Data Tidying: ICPMS

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1. Importing the Data

# Importing the relevant data into the R markdown file  
  
# Before running this code make sure to upload the data onto the RStudio server   
# or save the data files in an appropriate location for desktop versions of R  
  
# To resolve error messages about the data path set the working directory as the location where the data is saved.  
# The example calls the full path, this will need to be changed to however the data is saved on your computer. An easy way to determine the path is to click the import dataset button in the environment and copy the path from the box on the top.  
  
#ICPMS Data  
ICPMS\_imported <- read.csv("~/RStudio/Projects/Chem311\_JCWS/data/ICPMS\_Data.csv", skip=1)  
#This data frame will only be used for matching the correct columns to the correct metals  
  
#Sample Key  
sample\_key <- read.csv("~/RStudio/Projects/Chem311\_JCWS/data/Sample\_Key.csv", skip=0)  
  
#The following code previews each of the imported data frames  
ICPMS\_imported

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## 70 45 Sc ( ISTD ) [ He ] : CPS RSD value = 27.58 is over the allowed maximum = 5.0072 Ge ( ISTD ) [ He ] : CPS RSD value = 10.11 is over the allowed maximum = 5.00209 Bi ( ISTD ) [ He ] : CPS RSD value = 49.86 is over the allowed maximum = 5.00  
## 71 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 126.68 is outside the allowed range [80.00, 120.00]  
## 72 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 125.77 is outside the allowed range [80.00, 120.00]  
## 73 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 128.45 is outside the allowed range [80.00, 120.00]  
## 74 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 126.42 is outside the allowed range [80.00, 120.00]  
## 75 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 132.44 is outside the allowed range [80.00, 120.00]  
## 76 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 138.10 is outside the allowed range [80.00, 120.00]  
## 77 45 Sc ( ISTD ) [ He ] : CPS RSD value = 6.71 is over the allowed maximum = 5.00209 Bi ( ISTD ) [ He ] : CPS RSD value = 6.90 is over the allowed maximum = 5.00209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 126.51 is outside the allowed range [80.00, 120.00]  
## 78 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 127.41 is outside the allowed range [80.00, 120.00]  
## 79 45 Sc ( ISTD ) [ He ] : CPS RSD value = 5.31 is over the allowed maximum = 5.00209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 130.79 is outside the allowed range [80.00, 120.00]  
## 80 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 127.31 is outside the allowed range [80.00, 120.00]  
## 81 45 Sc ( ISTD ) [ He ] : CPS RSD value = 5.68 is over the allowed maximum = 5.00209 Bi ( ISTD ) [ He ] : CPS RSD value = 11.26 is over the allowed maximum = 5.00  
## 82 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 133.59 is outside the allowed range [80.00, 120.00]209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 121.40 is outside the allowed range [80.00, 120.00]  
## 83 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 134.31 is outside the allowed range [80.00, 120.00]209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 122.06 is outside the allowed range [80.00, 120.00]  
## 84 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 133.51 is outside the allowed range [80.00, 120.00]209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 120.09 is outside the allowed range [80.00, 120.00]  
## 85 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 135.07 is outside the allowed range [80.00, 120.00]209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 129.83 is outside the allowed range [80.00, 120.00]  
## 86 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 134.52 is outside the allowed range [80.00, 120.00]  
## 87 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 133.40 is outside the allowed range [80.00, 120.00]209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 120.18 is outside the allowed range [80.00, 120.00]  
## 88 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 140.35 is outside the allowed range [80.00, 120.00]209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 120.03 is outside the allowed range [80.00, 120.00]  
## 89 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 136.05 is outside the allowed range [80.00, 120.00]209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 123.55 is outside the allowed range [80.00, 120.00]  
## 90 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 135.95 is outside the allowed range [80.00, 120.00]209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 120.07 is outside the allowed range [80.00, 120.00]  
## 91 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 131.34 is outside the allowed range [80.00, 120.00]209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 120.09 is outside the allowed range [80.00, 120.00]  
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## 94 45 Sc ( ISTD ) [ He ] : CPS RSD value = 27.58 is over the allowed maximum = 5.0072 Ge ( ISTD ) [ He ] : CPS RSD value = 10.11 is over the allowed maximum = 5.00209 Bi ( ISTD ) [ He ] : CPS RSD value = 49.86 is over the allowed maximum = 5.00  
## 95 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 126.68 is outside the allowed range [80.00, 120.00]  
## 96 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 125.77 is outside the allowed range [80.00, 120.00]  
## 97 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 128.45 is outside the allowed range [80.00, 120.00]  
## 98 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 126.42 is outside the allowed range [80.00, 120.00]  
## 99 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 132.44 is outside the allowed range [80.00, 120.00]  
## 100 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 138.10 is outside the allowed range [80.00, 120.00]  
## 101 45 Sc ( ISTD ) [ He ] : CPS RSD value = 6.71 is over the allowed maximum = 5.00209 Bi ( ISTD ) [ He ] : CPS RSD value = 6.90 is over the allowed maximum = 5.00209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 126.51 is outside the allowed range [80.00, 120.00]  
## 102 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 127.41 is outside the allowed range [80.00, 120.00]  
## 103 45 Sc ( ISTD ) [ He ] : CPS RSD value = 5.31 is over the allowed maximum = 5.00209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 130.79 is outside the allowed range [80.00, 120.00]  
## 104 209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 127.31 is outside the allowed range [80.00, 120.00]  
## 105 208 Pb [ He ] : CPS RSD value = 9.30 is over the allowed maximum = 5.0045 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 335.84 is outside the allowed range [80.00, 120.00]72 Ge ( ISTD ) [ He ] : ISTD Recovery Percent value = 277.01 is outside the allowed range [80.00, 120.00]209 Bi ( ISTD ) [ He ] : CPS RSD value = 9.19 is over the allowed maximum = 5.00209 Bi ( ISTD ) [ He ] : ISTD Recovery Percent value = 239.33 is outside the allowed range [80.00, 120.00]  
## 106 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 133.28 is outside the allowed range [80.00, 120.00]  
## 107 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 139.13 is outside the allowed range [80.00, 120.00]  
## 108 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 134.44 is outside the allowed range [80.00, 120.00]  
## 109 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 130.85 is outside the allowed range [80.00, 120.00]  
## 110 45 Sc ( ISTD ) [ He ] : CPS RSD value = 7.67 is over the allowed maximum = 5.0045 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 133.74 is outside the allowed range [80.00, 120.00]209 Bi ( ISTD ) [ He ] : CPS RSD value = 7.71 is over the allowed maximum = 5.00  
## 111 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 134.22 is outside the allowed range [80.00, 120.00]  
## 112 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 131.37 is outside the allowed range [80.00, 120.00]  
## 113 45 Sc ( ISTD ) [ He ] : ISTD Recovery Percent value = 131.98 is outside the allowed range [80.00, 120.00]  
## Rjct Data.File Sample.Key Acq..Date.Time Type Level  
## 1 FALSE 001BLKV.d 0 11/22/19 18:20 BlkVrfy NA  
## 2 FALSE 002BLKV.d 0 11/22/19 18:24 BlkVrfy NA  
## 3 FALSE 003BLKV.d 0 11/22/19 18:28 BlkVrfy NA  
## 4 FALSE 004CALB.d 0 11/22/19 18:33 CalBlk 1  
## 5 FALSE 005CALB.d 65 11/22/19 18:37 CalBlk 1  
## 6 FALSE 006CALS.d 66 11/22/19 18:40 CalStd 2  
## 7 FALSE 007CALS.d 67 11/22/19 18:44 CalStd 3  
## 8 FALSE 008CALS.d 68 11/22/19 18:48 CalStd 4  
## 9 FALSE 009CALS.d 69 11/22/19 18:52 CalStd 5  
## 10 FALSE 010CALS.d 70 11/22/19 18:56 CalStd 6  
## 11 FALSE 011CALS.d 71 11/22/19 19:01 CalStd 7  
## 12 FALSE 012CALS.d 72 11/22/19 19:05 CalStd 8  
## 13 FALSE 013CALS.d 73 11/22/19 19:09 CalStd 9  
## 14 FALSE 014CALS.d 74 11/22/19 19:14 CalStd 10  
## 15 FALSE 015CALS.d 75 11/22/19 19:18 CalStd 11  
## 16 FALSE 016BLKV.d 0 11/22/19 19:23 BlkVrfy NA  
## 17 FALSE 017BLKV.d 0 11/22/19 19:27 BlkVrfy NA  
## 18 FALSE 018BLKV.d 0 11/22/19 19:31 BlkVrfy NA  
## 19 FALSE 019BLKV.d 0 11/22/19 19:35 BlkVrfy NA  
## 20 FALSE 020SMPL.d NIST 11/22/19 19:39 Sample NA  
## 21 FALSE 021SMPL.d 6 11/22/19 19:43 Sample NA  
## 22 FALSE 022SMPL.d 7 11/22/19 19:47 Sample NA  
## 23 FALSE 023SMPL.d 8 11/22/19 19:51 Sample NA  
## 24 FALSE 024SMPL.d 9 11/22/19 19:56 Sample NA  
## 25 FALSE 025SMPL.d 10 11/22/19 20:00 Sample NA  
## 26 FALSE 026SMPL.d 11 11/22/19 20:04 Sample NA  
## 27 FALSE 027SMPL.d 12 11/22/19 20:08 Sample NA  
## 28 FALSE 028SMPL.d 13 11/22/19 20:12 Sample NA  
## 29 FALSE 029SMPL.d 14 11/22/19 20:17 Sample NA  
## 30 FALSE 030SMPL.d 15 11/22/19 20:21 Sample NA  
## 31 FALSE 031SMPL.d 16 11/22/19 20:25 Sample NA  
## 32 FALSE 032SMPL.d 17 11/22/19 20:29 Sample NA  
## 33 FALSE 033BLKV.d 