 inch-01	2.2	59.2	57	98.7%
CR-H-0-SL -1/4 inch-02	2.2	63.6	61.4	
Totals	6.6	126.6	120	



Mixing and Subsampling

Subsample Taken	
Net Mass [g]	1765.20
Estimated Remaining Mass [lb]	116.1



Moisture Content as Determined as Disa Lab

% Moisture	4.69%
Estimated True Dry Mass [g]	110.7



Material Pre-Cutting over 270-mesh screen at site 8/27/2022



Continued on Church Rock High Concentration Mass Balance 2



-270 Feed Fines Brought Back to Shop and Dried

Dried Pan ID	Tare Mass [lb]	Gross Mass [lb]	Net Mass [lb]
CR-H-0-F-01	2.8	3.8	1.0
CR-H-0-F-02	2.8	7.2	4.4
CR-H-0-F-03	2.8	11.4	8.6
			14.0
All Water Settled			

Notes:

Refer to sample nomenclature in Section 4.1

lb                      pound  
g                         gram

**Church Rock High Concentration Mass Balance**  
2

Continued from Church  
Rock High  
Concentration Mass  
Balance 2



Coarse Material Processed 8/28/2022



Samples Collected and RO-TAPPED at Disa HQ

Dry Calculated Mass [lb]	96.7		
Still Wet Mass Recorded in Field			
ID	Tare [lb]	Gross [lb]	Net [lb]
Bucket 1	2.2	65.6	63.4
Bucket 2	2.2	58.2	56
		Total	119.4
		% Moisture	19.0%

Processed Mass % of Total	87.3%
Fines Mass % of Total	12.7%

Sample ID	Field CoC 8/28/22			Shop Receipt CoC 9/2/22 (True Value)			Solids Dry Mass [g]	Solids Dry Mass [lb]	Solids % by Mass
	Tare [lb]	Gross [lb]	Net [lb]	Tare [lb]	Gross [lb]	Net [lb]			
CR-H-4-SY	1.2	20.8	19.6	1.2	21.0	19.8	1663.96	3.67	18.5%
CR-H-8-SY	1.2	20.0	18.8	1.2	20.0	18.8	1655.26	3.65	19.4%
CR-H-30-SY	1.2	21.0	19.8	1.2	20.0	18.8	1350.28	2.98	15.8%

Mass Balance and Combination Goals							
Sample ID	RO-TAP Mass (-270-mesh) [g]	Mass % of RO-TAP Sample	Mass % TTL by Mass Balance	Proposed Mass Added of CR-H-0-F [g]	RO-TAP -270 XRF U mg/kg	Fines XRF U mg/kg	Proposed Combined Concentrate U mg/kg
CR-H-4-SY	97.92	5.9%	5.1%	240.99	2745	5414	4643
CR-H-8-SY	105.42	6.4%	5.6%	239.73	2683	5414	4580
CR-H-30-SY	167.47	12.4%	10.8%	195.56	1509	5414	3613

Sample Mass Check				
Sample ID	Total RO-TAP Mass [g]	Total RO-TAP Mass Including Combined CR-H-0-F [g]	Concentrate Mass % of Total (Mass Calculated)	Concentrate Mass % of Total (Balance sum of Percents in this Sheet)
CR-H-4-SY	1663.96	1904.95	17.79%	17.79%
CR-H-8-SY	1655.26	1894.99	18.21%	18.21%
CR-H-30-SY	1350.28	1545.84	23.48%	23.48%

Notes:  
Refer to sample nomenclature in Section 4.1  
CoC chain of custody  
g gram  
lb pound  
mg/kg milligrams per kilogram  
U Uranium

**APPENDIX C-5**  
**QUIVIRA CHURCH ROCK 1 MINE MASS BALANCE SHEETS**

**Quivira Low Sample Concentration Mass Balance**

**1**

Original Mass Collected			
Bulk Sample ID	Tare [lb]	Gross [lb]	Net [lb]
QV-L-0-SL-01 Unscreened	2.2	61	58.8
QV-L-0-SL-02 Unscreened	2.2	58.4	56.2
<b>Totals</b>	<b>4.4</b>	<b>119.4</b>	<b>115</b>

8/25/2022



Material Screening over 1/4 inch

1/4" Screened Material				
Bulk Sample ID	Tare [lb]	Gross [lb]	Net [lb]	Percent of Total
QV-L-0-SL +1/4-inch-01	2.2	6.8	4.6	4.0%
QV-L-0-SL -1/4-inch-01	2.2	59.8	57.6	96.0%
QV-L-0-SL -1/4-inch-02	2.2	54.6	52.4	
<b>Totals</b>	<b>6.6</b>	<b>121.2</b>	<b>114.6</b>	