0 11/22/19 20:34 BlkVrfy NA  
## 34 FALSE 034\_QC1.d Check10 11/22/19 20:38 QC1 NA  
## 35 FALSE 035BLKV.d 0 11/22/19 20:42 BlkVrfy NA  
## 36 FALSE 036SMPL.d 18 11/22/19 20:46 Sample NA  
## 37 FALSE 037SMPL.d 19 11/22/19 20:50 Sample NA  
## 38 FALSE 038SMPL.d 20 11/22/19 20:55 Sample NA  
## 39 FALSE 039SMPL.d 21 11/22/19 20:59 Sample NA  
## 40 FALSE 040SMPL.d 22 11/22/19 21:03 Sample NA  
## 41 FALSE 041SMPL.d 23 11/22/19 21:07 Sample NA  
## 42 FALSE 042SMPL.d 24 11/22/19 21:12 Sample NA  
## 43 FALSE 043SMPL.d 25 11/22/19 21:16 Sample NA  
## 44 FALSE 044SMPL.d 26 11/22/19 21:20 Sample NA  
## 45 FALSE 045SMPL.d 27 11/22/19 21:25 Sample NA  
## 46 FALSE 046SMPL.d 38 11/22/19 21:29 Sample NA  
## 47 FALSE 047SMPL.d 39 11/22/19 21:34 Sample NA  
## 48 FALSE 048BLKV.d 0 11/22/19 21:38 BlkVrfy NA  
## 49 FALSE 049\_QC1.d Check10 11/22/19 21:42 QC1 NA  
## 50 FALSE 050BLKV.d 0 11/22/19 21:46 BlkVrfy NA  
## 51 FALSE 051SMPL.d 40 11/22/19 21:50 Sample NA  
## 52 FALSE 052SMPL.d 41 11/22/19 21:54 Sample NA  
## 53 FALSE 053SMPL.d 42 11/22/19 21:59 Sample NA  
## 54 FALSE 054SMPL.d 43 11/22/19 22:03 Sample NA  
## 55 FALSE 055SMPL.d 44 11/22/19 22:07 Sample NA  
## 56 FALSE 056SMPL.d 45 11/22/19 22:12 Sample NA  
## 57 FALSE 057SMPL.d 46 11/22/19 22:16 Sample NA  
## 58 FALSE 058SMPL.d 47 11/22/19 22:20 Sample NA  
## 59 FALSE 059SMPL.d 48 11/22/19 22:25 Sample NA  
## 60 FALSE 060SMPL.d 49 11/22/19 22:29 Sample NA  
## 61 FALSE 061SMPL.d 50 11/22/19 22:34 Sample NA  
## 62 FALSE 062SMPL.d 51 11/22/19 22:38 Sample NA  
## 63 FALSE 063BLKV.d 0 11/22/19 22:42 BlkVrfy NA  
## 64 FALSE 064\_QC1.d Check10 11/22/19 22:46 QC1 NA  
## 65 FALSE 065BLKV.d 0 11/22/19 22:50 BlkVrfy NA  
## 66 FALSE 076BLKV.d 0 11/22/19 23:35 BlkVrfy NA  
## 67 FALSE 077\_QC1.d Check10 11/22/19 23:39 QC1 NA  
## 68 FALSE 078BLKV.d 0 11/22/19 23:43 BlkVrfy NA  
## 69 FALSE 004CALB\_Reed\_11\_22\_19.D 0 11/22/19 18:33 CalBlk 1  
## 70 FALSE 005CALB\_Reed\_11\_22\_19.D 76 11/22/19 18:37 CalBlk 1  
## 71 FALSE 006CALS\_Reed\_11\_22\_19.D 77 11/22/19 18:40 CalStd 2  
## 72 FALSE 007CALS\_Reed\_11\_22\_19.D 78 11/22/19 18:44 CalStd 3  
## 73 FALSE 008CALS\_Reed\_11\_22\_19.D 79 11/22/19 18:48 CalStd 4  
## 74 FALSE 009CALS\_Reed\_11\_22\_19.D 80 11/22/19 18:52 CalStd 5  
## 75 FALSE 010CALS\_Reed\_11\_22\_19.D 81 11/22/19 18:56 CalStd 6  
## 76 FALSE 011CALS\_Reed\_11\_22\_19.D 82 11/22/19 19:01 CalStd 7  
## 77 FALSE 012CALS\_Reed\_11\_22\_19.D 83 11/22/19 19:05 CalStd 8  
## 78 FALSE 013CALS\_Reed\_11\_22\_19.D 84 11/22/19 19:09 CalStd 9  
## 79 FALSE 014CALS\_Reed\_11\_22\_19.D 85 11/22/19 19:14 CalStd 10  
## 80 FALSE 015CALS\_Reed\_11\_22\_19.D 86 11/22/19 19:18 CalStd 11  
## 81 FALSE 001BLKV.d 0 11/23/19 11:12 BlkVrfy NA  
## 82 FALSE 016BLKV.d 0 11/23/19 11:17 BlkVrfy NA  
## 83 FALSE 017BLKV.d 0 11/23/19 11:22 BlkVrfy NA  
## 84 FALSE 018BLKV.d 0 11/23/19 11:27 BlkVrfy NA  
## 85 FALSE 019SMPL.d NIST 11/23/19 11:31 Sample NA  
## 86 FALSE 020\_QC1.d Check10 11/23/19 11:36 QC1 NA  
## 87 FALSE 021BLKV.d 0 11/23/19 11:41 BlkVrfy NA  
## 88 FALSE 022SMPL.d 52 11/23/19 11:46 Sample NA  
## 89 FALSE 023SMPL.d 53 11/23/19 11:51 Sample NA  
## 90 FALSE 024SMPL.d 54 11/23/19 11:56 Sample NA  
## 91 FALSE 025SMPL.d 55 11/23/19 12:01 Sample NA  
## 92 FALSE 001BLKV.d 0 11/23/19 12:20 BlkVrfy NA  
## 93 FALSE 004CALB\_Reed\_11\_22\_19.D 0 11/22/19 18:33 CalBlk 1  
## 94 FALSE 005CALB\_Reed\_11\_22\_19.D 87 11/22/19 18:37 CalBlk 1  
## 95 FALSE 006CALS\_Reed\_11\_22\_19.D 88 11/22/19 18:40 CalStd 2  
## 96 FALSE 007CALS\_Reed\_11\_22\_19.D 89 11/22/19 18:44 CalStd 3  
## 97 FALSE 008CALS\_Reed\_11\_22\_19.D 90 11/22/19 18:48 CalStd 4  
## 98 FALSE 009CALS\_Reed\_11\_22\_19.D 91 11/22/19 18:52 CalStd 5  
## 99 FALSE 010CALS\_Reed\_11\_22\_19.D 92 11/22/19 18:56 CalStd 6  
## 100 FALSE 011CALS\_Reed\_11\_22\_19.D 93 11/22/19 19:01 CalStd 7  
## 101 FALSE 012CALS\_Reed\_11\_22\_19.D 94 11/22/19 19:05 CalStd 8  
## 102 FALSE 013CALS\_Reed\_11\_22\_19.D 95 11/22/19 19:09 CalStd 9  
## 103 FALSE 014CALS\_Reed\_11\_22\_19.D 96 11/22/19 19:14 CalStd 10  
## 104 FALSE 015CALS\_Reed\_11\_22\_19.D 97 11/22/19 19:18 CalStd 11  
## 105 FALSE 016SMPL.d 56 11/23/19 12:24 Sample NA  
## 106 FALSE 017SMPL.d 57 11/23/19 12:29 Sample NA  
## 107 FALSE 018SMPL.d 58 11/23/19 12:34 Sample NA  
## 108 FALSE 019SMPL.d 59 11/23/19 12:39 Sample NA  
## 109 FALSE 020SMPL.d H2O 11/23/19 12:44 Sample NA  
## 110 FALSE 021SMPL.d H2O 11/23/19 12:49 Sample NA  
## 111 FALSE 022BLKV.d 0 11/23/19 12:54 BlkVrfy NA  
## 112 FALSE 023\_QC1.d Check10 11/23/19 12:59 QC1 NA  
## 113 FALSE 024BLKV.d 0 11/23/19 13:05 BlkVrfy NA  
## Vial.Number Total.Dil. CPS CPS.RSD CPS.1 CPS.RSD.1  
## 1 1101 1 1810.177 3.2268645 217.8900 5.28698979  
## 2 1102 1 1685.707 3.6804891 187.5567 13.07826550  
## 3 1101 1 1761.280 4.3179756 210.5567 7.35208173  
## 4 1102 1 1724.600 5.4486702 194.0033 9.09339624  
## 5 1101 1 1360.123 40.6955997 144.7767 40.54332265  
## 6 2101 1 8276.697 3.8993337 965.3633 2.59028318  
## 7 2102 1 14986.780 0.5405808 1795.5400 0.68297668  
## 8 2103 1 27333.750 1.4418604 3397.2200 1.21343632  
## 9 2104 1 66167.330 0.9332371 8099.4833 1.39078083  
## 10 2105 1 130314.373 0.2176385 16010.1367 0.65703596  
## 11 2106 1 271600.850 0.7354312 32970.4967 0.26335067  
## 12 2107 1 769458.783 0.9168668 94682.3467 0.55892553  
## 13 2108 1 1345846.040 0.7706362 162711.4400 0.14788271  
## 14 2109 1 6806555.940 0.8205068 822569.0133 0.71601082  
## 15 2110 1 13853686.320 0.2186808 1692230.1800 0.24872799  
## 16 1101 1 2252.463 12.1876681 280.3367 3.19158798  
## 17 1102 1 1750.170 0.6864146 211.4467 3.40345941  
## 18 1101 1 1979.087 7.6461550 245.5567 4.61725321  
## 19 1102 1 1851.290 3.6035662 218.0000 5.96330275  
## 20 2401 1 47985.990 0.1272753 5917.6500 1.58478866  
## 21 4101 1 141446.230 0.4998079 17273.8433 0.45393561  
## 22 4102 1 7664.203 1.2420991 943.4700 1.48919788  
## 23 4103 1 64776.467 1.6405571 7884.0533 0.31874102  
## 24 4104 1 7542.990 2.1504351 909.9167 1.88515973  
## 25 4105 1 21522.437 1.4363974 2610.4167 0.80738137  
## 26 4106 1 8698.017 0.5690129 1028.8100 1.72253707  
## 27 4107 1 67044.873 0.7261604 8160.4000 0.63105224  
## 28 4108 1 258217.077 0.4688423 31445.0500 0.28245321  
## 29 4109 1 73978.623 0.5164272 9107.6233 0.44471713  
## 30 4110 1 260231.683 1.3266221 31967.0733 0.53303762  
## 31 4111 1 95623.050 1.0633416 11563.2367 0.50827177  
## 32 4112 1 297266.720 1.4395788 36508.7500 0.83499542  
## 33 1102 1 1834.620 4.6198678 224.4467 10.72271414  
## 34 1104 1 142210.550 0.5758326 17332.4467 0.37233167  
## 35 1102 1 1707.937 8.4998061 221.6700 0.78136455  
## 36 4201 1 77173.853 2.0306780 9429.9000 1.66778751  
## 37 4202 1 215929.207 0.5421739 26425.7267 0.12837467  
## 38 4203 1 8237.793 3.2024246 1006.5867 3.24374925  
## 39 4204 1 42603.277 1.1826339 5163.5233 1.11927973  
## 40 4205 1 136373.753 1.6038086 16739.6767 0.84730512  
## 41 4206 1 228799.303 0.5350505 27782.4967 0.72051359  
## 42 4207 1 276393.203 1.3220093 33962.9667 0.48946285  
## 43 4208 1 10702.543 2.7723036 1347.1667 1.86964922  
## 44 4209 1 153415.313 0.8025562 18814.1333 0.62469690  
## 45 4210 1 313794.360 0.2868119 38229.1133 0.29060325  
## 46 4211 1 188859.103 0.5008846 22966.8533 0.89691247  
## 47 4212 1 236163.007 0.5921260 28903.4500 0.37209712  
## 48 1102 1 1795.730 3.9835372 226.5600 4.64432439  
## 49 1104 1 146833.697 1.1084029 17878.4133 0.66262846  
## 50 1102 1 2066.890 3.0733597 233.2267 10.57290886  
## 51 4301 1 70734.550 1.3583365 8596.0433 0.69423375  
## 52 4302 1 98325.193 0.6907821 12067.0067 0.59869990  
## 53 4303 1 8278.940 2.1319378 985.0300 4.08204934  
## 54 4304 1 7977.670 2.2029945 992.0300 3.12701662  
## 55 4305 1 327104.457 0.6585698 40083.9433 0.25312723  
## 56 4306 1 99635.467 0.1823289 12238.0100 0.39916349  
## 57 4307 1 136224.340 0.8517556 16858.0167 0.62545405  
## 58 4308 1 343554.280 0.3490373 41921.7233 0.94674585  
## 59 4309 1 173606.923 0.5834510 21310.5200 0.16007919  
## 60 4310 1 8469.017 3.0001153 1056.5900 2.01956852  
## 61 4311 1 8334.543 0.7488315 1021.3667 1.49877126  
## 62 4312 1 60343.843 1.1776415 7410.8600 0.03917571  
## 63 1102 1 1812.397 8.0902744 222.8933 9.34774990  
## 64 1104 1 148529.060 1.0529029 18214.7500 0.81868887  
## 65 1102 1 1892.403 5.6952156 227.7800 0.73791954  
## 66 1102 1 2064.663 4.6972083 244.0000 2.16864862  
## 67 1104 1 154470.597 0.1874972 18724.8100 1.14669002  
## 68 1102 1 2099.110 5.4842300 243.8900 1.46098109  
## 69 1102 1 1724.600 5.4000000 194.0000 9.10000000  
## 70 1101 1 1360.120 40.7000000 144.7800 40.50000000  
## 71 2101 1 8276.700 3.9000000 965.3600 2.60000000  
## 72 2102 1 14986.780 0.5000000 1795.5400 0.70000000  
## 73 2103 1 27333.750 1.4000000 3397.2200 1.20000000  
## 74 2104 1 66167.330 0.9000000 8099.4800 1.40000000  
## 75 2105 1 130314.370 0.2000000 16010.1400 0.70000000  
## 76 2106 1 271600.850 0.7000000 32970.5000 0.30000000  
## 77 2107 1 769458.780 0.9000000 94682.3500 0.60000000  
## 78 2108 1 1345846.040 0.8000000 162711.4400 0.10000000  
## 79 2109 1 6806555.940 0.8000000 822569.0100 0.70000000  
## 80 2110 1 13853686.320 0.2000000 1692230.1800 0.20000000  
## 81 1101 1 2240.240 4.8000000 276.2200 1.80000000  
## 82 1102 1 2235.800 7.8000000 260.4500 5.90000000  
## 83 1101 1 2480.280 3.4000000 296.1100 3.00000000  
## 84 1102 1 2107.990 4.4000000 258.5600 4.20000000  
## 85 2401 5 57496.530 2.2000000 7087.2800 0.40000000  
## 86 1104 1 166894.910 0.7000000 20223.4100 1.30000000  
## 87 1102 1 2079.110 7.4000000 268.7200 4.90000000  
## 88 4401 1 118080.720 1.0000000 14344.0900 0.50000000  
## 89 4402 1 373469.100 0.6000000 45511.1900 0.70000000  
## 90 4403 1 104173.830 0.9000000 12606.4800 0.70000000  
## 91 4404 1 9104.900 2.2000000 1117.8200 1.70000000  
## 92 1102 1 2077.990 1.8000000 248.5600 3.80000000  
## 93 1102 1 1724.600 5.4000000 194.0000 9.10000000  
## 94 1101 1 1360.120 40.7000000 144.7800 40.50000000  
## 95 2101 1 8276.700 3.9000000 965.3600 2.60000000  
## 96 2102 1 14986.780 0.5000000 1795.5400 0.70000000  
## 97 2103 1 27333.750 1.4000000 3397.2200 1.20000000  
## 98 2104 1 66167.330 0.9000000 8099.4800 1.40000000  
## 99 2105 1 130314.370 0.2000000 16010.1400 0.70000000  
## 100 2106 1 271600.850 0.7000000 32970.5000 0.30000000  
## 101 2107 1 769458.780 0.9000000 94682.3500 0.60000000  
## 102 2108 1 1345846.040 0.8000000 162711.4400 0.10000000  
## 103 2109 1 6806555.940 0.8000000 822569.0100 0.70000000  
## 104 2110 1 13853686.320 0.2000000 1692230.1800 0.20000000  
## 105 4405 1 106853.620 2.6000000 13155.6500 0.90000000  
## 106 4406 1 319056.870 1.1000000 38923.0000 0.60000000  
## 107 4407 1 126095.590 0.7000000 15379.9300 0.90000000  
## 108 4408 1 354140.770 0.4000000 43170.8000 0.30000000  
## 109 4409 1 10272.260 0.6000000 1251.2700 1.80000000  
## 110 4410 1 10372.290 2.7000000 1247.2700 2.20000000  
## 111 1102 1 2195.790 7.9000000 257.2300 6.40000000  
## 112 1104 1 162408.420 1.7000000 19524.4200 1.80000000  
## 113 1102 1 2140.220 3.1000000 262.2300 6.40000000  
## CPS.2 CPS.RSD.2 CPS.3 CPS.RSD.3 CPS.4 CPS.RSD.4  
## 1 465.3433 5.8858987 0.000000e+00 N/A 6.666667e+00 27.8702799  
## 2 332.8933 3.7502630 0.000000e+00 N/A 6.553333e+00 20.5839957  
## 3 352.1133 3.4190945 2.223333e+00 173.2050808 6.113333e+00 8.3349337  
## 4 397.2300 5.2971264 3.333333e+00 100.0500375 5.776667e+00 29.6748138  
## 5 398.2300 17.6736355 2.223333e+00 173.2050808 6.223333e+00 43.2316913  
## 6 1197.2667 1.6561244 2.121343e+03 5.27420762 5.016853e+03 1.4483229  
## 7 1977.7833 1.3739835 4.109570e+03 0.619676275 1.035400e+04 0.3363097  
## 8 3445.2333 1.6166178 8.275717e+03 2.982682379 2.026614e+04 0.7761039  
## 9 8293.9400 2.0946643 2.011471e+04 1.38814955 5.078245e+04 0.2701645  
## 10 16051.6333 0.4140387 4.048754e+04 2.322128462 1.009423e+05 0.1615268  
## 11 33081.6667 1.2374367 8.440363e+04 0.489939387 2.113009e+05 0.5935784  
## 12 81955.4833 0.2473291 2.425954e+05 0.531105994 6.036589e+05 0.5462463  
## 13 162653.8767 0.5667939 4.177049e+05 0.579240806 1.048247e+06 0.2239205  
## 14 823117.5067 0.7361890 2.105879e+06 0.834553738 5.410833e+06 0.4407081  
## 15 1714247.6100 0.7400396 4.298395e+06 0.482350572 1.096414e+07 0.2176914  
## 16 818.2433 3.1644882 1.455633e+02 38.34238283 3.464500e+02 22.1880738  
## 17 624.9033 7.2838858 2.333667e+01 37.80184718 8.700000e+01 12.0393122  
## 18 500.6733 3.8228192 5.444667e+01 9.350480193 1.505533e+02 6.7772746  
## 19 537.9000 5.0253187 2.222333e+01 48.21895439 6.522333e+01 6.3063543  
## 20 18993.4867 1.1314328 4.590830e+03 4.090905899 1.154887e+04 0.8583556  
## 21 2456.9600 2.2929278 2.444567e+02 7.752058186 8.510267e+02 2.2181201  
## 22 400.2300 0.7555913 2.778000e+01 30.20248486 5.744667e+01 10.4661538  
## 23 1931.4467 1.7514323 1.744533e+02 34.466672 4.693433e+02 2.3996134  
## 24 429.7833 7.0279891 2.555667e+01 27.1676952 7.422333e+01 1.8174040  
## 25 921.2500 0.1161618 8.111667e+01 48.15972933 2.034467e+02 2.1367980  
## 26 429.4533 9.6005152 1.111333e+01 45.8198694 4.044333e+01 7.9160262  
## 27 2653.9833 2.3920800 1.644533e+02 14.38107111 4.803400e+02 4.5181610  
## 28 7754.4733 1.4825232 3.508307e+03 2.389894031 9.178340e+03 0.7973273  
## 29 1613.5233 1.4852555 2.211200e+02 7.436564457 8.432467e+02 3.5789159  
## 30 7846.2933 0.7960724 3.416053e+03 3.639762593 9.031590e+03 0.6185520  
## 31 3599.5967 0.1610325 2.044567e+02 6.589803872 6.106800e+02 3.4989639  
## 32 8928.3533 1.0758094 3.958423e+03 3.207612833 1.008851e+04 0.7797758  
## 33 578.9033 2.4702461 1.889000e+01 36.74725263 4.711000e+01 7.8869347  
## 34 16479.5733 1.2872859 4.179062e+04 0.854274852 1.020526e+05 0.8511260  
## 35 323.2267 4.0329922 1.333333e+01 114.5643924 2.977667e+01 13.3616271  
## 36 1933.5567 1.9087262 2.077867e+02 25.58619375 8.934700e+02 2.1193569  
## 37 6509.0900 1.1133048 3.733913e+03 4.528777731 9.471377e+03 0.4315135  
## 38 493.5667 1.3639301 2.000333e+01 28.86270301 5.633667e+01 12.8409765  
## 39 1317.8333 2.7158791 2.289000e+02 25.48838789 5.482300e+02 2.9680318  
## 40 3624.0500 2.5329082 2.177900e+02 14.86697139 7.030167e+02 2.5451854  
## 41 6605.9033 0.1365218 2.903717e+03 4.421314954 7.630480e+03 1.0811848  
## 42 3896.3267 1.7591827 3.444667e+02 11.17435914 1.291387e+03 1.6253660  
## 43 381.7867 5.0000479 9.556000e+01 13.21090993 2.837833e+02 0.4442849  
## 44 1904.7767 1.6715678 2.633500e+02 4.562822571 8.071333e+02 0.4701255  
## 45 9168.5900 0.7573548 4.157373e+03 3.713291407 1.039324e+04 0.2365168  
## 46 1954.0033 2.4863997 3.055733e+02 13.19804518 7.381333e+02 2.1114828  
## 47 7095.4233 1.9426743 3.091530e+03 2.696806165 7.986637e+03 1.4192172  
## 48 447.1200 3.6392112 6.666667e+00 132.325366 3.522000e+01 11.8287601  
## 49 17060.0067 0.8759368 4.177270e+04 0.384383078 1.034857e+05 0.6291373  
## 50 530.3433 5.5336039 1.889000e+01 20.35549387 5.355667e+01 21.5640053  
## 51 1932.7800 2.4796915 1.822300e+02 14.67332885 8.645800e+02 0.8624784  
## 52 2883.4633 1.3073741 2.766833e+02 11.49204595 1.630530e+03 1.4666215  
## 53 554.3433 5.1212800 1.555667e+01 61.86691014 5.277667e+01 14.9001794  
## 54 484.0067 2.2457925 2.333667e+01 37.80184718 7.566667e+01 17.5025198  
## 55 9495.6500 0.9131825 4.124013e+03 2.971786864 1.090923e+04 1.1512810  
## 56 2469.8467 0.9618290 3.389133e+02 34.13512885 1.276163e+03 1.5701716  
## 57 1878.4400 2.5927766 2.266833e+02 15.49246931 9.581433e+02 3.1320810  
## 58 9730.9933 0.2671300 4.347413e+03 2.212561076 1.117907e+04 0.4509668  
## 59 1766.4267 2.6142009 2.077867e+02 6.074569059 8.822467e+02 2.9376111  
## 60 405.6733 3.2077076 1.111000e+01 91.65740795 5.911000e+01 8.4833344  
## 61 394.7833 3.5551003 1.000000e+01 33.3 2.866667e+01 8.3882354  
## 62 2457.2900 2.8337378 2.055667e+02 14.71336974 2.054463e+03 2.0495200  
## 63 356.1167 8.2546212 3.333333e+00 173.2050808 3.222333e+01 13.9679778  
## 64 17066.5700 0.4828330 4.163137e+04 0.888570335 1.042399e+05 0.5175753  
## 65 358.8933 1.0358166 3.333333e+00 100.0500375 3.044333e+01 0.6448016  
## 66 589.6800 2.9810059 5.556667e+00 91.6397388 1.811000e+01 31.2873831  
## 67 18000.9133 0.6228512 4.382125e+04 1.715269538 1.073371e+05 1.1976665  
## 68 560.4567 3.5695775 2.000000e+01 33.35 3.144667e+01 23.2573481  
## 69 397.2300 5.3000000 3.330000e+00 100.1 5.780000e+00 29.7000000  
## 70 398.2300 17.7000000 2.220000e+00 173.2 6.220000e+00 43.2000000  
## 71 1197.2700 1.7000000 2.121340e+03 5.3 5.016850e+03 1.4000000  
## 72 1977.7800 1.4000000 4.109570e+03 0.6 1.035400e+04 0.3000000  
## 73 3445.2300 1.6000000 8.275720e+03 3 2.026614e+04 0.8000000  
## 74 8293.9400 2.1000000 2.011471e+04 1.4 5.078245e+04 0.3000000  
## 75 16051.6300 0.4000000 4.048754e+04 2.3 1.009423e+05 0.2000000  
## 76 33081.6700 1.2000000 8.440363e+04 0.5 2.113009e+05 0.6000000  
## 77 81955.4800 0.2000000 2.425954e+05 0.5 6.036589e+05 0.5000000  
## 78 162653.8800 0.6000000 4.177049e+05 0.6 1.048247e+06 0.2000000  
## 79 823117.5100 0.7000000 2.105879e+06 0.8 5.410833e+06 0.4000000  
## 80 1714247.6100 0.7000000 4.298395e+06 0.5 1.096414e+07 0.2000000  
## 81 961.8100 1.9000000 6.222000e+01 17.2 1.520000e+02 4.5000000  
## 82 874.3600 2.0000000 1.889000e+01 20.4 4.678000e+01 1.5000000  
## 83 976.3600 15.1000000 4.445000e+01 48.8 1.474500e+02 4.9000000  
## 84 793.8000 4.5000000 8.890000e+00 57.3 3.956000e+01 27.5000000  
## 85 22743.7200 0.4000000 4.976490e+03 4.6 1.227447e+04 1.1000000  
## 86 19264.0000 1.0000000 4.347594e+04 1.8 1.075440e+05 1.2000000  
## 87 640.0100 2.4000000 1.222000e+01 95.8 3.956000e+01 13.6000000  
## 88 2936.7000 0.6000000 3.489100e+02 6.4 1.735540e+03 0.8000000  
## 89 10939.3600 0.5000000 4.458550e+03 2.2 1.107233e+04 0.5000000  
## 90 2180.3600 4.2000000 1.955700e+02 7.7 7.463500e+02 2.1000000  
## 91 731.9100 4.2000000 1.000000e+01 57.7 3.789000e+01 4.0000000  
## 92 620.2300 0.3000000 1.444000e+01 87.4 3.333000e+01 11.1000000  
## 93 397.2300 5.3000000 3.330000e+00 100.1 5.780000e+00 29.7000000  
## 94 398.2300 17.7000000 2.220000e+00 173.2 6.220000e+00 43.2000000  
## 95 1197.2700 1.7000000 2.121340e+03 5.3 5.016850e+03 1.4000000  
## 96 1977.7800 1.4000000 4.109570e+03 0.6 1.035400e+04 0.3000000  
## 97 3445.2300 1.6000000 8.275720e+03 3 2.026614e+04 0.8000000  
## 98 8293.9400 2.1000000 2.011471e+04 1.4 5.078245e+04 0.3000000  
## 99 16051.6300 0.4000000 4.048754e+04 2.3 1.009423e+05 0.2000000  
## 100 33081.6700 1.2000000 8.440363e+04 0.5 2.113009e+05 0.6000000  
## 101 81955.4800 0.2000000 2.425954e+05 0.5 6.036589e+05 0.5000000  
## 102 162653.8800 0.6000000 4.177049e+05 0.6 1.048247e+06 0.2000000  
## 103 823117.5100 0.7000000 2.105879e+06 0.8 5.410833e+06 0.4000000  
## 104 1714247.6100 0.7000000 4.298395e+06 0.5 1.096414e+07 0.2000000  
## 105 3210.6400 0.4000000 2.611300e+02 16 1.716980e+03 2.7000000  
## 106 9384.2600 1.3000000 3.816160e+03 1.6 9.822350e+03 0.6000000  
## 107 2337.1600 1.7000000 2.355700e+02 10.2 9.877000e+02 1.1000000  
## 108 10424.3800 0.4000000 4.361870e+03 1.6 1.094959e+04 0.3000000  
## 109 563.3500 3.9000000 4.440000e+00 173.2 1.200000e+01 9.6000000  
## 110 518.6800 8.4000000 3.330000e+00 100.1 9.670000e+00 22.6000000  
## 111 533.1200 4.1000000 8.890000e+00 114.5 2.300000e+01 7.5000000  
## 112 18543.1400 1.2000000 4.185983e+04 1.3 1.041232e+05 1.0000000  
## 113 484.8400 5.8000000 8.890000e+00 94.4 2.489000e+01 6.9000000  
## CPS.5 CPS.RSD.5 CPS.6 CPS.RSD.6 CPS.7 CPS.RSD.7 CPS.8  
## 1 683.3833 11.25138787 78342.87 2.2214675 73923.95 2.0608795 2212422  
## 2 315.5733 6.18961791 79527.54 2.1599563 73332.81 0.9673837 2189749  
## 3 602.2667 16.68231701 78913.51 1.0913866 73083.65 0.5807329 2221602  
## 4 334.4633 14.92756856 76616.16 1.2650287 72713.74 1.0870389 2191024  
## 5 598.9333 8.42798498 69934.49 27.5796951 80651.82 10.1057232 1718073  
## 6 2739.2600 3.74042448 77447.34 4.6078987 73107.66 4.4285668 2176420  
## 7 5115.5200 3.33707601 77532.22 0.4679183 73499.20 0.3646950 2160808  
## 8 9227.5033 3.25374029 78222.87 2.6312600 73419.69 0.8152810 2206867  
## 9 22911.8333 2.65068717 