8/26/2022



Mixing and Subsampling

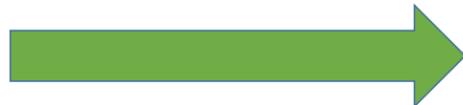
Subsample Taken	
Net Mass [g]	1415.53
Estimated Remaining Mass 8/26 [lb]	111.48

CoC 8/26 recorded as 1414.34 g in field. Verified as 1415.53 in Lab



Moisture Content as Determined as Disa Lab

% Moisture	4.41%
Estimated True Dry Mass [lb]	106.56



Material Pre-Cutting over 270-mesh screen at site 8/27/2022



Continued on Quivira Low Concentration Mass Balance 2



-270 Feed Fines Brought Back to Shop and Dried

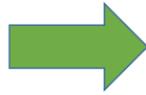
Dried Pan ID	Tare Mass [lb]	Gross Mass [lb]	Net Mass [lb]
QV-L-0-F-01	2.8	3.0	0.2
QV-L-0-F-02	2.8	8.0	5.2
QV-L-0-F-03	2.8	5.8	3.0
QV-L-0-F-04	2.8	6.4	3.6
			<b>12.0</b>

Notes:  
Refer to sample nomenclature in Section 4.1  
lb                   pound  
g                     gram

Unsettled Water Collection	
Depth Drum Total [in]	34
Volume Drum Total [gal]	55
Depth to Top of Water [in]	5.25
Volume Unsettled Water [gal]	46.5
Collected Unsettled Water Bucket Net Mass [lb]	14.4
Collected Unsettled Water Volume [gal]	1.73
Sampled as % of Total	3.7%
Net Mass Unsettled Water Sample [g]	35.19
Approximate Unsettled Mass [lb]	2.1

**Quivira Low Sample Concentration Mass Balance  
2**

Continued from  
Quivira Low  
Concentration  
Mass Balance 2



Coarse Material Processed 8/28/2022



Samples Collected and Wet Sieved at Disa Lab

Dry Calculated Mass [lb]	92.47		
Still Wet Mass Recorded in Field 8/28			
ID	Tare [lb]	Gross [lb]	Net [lb]
Bucket 1	2.2	46	43.8
Bucket 2	2.2	64	61.8
		Total	105.6
		% Moisture	12.4%

Processed Mass % of Total	86.8%
Fines Mass % of Total	13.2%

Notes:  
Refer to sample nomenclature in Section 4.1

- CoC chain of custody
- g gram
- lb pound
- mg/kg milligrams per kilogram
- U Uranium

Sample ID	Field CoC 8/28/22			Shop Receipt CoC 9/2/22 (True Value)			Solids Dry Mass [g]	Solids Dry Mass [lb]	Solids % by Mass
	Tare [lb]	Gross [lb]	Net [lb]	Tare [lb]	Gross [lb]	Net [lb]			
QV-L-4-SY	1.2	18.2	17.0	1.2	18.2	17.0	1092.75	2.409	14.2%
QV-L-8-SY	1.2	20.8	19.6	1.2	21.0	19.8	1428.03	3.148	15.9%
QV-L-30-SY	1.2	20.0	18.8	1.2	19.8	18.6	1473.62	3.249	17.5%

Mass Balance and Combination Goals							
Sample ID	Sieved Mass (-270-mesh) [g]	Mass % of Sieved Sample	Mass % TTL by Mass Balance	Proposed Mass Added of QV-L-0-F [g]	Sieved -270 XRF U mg/kg	Fines XRF U mg/kg	Proposed Combined Concentrate U mg/kg
QV-L-4-SY	117.17	11%	9.3%	166.52	154	313	247
QV-L-8-SY	141.64	10%	8.3%	224.56	145	313	248
QV-L-30-SY	181.25	13%	11.0%	217.61	106	313	219

Sample Mass Check				
Sample ID	Total Sieved Mass [g]	Total Sieved Mass including Combined QV-L-0-F [g]	Concentrate Mass % of Total (Mass Calculated)	Concentrate Mass % of Total (Balance sum of Percents in this Sheet)
QV-L-4-SY	1092.75	1259.27	22.53%	22.53%
QV-L-8-SY	1473.62	1698.18	21.56%	21.56%
QV-L-30-SY	1428.03	1645.64	24.24%	24.24%

**Quivira Medium Sample Concentration Mass Balance**

**1**

Original Mass Collected			
Bulk Sample ID	Tare [lb]	Gross [lb]	Net [lb]
QV-M-O-SL-01			
Unscreened	2.2	56.8	54.6
QV-M-O-SL-02			
Unscreened	2.2	55.6	53.4
Totals	4.4	112.4	108