77469.49 1.1859871 73560.37 1.4972784 2171951  
## 10 44741.5967 0.41879644 79387.71 1.7912704 74142.58 1.1835408 2275402  
## 11 91275.5967 2.05694486 83765.94 3.3304390 77480.21 2.1202613 2372616  
## 12 231695.3500 1.11109592 77992.83 6.7113687 74460.98 4.9233523 2173565  
## 13 454154.5267 0.52398376 78737.32 4.0925829 74833.30 2.9520314 2189013  
## 14 2358810.8670 0.47086628 79553.54 5.3113950 75367.62 4.5161388 2247013  
## 15 4687901.9100 0.25873691 76668.43 1.3692040 72802.90 1.0438901 2187267  
## 16 1335.6767 9.80234690 77919.18 2.8413048 72395.28 1.8830652 2214663  
## 17 758.9500 21.26826074 75385.69 0.6552942 71131.58 0.8494024 2175310  
## 18 793.3900 10.65512700 73931.82 3.7180184 70513.97 4.3843326 2115150  
## 19 497.8167 3.01930160 75825.21 2.3798374 70765.50 0.5759431 2180408  
## 20 165250.8667 0.52099469 79541.73 1.3645527 73357.15 0.7511311 2415966  
## 21 400038.6167 1.14219472 81893.48 0.7822318 71978.50 1.1360563 2202313  
## 22 773.3933 15.84287964 76514.48 1.3702260 71536.70 0.2837907 2240318  
## 23 170482.8467 1.82187966 85492.30 4.8641754 75450.58 3.6943935 2329973  
## 24 1430.1400 2.62706272 77112.49 0.7726182 71416.64 1.4494860 2250662  
## 25 40453.6867 1.37342249 78515.44 1.9050211 72343.43 2.9852697 2165696  
## 26 1101.2033 3.33459467 77045.45 0.9110957 71584.36 0.7768055 2218823  
## 27 180029.6833 0.56241857 81409.76 1.2498477 72829.75 1.4763922 2184881  
## 28 1841731.1170 1.61491745 79662.36 1.8429940 73376.35 0.2694183 2215383  
## 29 204840.8900 0.78399484 80244.68 0.5681873 73261.19 2.2530232 2184289  
## 30 1870582.8700 1.36740602 82502.58 1.1096202 74096.07 2.4843161 2276429  
## 31 247287.0033 0.99388786 87877.80 0.3022221 75073.21 1.1463311 2266415  
## 32 2104811.2530 0.95447947 80914.32 0.9521027 74275.60 0.9983314 2251708  
## 33 785.6133 10.06308264 78097.67 2.3441612 73226.81 2.1868222 2187511  
## 34 43902.6067 2.20938668 79168.92 1.2643070 74832.12 2.0283771 2202965  
## 35 351.1333 5.72225601 79285.42 3.3562068 73623.14 1.1434112 2176332  
## 36 197118.0733 0.54317398 82015.73 0.5749232 74465.79 1.0257190 2206968  
## 37 2017959.9530 0.75237591 81909.92 0.8153351 75722.30 2.1162747 2259631  
## 38 1127.8800 5.32333134 78585.58 0.5610392 73719.73 0.9716272 2192037  
## 39 467066.7767 0.93764272 84973.74 1.4467871 75093.26 1.3544640 2296320  
## 40 210067.1700 1.24974101 84900.60 5.1744807 74913.67 3.7622369 2318864  
## 41 1504430.1700 1.40685866 82911.42 1.3302423 75283.01 0.8354770 2230413  
## 42 515157.0467 1.05944091 87642.04 1.0907514 75873.38 1.6116302 2433104  
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## 44 419717.7767 0.70935550 87501.12 0.8834970 76664.44 0.6770032 2263785  
## 45 2259778.7370 1.07212830 83625.67 0.3504727 77025.12 1.5576658 2252941  
## 46 486611.5600 0.61741545 87416.20 1.0162293 76072.09 1.1565836 2314932  
## 47 1616627.7730 1.08623178 83565.02 0.7806049 77991.06 0.7501464 2239446  
## 48 534.4800 5.65884901 82610.96 0.6620524 76712.30 0.2072387 2246747  
## 49 44786.1767 2.48422513 81652.40 0.8942168 76335.09 0.9039815 2209918  
## 50 481.1433 9.60815129 82637.91 2.2390666 75873.55 0.9223320 2210283  
## 51 228665.2367 1.75502840 83409.38 2.7880900 74938.37 2.3791391 2219598  
## 52 1465302.4100 1.82430931 88182.63 1.2961461 77438.72 0.6386616 2265115  
## 53 1000.0833 9.40490020 82415.57 0.4356526 74873.20 0.7783580 2225831  
## 54 2450.3100 2.38406919 82911.60 4.8564361 76958.01 2.0304441 2296943  
## 55 2200119.8830 0.08679372 84973.91 3.5034200 77026.03 1.2271225 2278054  
## 56 420708.5700 0.88140011 86215.21 1.2246450 76526.04 0.3781123 2216977  
## 57 552082.1033 0.56627365 87265.47 0.6887885 76731.41 1.1709311 2266749  
## 58 2314487.3800 0.69558377 87352.82 1.2851514 79057.25 0.4311675 2274128  
## 59 422038.8100 0.90921470 86755.63 3.5940364 77471.20 1.1934732 2256351  
## 60 1217.8900 8.64053949 84561.37 3.5590758 77227.96 3.0178830 2298464  
## 61 905.6267 6.05214508 78315.29 7.6957174 73518.37 6.7456062 2151114  
## 62 358599.3967 0.72361625 85981.85 1.4668203 76563.61 0.4844361 2255726  
## 63 410.0267 12.27535516 83350.88 1.0271573 77127.28 1.3307637 2199170  
## 64 43830.3367 1.48138966 83616.57 0.7263804 77587.27 0.3403409 2203969  
## 65 327.8000 15.40010166 84840.03 1.8564505 78902.13 0.2201995 2253829  
## 66 276.6867 3.18833256 90644.12 2.0454088 81804.94 1.4475819 2371695  
## 67 44632.1867 2.14159370 88452.47 0.8064378 81487.19 1.8643057 2255177  
## 68 381.1367 9.26934648 89858.38 0.7624265 81094.79 1.1497154 2322352  
## 69 334.4600 14.90000000 76616.16 1.3000000 72713.74 1.1000000 2191024  
## 70 598.9300 8.40000000 69934.49 27.6000000 80651.82 10.1000000 1718073  
## 71 2739.2600 3.70000000 77447.34 4.6000000 73107.66 4.4000000 2176420  
## 72 5115.5200 3.30000000 77532.22 0.5000000 73499.20 0.4000000 2160808  
## 73 9227.5000 3.30000000 78222.87 2.6000000 73419.69 0.8000000 2206867  
## 74 22911.8300 2.70000000 77469.49 1.2000000 73560.37 1.5000000 2171951  
## 75 44741.6000 0.40000000 79387.71 1.8000000 74142.58 1.2000000 2275402  
## 76 91275.6000 2.10000000 83765.94 3.3000000 77480.21 2.1000000 2372616  
## 77 231695.3500 1.10000000 77992.83 6.7000000 74460.98 4.9000000 2173565  
## 78 454154.5300 0.50000000 78737.32 4.1000000 74833.30 3.0000000 2189013  
## 79 2358810.8700 0.50000000 79553.54 5.3000000 75367.62 4.5000000 2247013  
## 80 4687901.9100 0.30000000 76668.43 1.4000000 72802.90 1.0000000 2187267  
## 81 6013.7700 29.90000000 83087.83 5.7000000 81721.35 1.3000000 1645668  
## 82 3317.2700 5.10000000 93427.99 1.4000000 83931.51 0.6000000 2085753  
## 83 3808.5300 5.80000000 93931.83 0.9000000 83914.37 1.3000000 2097131  
## 84 3569.5800 7.50000000 93369.68 2.6000000 82955.44 3.4000000 2063223  
## 85 146342.4600 1.30000000 94463.15 0.9000000 83734.75 1.4000000 2230657  
## 86 41927.6200 1.10000000 94078.11 1.0000000 84497.37 0.9000000 2046682  
## 87 3511.7400 4.70000000 93293.88 0.4000000 82465.52 0.8000000 2064760  
## 88 882579.1100 1.10000000 98152.59 1.3000000 80671.76 2.1000000 2062202  
## 89 2089301.4300 1.00000000 95143.11 1.8000000 82611.99 1.5000000 2122684  
## 90 317691.9500 0.40000000 95076.45 1.4000000 80735.60 1.4000000 2062860  
## 91 5098.9400 2.90000000 91850.10 0.3000000 81275.72 0.5000000 2063291  
## 92 8293.2800 2.50000000 78973.86 0.4000000 71588.96 1.2000000 1768435  
## 93 334.4600 14.90000000 76616.16 1.3000000 72713.74 1.1000000 2191024  
## 94 598.9300 8.40000000 69934.49 27.6000000 80651.82 10.1000000 1718073  
## 95 2739.2600 3.70000000 77447.34 4.6000000 73107.66 4.4000000 2176420  
## 96 5115.5200 3.30000000 77532.22 0.5000000 73499.20 0.4000000 2160808  
## 97 9227.5000 3.30000000 78222.87 2.6000000 73419.69 0.8000000 2206867  
## 98 22911.8300 2.70000000 77469.49 1.2000000 73560.37 1.5000000 2171951  
## 99 44741.6000 0.40000000 79387.71 1.8000000 74142.58 1.2000000 2275402  
## 100 91275.6000 2.10000000 83765.94 3.3000000 77480.21 2.1000000 2372616  
## 101 231695.3500 1.10000000 77992.83 6.7000000 74460.98 4.9000000 2173565  
## 102 454154.5300 0.50000000 78737.32 4.1000000 74833.30 3.0000000 2189013  
## 103 2358810.8700 0.50000000 79553.54 5.3000000 75367.62 4.5000000 2247013  
## 104 4687901.9100 0.30000000 76668.43 1.4000000 72802.90 1.0000000 2187267  
## 105 1485124.6800 4.80000000 100774.76 2.0000000 85081.16 1.6000000 2521206  
## 106 1707353.9300 1.00000000 93209.68 0.9000000 79840.46 0.4000000 2013295  
## 107 346141.7700 0.70000000 97301.64 2.3000000 80575.08 1.5000000 1976612  
## 108 1913108.5100 0.70000000 94017.86 0.8000000 81901.04 0.5000000 1982164  
## 109 7970.8800 3.10000000 91512.08 1.1000000 80866.80 1.1000000 1906249  
## 110 7949.9300 11.40000000 93528.18 7.7000000 80343.73 4.1000000 1932129  
## 111 8536.0700 5.00000000 93867.71 2.7000000 82541.57 2.5000000 1966054  
## 112 43597.8000 1.30000000 91874.99 1.0000000 81028.93 0.7000000 1894246  
## 113 9033.9400 2.80000000 92296.95 3.2000000 81311.53 1.7000000 1898834  
## CPS.RSD.8  
## 1 2.4885745  
## 2 3.1756525  
## 3 1.1114717  
## 4 0.4445676  
## 5 49.8605023  
## 6 3.5861029  
## 7 0.6405744  
## 8 2.8808231  
## 9 1.0480175  
## 10 2.2723218  
## 11 4.4953771  
## 12 6.9018092  
## 13 2.9466235  
## 14 2.6199354  
## 15 1.0922249  
## 16 2.2828381  
## 17 0.4121940  
## 18 3.8471349  
## 19 2.0333916  
## 20 1.2470670  
## 21 1.3866330  
## 22 0.6695636  
## 23 3.8250398  
## 24 2.6091371  
## 25 1.0585799  
## 26 0.8475403  
## 27 1.3478856  
## 28 0.8561921  
## 29 0.8169373  
## 30 2.6689297  
## 31 0.6397431  
## 32 0.9279476  
## 33 2.3540377  
## 34 0.9078324  
## 35 3.3393708  
## 36 1.4595449  
## 37 1.8936739  
## 38 0.9231316  
## 39 2.3529325  
## 40 3.6387916  
## 41 1.7787351  
## 42 1.8785142  
## 43 0.7645956  
## 44 0.4307390  
## 45 1.5023333  
## 46 1.6427570  
## 47 0.7131951  
## 48 0.2440538  
## 49 0.3931559  
## 50 1.1507174  
## 51 1.7494553  
## 52 1.6979310  
## 53 0.5932003  
## 54 2.4604676  
## 55 2.8875446  
## 56 0.8568416  
## 57 0.5777351  
## 58 0.6510086  
## 59 2.5178175  
## 60 2.2609770  
## 61 8.3594352  
## 62 3.1693856  
## 63 0.7817805  
## 64 0.3046079  
## 65 1.3124879  
## 66 3.2639342  
## 67 0.6714892  
## 68 0.3949595  
## 69 0.4000000  
## 70 49.9000000  
## 71 3.6000000  
## 72 0.6000000  
## 73 2.9000000  
## 74 1.0000000  
## 75 2.3000000  
## 76 4.5000000  
## 77 6.9000000  
## 78 2.9000000  
## 79 2.6000000  
## 80 1.1000000  
## 81 11.3000000  
## 82 1.2000000  
## 83 1.7000000  
## 84 1.7000000  
## 85 1.0000000  
## 86 1.1000000  
## 87 0.1000000  
## 88 0.6000000  
## 89 0.4000000  
## 90 1.2000000  
## 91 0.7000000  
## 92 2.0000000  
## 93 0.4000000  
## 94 49.9000000  
## 95 3.6000000  
## 96 0.6000000  
## 97 2.9000000  
## 98 1.0000000  
## 99 2.3000000  
## 100 4.5000000  
## 101 6.9000000  
## 102 2.9000000  
## 103 2.6000000  
## 104 1.1000000  
## 105 3.3000000  
## 106 0.5000000  
## 107 1.9000000  
## 108 2.6000000  
## 109 1.0000000  
## 110 7.7000000  
## 111 3.2000000  
## 112 1.3000000  
## 113 3.3000000

sample\_key

## Sample.Key Type Site Analyst Mass.of.Soil Total.Volume Concentration  
## 1 1 CalStd NA NA 1e-01  
## 2 2 CalStd NA NA 1e+00  
## 3 3 CalStd NA NA 2e+00  
## 4 4 CalStd NA NA 5e+00  
## 5 5 CalStd NA NA 1e+01  
## 6 6 Sample C MRMJ 1.50090 45.0 NA  
## 7 7 Sample MB MRMJ 0.00000 45.0 NA  
## 8 8 Sample E ARG 1.54230 50.0 NA  
## 9 9 Sample MB ARG 0.00000 50.0 NA  
## 10 10 Sample F CYT 1.49350 46.0 NA  
## 11 11 Sample MB CYT 0.00000 46.0 NA  
## 12 12 Sample F DJHR 1.51600 43.0 NA  
## 13 13 Sample QC DJHR 1.49230 43.0 NA  
## 14 14 Sample D CAG 1.50621 50.0 NA  
## 15 15 Sample QC CAG 1.48989 50.0 NA  
## 16 16 Sample F JHV 1.50630 45.0 NA  
## 17 17 Sample QC JHV 1.52360 45.0 NA  
## 18 18 Sample D SJB 1.55000 45.0 NA  
## 19 19 Sample QC SJB 1.53000 45.0 NA  
## 20 20 Sample MB MD 0.00000 50.0 NA  
## 21 21 Sample D MD 1.57560 50.0 NA  
## 22 22 Sample E SEP 1.60000 44.0 NA  
## 23 23 Sample QC SEP 1.01360 42.5 NA  
## 24 24 Sample C SGB 1.50740 44.0 NA  
## 25 25 Sample MB SGB 0.00000 44.5 NA  
## 26 26 Sample C AWB 1.51150 42.5 NA  
## 27 27 Sample QC AWB 1.57940 43.5 NA  
## 28 28 CalStd2 NA NA 1e-01  
## 29 29 CalStd2 NA NA 1e+00  
## 30 30 CalStd2 NA NA 2e+00  
## 31 31 CalStd2 NA NA 5e+00  
## 32 32 CalStd2 NA NA 1e+01  
## 33 33 CalStd3 NA NA 1e-01  
## 34 34 CalStd3 NA NA 1e+00  
## 35 35 CalStd3 NA NA 2e+00  
## 36 36 CalStd3 NA NA 5e+00  
## 37 37 CalStd3 NA NA 1e+01  
## 38 38 Sample C GB 1.51270 50.0 NA  
## 39 39 Sample QC GB 1.55540 45.0 NA  
## 40 40 Sample B AB 1.53780 50.0 NA  
## 41 41 Sample B LF 1.45870 45.0 NA  
## 42 42 Sample MB LF 0.00000 45.0 NA  
## 43 43 Sample MB AB 0.00000 45.0 NA  
## 44 44 Sample QC KAD 1.55980 50.0 NA  
## 45 45 Sample B KAD 1.54000 45.0 NA  
## 46 46 Sample A LML 1.57641 43.0 NA  
## 47 47 Sample QC LML 1.54717 43.0 NA  
## 48 48 Sample A AH 1.50000 43.7 NA  
## 49 49 Sample MB AH 0.00000 45.0 NA  
## 50 50 Sample MB LG 0.00000 45.2 NA  
## 51 51 Sample C LG 1.50380 45.0 NA  
## 52 52 Sample B MF 1.45810 18.0 NA  
## 53 53 Sample QC MF 1.59160 22.0 NA  
## 54 54 Sample A LAK 1.52350 40.0 NA  
## 55 55 Sample MB LAK 0.00000 45.0 NA  
## 56 56 Sample A AVM 1.53750 47.0 NA  
## 57 57 Sample QC AVM 1.51670 45.0 NA  
## 58 58 Sample B SS 1.53630 42.5 NA  
## 59 59 Sample QC SS 1.55780 42.8 NA  
## 60 60 CalStd4 NA NA 1e-01  
## 61 61 CalStd4 NA NA 1e+00  
## 62 62 CalStd4 NA NA 2e+00  
## 63 63 CalStd4 NA NA 5e+00  
## 64 64 CalStd4 NA NA 1e+01  
## 65 65 Cal1 NA NA 0e+00  
## 66 66 Cal1 NA NA 5e-01  
## 67 67 Cal1 NA NA 1e+00  
## 68 68 Cal1 NA NA 2e+00  
## 69 69 Cal1 NA NA 5e+00  
## 70 70 Cal1 NA NA 1e+01  
## 71 71 Cal1 NA NA 2e+01  
## 72 72 Cal1 NA NA 5e+01  
## 73 73 Cal1 NA NA 1e+02  
## 74 74 Cal1 NA NA 5e+02  
## 75 75 Cal1 NA NA 1e+03  
## 76 76 Cal2 NA NA 0e+00  
## 77 77 Cal2 NA NA 5e-01  
## 78 78 Cal2 NA NA 1e+00  
## 79 79 Cal2 NA NA 2e+00  
## 80 80 Cal2 NA NA 5e+00  
## 81 81 Cal2 NA NA 1e+01  
## 82 82 Cal2 NA NA 2e+01  
## 83 83 Cal2 NA NA 5e+01  
## 84 84 Cal2 NA NA 1e+02  
## 85 85 Cal2 NA NA 5e+02  
## 86 86 Cal2 NA NA 1e+03  
## 87 87 Cal3 NA NA 0e+00  
## 88 88 Cal3 NA NA 5e-01  
## 89 89 Cal3 NA NA 1e+00  
## 90 90 Cal3 NA NA 2e+00  
## 91 91 Cal3 NA NA 5e+00  
## 92 92 Cal3 NA NA 1e+01  
## 93 93 Cal3 NA NA 2e+01  
## 94 94 Cal3 NA NA 5e+01  
## 95 95 Cal3 NA NA 1e+02  
## 96 96 Cal3 NA NA 5e+02  
## 97 97 Cal3 NA NA 1e+03

#Data Tidying

1. Tidying the RSD Data

#This code chunk tidies the ICPMS RSD data  
#this is done separately from the overall data tidying to ensure the RSD values   
#are properly matched to the correct sample reading (CPS)  
  
RSD\_data<-ICPMS\_imported %>%  
 #first the RSD columns are selected and renamed with the appropriate metal isotope  
 select(Cr52 = CPS.RSD,   
 Cr53 = CPS.RSD.1,   
 As75 = CPS.RSD.2,   
 Cd111 = CPS.RSD.3,   
 Cd114 = CPS.RSD.4,   
 Pb208 = CPS.RSD.5,  
 Ge72 = CPS.7,  
 Sample.Key)%>%   
 #The sample key is also selected for later use in verifying   
 #that the RSD data is properly matching the CPS Data  
   