Originally collected as QV-H, Relabel due to concentration 8/25-8/27

↓ Material Screening over 1/4 inch

1/4" Screened Material				
Bulk Sample ID	Tare [lb]	Gross [lb]	Net [lb]	Percent of Total
QV-M-O-SL +1/4-inch-01	2.2	4.6	2.4	2.2%
QV-M-O-SL -1/4-inch-01	2.2	58	55.8	97.8%
QV-M-O-SL -1/4-inch-01	2.2	51.8	49.6	
Totals	6.6	114.4	107.8	

8/26/2022

↓ Mixing and Subsampling

Subsample Taken	
Net Mass [g]	1545.98
Estimated Remaining Mass 8/26 [lb]	104.39

CoC 8/27 recorded as 1545.11 g in field. Verified as 1545.98 g in Lab

↓ Moisture Content as Determined as Disa Lab

% Moisture	4.64%
Estimated True Dry Mass [lb]	99.55

→ Material Pre-Cutting over 270-mesh screen at site 8/27/2022

→ Continued on Quivira Medium Concentration Mass Balance 2

↓

-270 Feed Fines Brought Back to Shop and Dried

Dried Pan ID	Tare Mass [lb]	Gross Mass [lb]	Net Mass [lb]
QV-M-O-F-01	3.0	4.0	1.0
QV-M-O-F-02	2.8	8.0	5.2
QV-M-O-F-03	3.0	9.8	6.8
			13.0
Unsettled Water Collection			
Depth Drum Total [in]	34.0		
Volume Drum Total [gal]	55.0		
Depth to Top of Water [in]	7.0		
Volume Unsettled Water [gal]	43.7		
Collected Unsettled Water Bucket Net Mass [lb]	17.4		
Collected Unsettled Water Volume [gal]	2.1		
Sampled as % of Total	4.8%		
Net Mass Unsettled Water Sample [g]	74.39		
Approximate Unsettled Mass [lb]	3.4		

Notes:  
Refer to sample nomenclature in Section 4.1  
lb pound  
g gram

**Quivira Medium Sample Concentration Mass Balance**

2

Continued from  
Quivira Medium  
Concentration  
Mass Balance 2



Coarse Material Processed 8/28/2022



Samples Collected and Wet Sieved at Disa Lab

Dry Calculated Mass [lb]	83.11		
Still Wet Mass Recorded in Field 8/28			
ID	Tare [lb]	Gross [lb]	Net [lb]
Bucket 1	2.2	63.8	61.6
Bucket 2	2.2	35.8	33.6
		Total	95.2
		% Moisture	12.7%

Processed Mass % of Total	83.5%
Fines Mass % of Total	16.5%

Sample ID	Field CoC 8/28/22			Shop Receipt CoC 9/2/22 (True Value)			Solids Dry Mass [g]	Solids Dry Mass [lb]	Solids % by Mass
	Tare [lb]	Gross [lb]	Net [lb]	Tare [lb]	Gross [lb]	Net [lb]			
QV-M-4-SY	1.0	20.8	19.8	1.2	21.0	19.8	1577.35	3.477	17.6%
QV-M-8-SY	1.2	20.8	19.6	1.2	21.0	19.8	1605.29	3.539	17.9%
QV-M-30-SY	1.2	20.8	19.6	1.2	21	19.8	1430.72	3.154	15.9%

Mass Balance and Combination Goals							
Sample ID	Sieved Mass (-270-mesh) [g]	Mass % of Sieved Sample	Mass % TTL by Mass Balance	Proposed Mass Added of QV-M-0-F [g]	Sieved -270 XRF U mg/kg	Fines XRF U mg/kg	Proposed Combined Concentrate U mg/kg
QV-M-4-SY	66.40	4%	3.5%	311.91	330	994	877
QV-M-8-SY	78.60	5%	4.1%	317.44	337	994	864
QV-M-30-SY	124.50	9%	7.3%	282.92	248	994	766

Notes:

Refer to sample nomenclature in Section 4.1

CoC chain of custody

g gram

lb pound

mg/kg milligrams per kilogram

U Uranium

Sample Mass Check				
Sample ID	Total Sieved Mass [g]	Total Sieved Mass Including Combined QV-M-0-F [g]	Concentrate Mass % of Total (Mass Calculated)	Concentrate Mass % of Total (Balance sum of Percents in this Sheet)
QV-M-4-SY	1577.35	1889.26	20.02%	20.02%
QV-M-8-SY	1605.29	1922.73	20.60%	20.60%
QV-M-30-SY	1430.72	1713.64	23.78%	23.78%

**Quivira High Sample Concentration Mass Balance**

**1**

Original Mass Collected			
Bulk Sample ID	Tare [lb]	Gross [lb]	Net [lb]
QV-H-0-SL-01 Unscreened	2.2	68.6	66.4
QV-H-0-SL-02 Unscreened	2.2	69.2	67
<b>Totals</b>	<b>4.4</b>	<b>137.8</b>	<b>133.4</b>