 #then the newly renamed RSD columns are gathered together and   
 #a column is created to indicate which metal corresponds to which RSD  
 gather(Cr52, Cr53, As75, Cd111, Cd114, Pb208, Ge72, key = "metal", value = "RSD")%>%  
   
 #Then the RSD values are mutated to ensure that they are in a numeric format,  
 #this helps prevent type related errors  
 mutate(RSD=as.numeric(RSD))  
  
#Previewing the Tidy RSD Data  
RSD\_data

## Sample.Key metal RSD  
## 1 0 Cr52 3.226865e+00  
## 2 0 Cr52 3.680489e+00  
## 3 0 Cr52 4.317976e+00  
## 4 0 Cr52 5.448670e+00  
## 5 65 Cr52 4.069560e+01  
## 6 66 Cr52 3.899334e+00  
## 7 67 Cr52 5.405808e-01  
## 8 68 Cr52 1.441860e+00  
## 9 69 Cr52 9.332371e-01  
## 10 70 Cr52 2.176385e-01  
## 11 71 Cr52 7.354312e-01  
## 12 72 Cr52 9.168668e-01  
## 13 73 Cr52 7.706362e-01  
## 14 74 Cr52 8.205068e-01  
## 15 75 Cr52 2.186808e-01  
## 16 0 Cr52 1.218767e+01  
## 17 0 Cr52 6.864146e-01  
## 18 0 Cr52 7.646155e+00  
## 19 0 Cr52 3.603566e+00  
## 20 NIST Cr52 1.272753e-01  
## 21 6 Cr52 4.998079e-01  
## 22 7 Cr52 1.242099e+00  
## 23 8 Cr52 1.640557e+00  
## 24 9 Cr52 2.150435e+00  
## 25 10 Cr52 1.436397e+00  
## 26 11 Cr52 5.690129e-01  
## 27 12 Cr52 7.261604e-01  
## 28 13 Cr52 4.688423e-01  
## 29 14 Cr52 5.164272e-01  
## 30 15 Cr52 1.326622e+00  
## 31 16 Cr52 1.063342e+00  
## 32 17 Cr52 1.439579e+00  
## 33 0 Cr52 4.619868e+00  
## 34 Check10 Cr52 5.758326e-01  
## 35 0 Cr52 8.499806e+00  
## 36 18 Cr52 2.030678e+00  
## 37 19 Cr52 5.421739e-01  
## 38 20 Cr52 3.202425e+00  
## 39 21 Cr52 1.182634e+00  
## 40 22 Cr52 1.603809e+00  
## 41 23 Cr52 5.350505e-01  
## 42 24 Cr52 1.322009e+00  
## 43 25 Cr52 2.772304e+00  
## 44 26 Cr52 8.025562e-01  
## 45 27 Cr52 2.868119e-01  
## 46 38 Cr52 5.008846e-01  
## 47 39 Cr52 5.921260e-01  
## 48 0 Cr52 3.983537e+00  
## 49 Check10 Cr52 1.108403e+00  
## 50 0 Cr52 3.073360e+00  
## 51 40 Cr52 1.358336e+00  
## 52 41 Cr52 6.907821e-01  
## 53 42 Cr52 2.131938e+00  
## 54 43 Cr52 2.202995e+00  
## 55 44 Cr52 6.585698e-01  
## 56 45 Cr52 1.823289e-01  
## 57 46 Cr52 8.517556e-01  
## 58 47 Cr52 3.490373e-01  
## 59 48 Cr52 5.834510e-01  
## 60 49 Cr52 3.000115e+00  
## 61 50 Cr52 7.488315e-01  
## 62 51 Cr52 1.177642e+00  
## 63 0 Cr52 8.090274e+00  
## 64 Check10 Cr52 1.052903e+00  
## 65 0 Cr52 5.695216e+00  
## 66 0 Cr52 4.697208e+00  
## 67 Check10 Cr52 1.874972e-01  
## 68 0 Cr52 5.484230e+00  
## 69 0 Cr52 5.400000e+00  
## 70 76 Cr52 4.070000e+01  
## 71 77 Cr52 3.900000e+00  
## 72 78 Cr52 5.000000e-01  
## 73 79 Cr52 1.400000e+00  
## 74 80 Cr52 9.000000e-01  
## 75 81 Cr52 2.000000e-01  
## 76 82 Cr52 7.000000e-01  
## 77 83 Cr52 9.000000e-01  
## 78 84 Cr52 8.000000e-01  
## 79 85 Cr52 8.000000e-01  
## 80 86 Cr52 2.000000e-01  
## 81 0 Cr52 4.800000e+00  
## 82 0 Cr52 7.800000e+00  
## 83 0 Cr52 3.400000e+00  
## 84 0 Cr52 4.400000e+00  
## 85 NIST Cr52 2.200000e+00  
## 86 Check10 Cr52 7.000000e-01  
## 87 0 Cr52 7.400000e+00  
## 88 52 Cr52 1.000000e+00  
## 89 53 Cr52 6.000000e-01  
## 90 54 Cr52 9.000000e-01  
## 91 55 Cr52 2.200000e+00  
## 92 0 Cr52 1.800000e+00  
## 93 0 Cr52 5.400000e+00  
## 94 87 Cr52 4.070000e+01  
## 95 88 Cr52 3.900000e+00  
## 96 89 Cr52 5.000000e-01  
## 97 90 Cr52 1.400000e+00  
## 98 91 Cr52 9.000000e-01  
## 99 92 Cr52 2.000000e-01  
## 100 93 Cr52 7.000000e-01  
## 101 94 Cr52 9.000000e-01  
## 102 95 Cr52 8.000000e-01  
## 103 96 Cr52 8.000000e-01  
## 104 97 Cr52 2.000000e-01  
## 105 56 Cr52 2.600000e+00  
## 106 57 Cr52 1.100000e+00  
## 107 58 Cr52 7.000000e-01  
## 108 59 Cr52 4.000000e-01  
## 109 H2O Cr52 6.000000e-01  
## 110 H2O Cr52 2.700000e+00  
## 111 0 Cr52 7.900000e+00  
## 112 Check10 Cr52 1.700000e+00  
## 113 0 Cr52 3.100000e+00  
## 114 0 Cr53 5.286990e+00  
## 115 0 Cr53 1.307827e+01  
## 116 0 Cr53 7.352082e+00  
## 117 0 Cr53 9.093396e+00  
## 118 65 Cr53 4.054332e+01  
## 119 66 Cr53 2.590283e+00  
## 120 67 Cr53 6.829767e-01  
## 121 68 Cr53 1.213436e+00  
## 122 69 Cr53 1.390781e+00  
## 123 70 Cr53 6.570360e-01  
## 124 71 Cr53 2.633507e-01  
## 125 72 Cr53 5.589255e-01  
## 126 73 Cr53 1.478827e-01  
## 127 74 Cr53 7.160108e-01  
## 128 75 Cr53 2.487280e-01  
## 129 0 Cr53 3.191588e+00  
## 130 0 Cr53 3.403459e+00  
## 131 0 Cr53 4.617253e+00  
## 132 0 Cr53 5.963303e+00  
## 133 NIST Cr53 1.584789e+00  
## 134 6 Cr53 4.539356e-01  
## 135 7 Cr53 1.489198e+00  
## 136 8 Cr53 3.187410e-01  
## 137 9 Cr53 1.885160e+00  
## 138 10 Cr53 8.073814e-01  
## 139 11 Cr53 1.722537e+00  
## 140 12 Cr53 6.310522e-01  
## 141 13 Cr53 2.824532e-01  
## 142 14 Cr53 4.447171e-01  
## 143 15 Cr53 5.330376e-01  
## 144 16 Cr53 5.082718e-01  
## 145 17 Cr53 8.349954e-01  
## 146 0 Cr53 1.072271e+01  
## 147 Check10 Cr53 3.723317e-01  
## 148 0 Cr53 7.813646e-01  
## 149 18 Cr53 1.667788e+00  
## 150 19 Cr53 1.283747e-01  
## 151 20 Cr53 3.243749e+00  
## 152 21 Cr53 1.119280e+00  
## 153 22 Cr53 8.473051e-01  
## 154 23 Cr53 7.205136e-01  
## 155 24 Cr53 4.894629e-01  
## 156 25 Cr53 1.869649e+00  
## 157 26 Cr53 6.246969e-01  
## 158 27 Cr53 2.906033e-01  
## 159 38 Cr53 8.969125e-01  
## 160 39 Cr53 3.720971e-01  
## 161 0 Cr53 4.644324e+00  
## 162 Check10 Cr53 6.626285e-01  
## 163 0 Cr53 1.057291e+01  
## 164 40 Cr53 6.942337e-01  
## 165 41 Cr53 5.986999e-01  
## 166 42 Cr53 4.082049e+00  
## 167 43 Cr53 3.127017e+00  
## 168 44 Cr53 2.531272e-01  
## 169 45 Cr53 3.991635e-01  
## 170 46 Cr53 6.254541e-01  
## 171 47 Cr53 9.467458e-01  
## 172 48 Cr53 1.600792e-01  
## 173 49 Cr53 2.019569e+00  
## 174 50 Cr53 1.498771e+00  
## 175 51 Cr53 3.917571e-02  
## 176 0 Cr53 9.347750e+00  
## 177 Check10 Cr53 8.186889e-01  
## 178 0 Cr53 7.379195e-01  
## 179 0 Cr53 2.168649e+00  
## 180 Check10 Cr53 1.146690e+00  
## 181 0 Cr53 1.460981e+00  
## 182 0 Cr53 9.100000e+00  
## 183 76 Cr53 4.050000e+01  
## 184 77 Cr53 2.600000e+00  
## 185 78 Cr53 7.000000e-01  
## 186 79 Cr53 1.200000e+00  
## 187 80 Cr53 1.400000e+00  
## 188 81 Cr53 7.000000e-01  
## 189 82 Cr53 3.000000e-01  
## 190 83 Cr53 6.000000e-01  
## 191 84 Cr53 1.000000e-01  
## 192 85 Cr53 7.000000e-01  
## 193 86 Cr53 2.000000e-01  
## 194 0 Cr53 1.800000e+00  
## 195 0 Cr53 5.900000e+00  
## 196 0 Cr53 3.000000e+00  
## 197 0 Cr53 4.200000e+00  
## 198 NIST Cr53 4.000000e-01  
## 199 Check10 Cr53 1.300000e+00  
## 200 0 Cr53 4.900000e+00  
## 201 52 Cr53 5.000000e-01  
## 202 53 Cr53 7.000000e-01  
## 203 54 Cr53 7.000000e-01  
## 204 55 Cr53 1.700000e+00  
## 205 0 Cr53 3.800000e+00  
## 206 0 Cr53 9.100000e+00  
## 207 87 Cr53 4.050000e+01  
## 208 88 Cr53 2.600000e+00  
## 209 89 Cr53 7.000000e-01  
## 210 90 Cr53 1.200000e+00  
## 211 91 Cr53 1.400000e+00  
## 212 92 Cr53 7.000000e-01  
## 213 93 Cr53 3.000000e-01  
## 214 94 Cr53 6.000000e-01  
## 215 95 Cr53 1.000000e-01  
## 216 96 Cr53 7.000000e-01  
## 217 97 Cr53 2.000000e-01  
## 218 56 Cr53 9.000000e-01  
## 219 57 Cr53 6.000000e-01  
## 220 58 Cr53 9.000000e-01  
## 221 59 Cr53 3.000000e-01  
## 222 H2O Cr53 1.800000e+00  
## 223 H2O Cr53 2.200000e+00  
## 224 0 Cr53 6.400000e+00  
## 225 Check10 Cr53 1.800000e+00  
## 226 0 Cr53 6.400000e+00  
## 227 0 As75 5.885899e+00  
## 228 0 As75 3.750263e+00  
## 229 0 As75 3.419095e+00  
## 230 0 As75 5.297126e+00  
## 231 65 As75 1.767364e+01  
## 232 66 As75 1.656124e+00  
## 233 67 As75 1.373984e+00  
## 234 68 As75 1.616618e+00  
## 235 69 As75 2.094664e+00  
## 236 70 As75 4.140387e-01  
## 237 71 As75 1.237437e+00  
## 238 72 As75 2.473291e-01  
## 239 73 As75 5.667939e-01  
## 240 74 As75 7.361890e-01  
## 241 75 As75 7.400396e-01  
## 242 0 As75 3.164488e+00  
## 243 0 As75 7.283886e+00  
## 244 0 As75 3.822819e+00  
## 245 0 As75 5.025319e+00  
## 246 NIST As75 1.131433e+00  
## 247 6 As75 2.292928e+00  
## 248 7 As75 7.555913e-01  
## 249 8 As75 1.751432e+00  
## 250 9 As75 7.027989e+00  
## 251 10 As75 1.161618e-01  
## 252 11 As75 9.600515e+00  
## 253 12 As75 2.392080e+00  
## 254 13 As75 1.482523e+00  
## 255 14 As75 1.485255e+00  
## 256 15 As75 7.960724e-01  
## 257 16 As75 1.610325e-01  
## 258 17 As75 1.075809e+00  
## 259 0 As75 2.470246e+00  
## 260 Check10 As75 1.287286e+00  
## 261 0 As75 4.032992e+00  
## 262 18 As75 1.908726e+00  
## 263 19 As75 1.113305e+00  
## 264 20 As75 1.363930e+00  
## 265 21 As75 2.715879e+00  
## 266 22 As75 2.532908e+00  
## 267 23 As75 1.365218e-01  
## 268 24 As75 1.759183e+00  
## 269 25 As75 5.000048e+00  
## 270 26 As75 1.671568e+00  
## 271 27 As75 7.573548e-01  
## 272 38 As75 2.486400e+00  
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## 274 0 As75 3.639211e+00  
## 275 Check10 As75 8.759368e-01  
## 276 0 As75 5.533604e+00  
## 277 40 As75 2.479692e+00  
## 278 41 As75 1.307374e+00  
## 279 42 As75 5.121280e+00  
## 280 43 As75 2.245792e+00  
## 281 44 As75 9.131825e-01  
## 282 45 As75 9.618290e-01  
## 283 46 As75 2.592777e+00  
## 284 47 As75 2.671300e-01  
## 285 48 As75 2.614201e+00  
## 286 49 As75 3.207708e+00  
## 287 50 As75 3.555100e+00  
## 288 51 As75 2.833738e+00  
## 289 0 As75 8.254621e+00  
## 290 Check10 As75 4.828330e-01  
## 291 0 As75 1.035817e+00  
## 292 0 As75 2.981006e+00  
## 293 Check10 As75 6.228512e-01  
## 294 0 As75 3.569577e+00  
## 295 0 As75 5.300000e+00  
## 296 76 As75 1.770000e+01  
## 297 77 As75 1.700000e+00  
## 298 78 As75 1.400000e+00  
## 299 79 As75 1.600000e+00  
## 300 80 As75 2.100000e+00  
## 301 81 As75 4.000000e-01  
## 302 82 As75 1.200000e+00  
## 303 83 As75 2.000000e-01  
## 304 84 As75 6.000000e-01  
## 305 85 As75 7.000000e-01  
## 306 86 As75 7.000000e-01  
## 307 0 As75 1.900000e+00  
## 308 0 As75 2.000000e+00  
## 309 0 As75 1.510000e+01  
## 310 0 As75 4.500000e+00  
## 311 NIST As75 4.000000e-01  
## 312 Check10 As75 1.000000e+00  
## 313 0 As75 2.400000e+00  
## 314 52 As75 6.000000e-01  
## 315 53 As75 5.000000e-01  
## 316 54 As75 4.200000e+00  
## 317 55 As75 4.200000e+00  
## 318 0 As75 3.000000e-01  
## 319 0 As75 5.300000e+00  
## 320 87 As75 1.770000e+01  
## 321 88 As75 1.700000e+00  
## 322 89 As75 1.400000e+00  
## 323 90 As75 1.600000e+00  
## 324 91 As75 2.100000e+00  
## 325 92 As75 4.000000e-01  
## 326 93 As75 1.200000e+00  
## 327 94 As75 2.000000e-01  
## 328 95 As75 6.000000e-01  
## 329 96 As75 7.000000e-01  
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## 331 56 As75 4.000000e-01  
## 332 57 As75 1.300000e+00  
## 333 58 As75 1.700000e+00  
## 334 59 As75 4.000000e-01  
## 335 H2O As75 3.900000e+00  
## 336 H2O As75 8.400000e+00  
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## 338 Check10 As75 1.200000e+00  
## 339 0 As75 5.800000e+00  
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## 341 0 Cd111 NA  