Material Screening over 1/4 inch

1/4" Screened Material 8/26/2022				
Bulk Sample ID	Tare [lb]	Gross [lb]	Net [lb]	Percent of Total
QV-H-0-SL +1/4-inch-01	2.2	5.6	3.4	2.6%
QV-H-0-SL -1/4-inch-01	2.2	62.0	59.8	97.4%
QV-H-0-SL -1/4-inch-02	2.2	57.8	55.6	
QV-H-0-SL -1/4-inch-03	2.2	15.6	13.4	
<b>Totals</b>	<b>8.8</b>	<b>141</b>	<b>132.2</b>	



Mixing and Subsampling

Subsample Taken	
Net Mass [g]	1603.28
Estimated Remaining Mass 8/26 [lb]	128.67

CoC 8/27 recorded as 1602.93 g in field. Verified as 1603.28 g in Lab



Moisture Content as Determined as Disa Lab

% Moisture	4.19%
Estimated True Dry Mass [lb]	123.3



Material Pre-Cutting over 270-mesh screen at site 8/27/2022



Continued on Quivira High Concentration Mass Balance 2



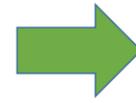
-270 Feed Fines Brought Back to Shop and Dried

Dried Pan ID	Tare Mass [lb]	Gross Mass [lb]	Net Mass [lb]
QV-H-0-F-01	2.8	11.2	8.4
QV-H-0-F-02	2.8	4.4	1.6
QV-H-0-F-03	2.8	5.8	3
			13
Unsettled Water Collection			
Depth Drum Total [in]		34	
Volume Drum Total [gal]		55	
Depth to Top of Water [in]		9	
Volume Unsettled Water [gal]		40.4	
Collected Unsettled Water Bucket Net Mass [lb]		16	
Collected Unsettled Water Volume [gal]		1.92	
Sampled as % of Total		4.7%	
Net Mass Unsettled Water Sample [g]		121.64	
Approximate Suspended Mass [lb]		5.66	

Notes:  
Refer to sample nomenclature in Section 4.1  
lb                      pound  
g                        gram

**Quivira High Sample Concentration Mass Balance**  
**2**

Continued from  
Quivira High  
Concentration  
Mass Balance 2



Coarse Material Processed 8/28/2022



Samples Collected and Wet Sieved at Disa Lab

Dry Calculated Mass [lb]	104.6		
Still Wet Mass Recorded in Field 8/28			
ID	Tare [lb]	Gross [lb]	Net [lb]
Bucket 1	2.2	65.6	63.4
Bucket 2	2.2	58.2	56
		Total	119.4
		% Moisture	12.4%

Processed Mass % of Total	84.9%
Fines Mass % of Total	15.1%

Notes:

Refer to sample nomenclature in Section 4.1

CoC chain of custody

g gram

lb pound

mg/kg milligrams per kilogram

U Uranium

Sample ID	Field CoC 8/28/22			Shop Receipt CoC 9/2/22 (True Value)			Solids Dry Mass [g]	Solids Dry Mass [lb]	Solids % by Mass
	Tare [lb]	Gross [lb]	Net [lb]	Tare [lb]	Gross [lb]	Net [lb]			
QV-H-4-SY	1.2	22.2	21.0	1.2	22.4	21.2	2185.54	4.818	22.7%
QV-H-8-SY	1.2	21.6	20.4	1.2	21.4	20.2	2125.8	4.687	23.2%
QV-H-30-SY	1.0	20.8	19.8	1.0	20.8	19.8	1808.39	3.987	20.1%

Mass Balance and Combination Goals							
Sample ID	Sieved Mass (-270-mesh) [g]	Mass % of Sieved Sample	Mass % TTL by Mass Balance	Proposed Mass Added of QV-H-0-F [g]	Sieved -270 XRF U mg/kg	Fines XRF U mg/kg	Proposed Combined Concentrate U mg/kg
QV-H-4-SY	84.22	4%	3.27%	389.75	658	1510	1359
QV-H-8-SY	96.03	5%	3.83%	379.09	545	1510	1315
QV-H-30-SY	144.96	8%	6.80%	322.49	340	1510	1147

Sample Mass Check				
Sample ID	Total Sieved Mass [g]	Total Sieved Mass Including Combined QV-H-0-F [g]	Concentrate Mass % of Total (Mass Calculated)	Concentrate Mass % of Total (Balance sum of Percents in this Sheet)
QV-H-4-SY	2185.54	2575.29	18.40%	18.40%
QV-H-8-SY	2125.80	2504.89	18.97%	18.97%
QV-H-30-SY	1808.39	2130.88	21.94%	21.94%