## 342 0 Cd111 1.732051e+02  
## 343 0 Cd111 1.000500e+02  
## 344 65 Cd111 1.732051e+02  
## 345 66 Cd111 5.274208e+00  
## 346 67 Cd111 6.196763e-01  
## 347 68 Cd111 2.982682e+00  
## 348 69 Cd111 1.388150e+00  
## 349 70 Cd111 2.322128e+00  
## 350 71 Cd111 4.899394e-01  
## 351 72 Cd111 5.311060e-01  
## 352 73 Cd111 5.792408e-01  
## 353 74 Cd111 8.345537e-01  
## 354 75 Cd111 4.823506e-01  
## 355 0 Cd111 3.834238e+01  
## 356 0 Cd111 3.780185e+01  
## 357 0 Cd111 9.350480e+00  
## 358 0 Cd111 4.821895e+01  
## 359 NIST Cd111 4.090906e+00  
## 360 6 Cd111 7.752058e+00  
## 361 7 Cd111 3.020248e+01  
## 362 8 Cd111 3.446667e+01  
## 363 9 Cd111 2.716770e+01  
## 364 10 Cd111 4.815973e+01  
## 365 11 Cd111 4.581987e+01  
## 366 12 Cd111 1.438107e+01  
## 367 13 Cd111 2.389894e+00  
## 368 14 Cd111 7.436564e+00  
## 369 15 Cd111 3.639763e+00  
## 370 16 Cd111 6.589804e+00  
## 371 17 Cd111 3.207613e+00  
## 372 0 Cd111 3.674725e+01  
## 373 Check10 Cd111 8.542749e-01  
## 374 0 Cd111 1.145644e+02  
## 375 18 Cd111 2.558619e+01  
## 376 19 Cd111 4.528778e+00  
## 377 20 Cd111 2.886270e+01  
## 378 21 Cd111 2.548839e+01  
## 379 22 Cd111 1.486697e+01  
## 380 23 Cd111 4.421315e+00  
## 381 24 Cd111 1.117436e+01  
## 382 25 Cd111 1.321091e+01  
## 383 26 Cd111 4.562823e+00  
## 384 27 Cd111 3.713291e+00  
## 385 38 Cd111 1.319805e+01  
## 386 39 Cd111 2.696806e+00  
## 387 0 Cd111 1.323254e+02  
## 388 Check10 Cd111 3.843831e-01  
## 389 0 Cd111 2.035549e+01  
## 390 40 Cd111 1.467333e+01  
## 391 41 Cd111 1.149205e+01  
## 392 42 Cd111 6.186691e+01  
## 393 43 Cd111 3.780185e+01  
## 394 44 Cd111 2.971787e+00  
## 395 45 Cd111 3.413513e+01  
## 396 46 Cd111 1.549247e+01  
## 397 47 Cd111 2.212561e+00  
## 398 48 Cd111 6.074569e+00  
## 399 49 Cd111 9.165741e+01  
## 400 50 Cd111 3.330000e+01  
## 401 51 Cd111 1.471337e+01  
## 402 0 Cd111 1.732051e+02  
## 403 Check10 Cd111 8.885703e-01  
## 404 0 Cd111 1.000500e+02  
## 405 0 Cd111 9.163974e+01  
## 406 Check10 Cd111 1.715270e+00  
## 407 0 Cd111 3.335000e+01  
## 408 0 Cd111 1.001000e+02  
## 409 76 Cd111 1.732000e+02  
## 410 77 Cd111 5.300000e+00  
## 411 78 Cd111 6.000000e-01  
## 412 79 Cd111 3.000000e+00  
## 413 80 Cd111 1.400000e+00  
## 414 81 Cd111 2.300000e+00  
## 415 82 Cd111 5.000000e-01  
## 416 83 Cd111 5.000000e-01  
## 417 84 Cd111 6.000000e-01  
## 418 85 Cd111 8.000000e-01  
## 419 86 Cd111 5.000000e-01  
## 420 0 Cd111 1.720000e+01  
## 421 0 Cd111 2.040000e+01  
## 422 0 Cd111 4.880000e+01  
## 423 0 Cd111 5.730000e+01  
## 424 NIST Cd111 4.600000e+00  
## 425 Check10 Cd111 1.800000e+00  
## 426 0 Cd111 9.580000e+01  
## 427 52 Cd111 6.400000e+00  
## 428 53 Cd111 2.200000e+00  
## 429 54 Cd111 7.700000e+00  
## 430 55 Cd111 5.770000e+01  
## 431 0 Cd111 8.740000e+01  
## 432 0 Cd111 1.001000e+02  
## 433 87 Cd111 1.732000e+02  
## 434 88 Cd111 5.300000e+00  
## 435 89 Cd111 6.000000e-01  
## 436 90 Cd111 3.000000e+00  
## 437 91 Cd111 1.400000e+00  
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## 439 93 Cd111 5.000000e-01  
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## 443 97 Cd111 5.000000e-01  
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## 445 57 Cd111 1.600000e+00  
## 446 58 Cd111 1.020000e+01  
## 447 59 Cd111 1.600000e+00  
## 448 H2O Cd111 1.732000e+02  
## 449 H2O Cd111 1.001000e+02  
## 450 0 Cd111 1.145000e+02  
## 451 Check10 Cd111 1.300000e+00  
## 452 0 Cd111 9.440000e+01  
## 453 0 Cd114 2.787028e+01  
## 454 0 Cd114 2.058400e+01  
## 455 0 Cd114 8.334934e+00  
## 456 0 Cd114 2.967481e+01  
## 457 65 Cd114 4.323169e+01  
## 458 66 Cd114 1.448323e+00  
## 459 67 Cd114 3.363097e-01  
## 460 68 Cd114 7.761039e-01  
## 461 69 Cd114 2.701645e-01  
## 462 70 Cd114 1.615268e-01  
## 463 71 Cd114 5.935784e-01  
## 464 72 Cd114 5.462463e-01  
## 465 73 Cd114 2.239205e-01  
## 466 74 Cd114 4.407081e-01  
## 467 75 Cd114 2.176914e-01  
## 468 0 Cd114 2.218807e+01  
## 469 0 Cd114 1.203931e+01  
## 470 0 Cd114 6.777275e+00  
## 471 0 Cd114 6.306354e+00  
## 472 NIST Cd114 8.583556e-01  
## 473 6 Cd114 2.218120e+00  
## 474 7 Cd114 1.046615e+01  
## 475 8 Cd114 2.399613e+00  
## 476 9 Cd114 1.817404e+00  
## 477 10 Cd114 2.136798e+00  
## 478 11 Cd114 7.916026e+00  
## 479 12 Cd114 4.518161e+00  
## 480 13 Cd114 7.973273e-01  
## 481 14 Cd114 3.578916e+00  
## 482 15 Cd114 6.185520e-01  
## 483 16 Cd114 3.498964e+00  
## 484 17 Cd114 7.797758e-01  
## 485 0 Cd114 7.886935e+00  
## 486 Check10 Cd114 8.511260e-01  
## 487 0 Cd114 1.336163e+01  
## 488 18 Cd114 2.119357e+00  
## 489 19 Cd114 4.315135e-01  
## 490 20 Cd114 1.284098e+01  
## 491 21 Cd114 2.968032e+00  
## 492 22 Cd114 2.545185e+00  
## 493 23 Cd114 1.081185e+00  
## 494 24 Cd114 1.625366e+00  
## 495 25 Cd114 4.442849e-01  
## 496 26 Cd114 4.701255e-01  
## 497 27 Cd114 2.365168e-01  
## 498 38 Cd114 2.111483e+00  
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## 502 0 Cd114 2.156401e+01  
## 503 40 Cd114 8.624784e-01  
## 504 41 Cd114 1.466621e+00  
## 505 42 Cd114 1.490018e+01  
## 506 43 Cd114 1.750252e+01  
## 507 44 Cd114 1.151281e+00  
## 508 45 Cd114 1.570172e+00  
## 509 46 Cd114 3.132081e+00  
## 510 47 Cd114 4.509668e-01  
## 511 48 Cd114 2.937611e+00  
## 512 49 Cd114 8.483334e+00  
## 513 50 Cd114 8.388235e+00  
## 514 51 Cd114 2.049520e+00  
## 515 0 Cd114 1.396798e+01  
## 516 Check10 Cd114 5.175753e-01  
## 517 0 Cd114 6.448016e-01  
## 518 0 Cd114 3.128738e+01  
## 519 Check10 Cd114 1.197666e+00  
## 520 0 Cd114 2.325735e+01  
## 521 0 Cd114 2.970000e+01  
## 522 76 Cd114 4.320000e+01  
## 523 77 Cd114 1.400000e+00  
## 524 78 Cd114 3.000000e-01  
## 525 79 Cd114 8.000000e-01  
## 526 80 Cd114 3.000000e-01  
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## 528 82 Cd114 6.000000e-01  
## 529 83 Cd114 5.000000e-01  
## 530 84 Cd114 2.000000e-01  
## 531 85 Cd114 4.000000e-01  
## 532 86 Cd114 2.000000e-01  
## 533 0 Cd114 4.500000e+00  
## 534 0 Cd114 1.500000e+00  
## 535 0 Cd114 4.900000e+00  
## 536 0 Cd114 2.750000e+01  
## 537 NIST Cd114 1.100000e+00  
## 538 Check10 Cd114 1.200000e+00  
## 539 0 Cd114 1.360000e+01  
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## 541 53 Cd114 5.000000e-01  
## 542 54 Cd114 2.100000e+00  
## 543 55 Cd114 4.000000e+00  
## 544 0 Cd114 1.110000e+01  
## 545 0 Cd114 2.970000e+01  
## 546 87 Cd114 4.320000e+01  
## 547 88 Cd114 1.400000e+00  
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## 555 96 Cd114 4.000000e-01  
## 556 97 Cd114 2.000000e-01  
## 557 56 Cd114 2.700000e+00  
## 558 57 Cd114 6.000000e-01  
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## 562 H2O Cd114 2.260000e+01  
## 563 0 Cd114 7.500000e+00  
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## 568 0 Pb208 1.668232e+01  
## 569 0 Pb208 1.492757e+01  
## 570 65 Pb208 8.427985e+00  
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## 572 67 Pb208 3.337076e+00  
## 573 68 Pb208 3.253740e+00  
## 574 69 Pb208 2.650687e+00  
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## 576 71 Pb208 2.056945e+00  
## 577 72 Pb208 1.111096e+00  
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## 587 7 Pb208 1.584288e+01  
## 588 8 Pb208 1.821880e+00  
## 589 9 Pb208 2.627063e+00  
## 590 10 Pb208 1.373422e+00  
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## 592 12 Pb208 5.624186e-01  
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## 595 15 Pb208 1.367406e+00  
## 596 16 Pb208 9.938879e-01  
## 597 17 Pb208 9.544795e-01  
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## 600 0 Pb208 5.722256e+00  
## 601 18 Pb208 5.431740e-01  
## 602 19 Pb208 7.523759e-01  
## 603 20 Pb208 5.323331e+00  
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## 605 22 Pb208 1.249741e+00  
## 606 23 Pb208 1.406859e+00  
## 607 24 Pb208 1.059441e+00  
## 608 25 Pb208 2.578568e+00  
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## 610 27 Pb208 1.072128e+00  
## 611 38 Pb208 6.174154e-01  
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## 617 41 Pb208 1.824309e+00  
## 618 42 Pb208 9.404900e+00  
## 619 43 Pb208 2.384069e+00  
## 620 44 Pb208 8.679372e-02  
## 621 45 Pb208 8.814001e-01  
## 622 46 Pb208 5.662736e-01  
## 623 47 Pb208 6.955838e-01  
## 624 48 Pb208 9.092147e-01  
## 625 49 Pb208 8.640539e+00  
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## 627 51 Pb208 7.236162e-01  
## 628 0 Pb208 1.227536e+01  
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## 634 0 Pb208 1.490000e+01  
## 635 76 Pb208 8.400000e+00  
## 636 77 Pb208 3.700000e+00  
## 637 78 Pb208 3.300000e+00  
## 638 79 Pb208 3.300000e+00  
## 639 80 Pb208 2.700000e+00  
## 640 81 Pb208 4.000000e-01  
## 641 82 Pb208 2.100000e+00  
## 642 83 Pb208 1.100000e+00  
## 643 84 Pb208 5.000000e-01  
## 644 85 Pb208 5.000000e-01  
## 645 86 Pb208 3.000000e-01  
## 646 0 Pb208 2.990000e+01  
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## 654 53 Pb208 1.000000e+00  
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## 660 88 Pb208 3.700000e+00  
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## 669 97 Pb208 3.000000e-01  
## 670 56 Pb208 4.800000e+00  
## 671 57 Pb208 1.000000e+00  
## 672 58 Pb208 7.000000e-01  
## 673 59 Pb208 7.000000e-01  
## 674 H2O Pb208 3.100000e+00  
## 675 H2O Pb208 1.140000e+01  
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## 677 Check10 Pb208 1.300000e+00  
## 678 0 Pb208 2.800000e+00  
## 679 0 Ge72 7.392395e+04  
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## 681 0 Ge72 7.308365e+04  
## 682 0 Ge72 7.271374e+04  
## 683 65 Ge72 8.065182e+04  
## 684 66 Ge72 7.310766e+04  
## 685 67 Ge72 7.349920e+04  
## 686 68 Ge72 7.341969e+04  
## 687 69 Ge72 7.356037e+04  
## 688 70 Ge72 7.414258e+04  
## 689 71 Ge72 7.748021e+04  
## 690 72 Ge72 7.446098e+04  
## 691 73 Ge72 7.483330e+04  
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## 693 75 Ge72 7.280290e+04  
## 694 0 Ge72 7.239528e+04  
## 695 0 Ge72 7.113158e+04  
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## 697 0 Ge72 7.076550e+04  
## 698 NIST Ge72 7.335715e+04  
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## 702 9 Ge72 7.141664e+04  
## 703 10 Ge72 7.234343e+04  
## 704 11 Ge72 7.158436e+04  
## 705 12 Ge72 7.282975e+04  
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## 707 14 Ge72 7.326119e+04  
## 708 15 Ge72 7.409607e+04  
## 709 16 Ge72 7.507321e+04  
## 710 17 Ge72 7.427560e+04  
## 711 0 Ge72 7.322681e+04  
## 712 Check10 Ge72 7.483212e+04  
## 713 0 Ge72 7.362314e+04  
## 714 18 Ge72 7.446579e+04  
## 715 19 Ge72 7.572230e+04  
## 716 20 Ge72 7.371973e+04  
## 717 21 Ge72 7.509326e+04  
## 718 22 Ge72 7.491367e+04  
## 719 23 Ge72 7.528301e+04  
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## 721 25 Ge72 7.647379e+04  
## 722 26 Ge72 7.666444e+04  
## 723 27 Ge72 7.702512e+04  
## 724 38 Ge72 7.607209e+04  
## 725 39 Ge72 7.799106e+04  
## 726 0 Ge72 7.671230e+04  
## 727 Check10 Ge72 7.633509e+04  
## 728 0 Ge72 7.587355e+04  
## 729 40 Ge72 7.493837e+04  
## 730 41 Ge72 7.743872e+04  
## 731 42 Ge72 7.487320e+04  
## 732 43 Ge72 7.695801e+04  
## 733 44 Ge72 7.702603e+04  
## 734 45 Ge72 7.652604e+04  
## 735 46 Ge72 7.673141e+04  
## 736 47 Ge72 7.905725e+04  
## 737 48 Ge72 7.747120e+04  
## 738 49 Ge72 7.722796e+04  
## 739 50 Ge72 7.351837e+04  
## 740 51 Ge72 7.656361e+04  
## 741 0 Ge72 7.712728e+04  
## 742 Check10 Ge72 7.758727e+04  
## 743 0 Ge72 7.890213e+04  
## 744 0 Ge72 8.180494e+04  
## 745 Check10 Ge72 8.148719e+04  
## 746 0 Ge72 8.109479e+04  
## 747 0 Ge72 7.271374e+04  
## 748 76 Ge72 8.065182e+04  
## 749 77 Ge72 7.310766e+04  
## 750 78 Ge72 7.349920e+04  
## 751 79 Ge72 7.341969e+04  
## 752 80 Ge72 7.356037e+04  
## 753 81 Ge72 7.414258e+04  
## 754 82 Ge72 7.748021e+04  
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## 756 84 Ge72 7.483330e+04  
## 757 85 Ge72 7.536762e+04  
## 758 86 Ge72 7.280290e+04  
## 759 0 Ge72 8.172135e+04  
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## 764 Check10 Ge72 8.449737e+04  
## 765 0 Ge72 8.246552e+04  
## 766 52 Ge72 8.067176e+04  
## 767 53 Ge72 8.261199e+04  
## 768 54 Ge72 8.073560e+04  
## 769 55 Ge72 8.127572e+04  
## 770 0 Ge72 7.158896e+04  
## 771 0 Ge72 7.271374e+04  
## 772 87 Ge72 8.065182e+04  
## 773 88 Ge72 7.310766e+04  
## 774 89 Ge72 7.349920e+04  
## 775 90 Ge72 7.341969e+04  
## 776 91 Ge72 7.356037e+04  
## 777 92 Ge72 7.414258e+04  
## 778 93 Ge72 7.748021e+04  
## 779 94 Ge72 7.446098e+04  
## 780 95 Ge72 7.483330e+04  
## 781 96 Ge72 7.536762e+04  
## 782 97 Ge72 7.280290e+04  
## 783 56 Ge72 8.508116e+04  
## 784 57 Ge72 7.984046e+04  
## 785 58 Ge72 8.057508e+04  
## 786 59 Ge72 8.190104e+04  
## 787 H2O Ge72 8.086680e+04  
## 788 H2O Ge72 8.034373e+04  
## 789 0 Ge72 8.254157e+04  
## 790 Check10 Ge72 8.102893e+04  
## 791 0 Ge72 8.131153e+04

1. Tidying the CPS Data

#Tidying the CPS Data for ICPMS and combining back in the RSD data  
ICPMS\_tidy <- ICPMS\_imported %>%   
   
 #Starting with renaming all of the CPS data with the appropriate metal  
 rename(Cr52 = CPS,  
 Cr53 = CPS.1,  
 As75 = CPS.2,  
 Cd111 = CPS.3,  
 Cd114 = CPS.4,  
 Pb208 = CPS.5,  
 Ge72 = CPS.7)%>%   
 #Next gathering the CPS data and creating a column that indicates the corresponding metal   
 gather(Cr52, Cr53, As75,   
 Cd111, Cd114, Pb208, Ge72,   
 key= "metal", value="CPS")%>%   
   
 #Selecting the relevant columns   
 #this can be adjusted to fit the data analysis being performed  
 select(Sample.Key, metal, CPS)%>%   
   
 #mutating in the RSD data  
 mutate(RSD = RSD\_data$RSD)  
  
  
#Confirming that the RSD data properly matches the CPS data  
#Should output TRUE if the data is properly matching   
all(RSD\_data$Sample.Key==ICPMS\_tidy$Sample.Key, RSD\_data$metal==ICPMS\_tidy$metal)

## [1] TRUE

#Previewing the ICPMS Data  
ICPMS\_tidy

## Sample.Key metal CPS RSD  
## 1 0 Cr52 1.810177e+03 3.226865e+00  
## 2 0 Cr52 1.685707e+03 3.680489e+00  
## 3 0 Cr52 1.761280e+03 4.317976e+00  
## 4 0 Cr52 1.724600e+03 5.448670e+00  
## 5 65 Cr52 1.360123e+03 4.069560e+01  
## 6 66 Cr52 8.276697e+03 3.899334e+00  
## 7 67 Cr52 1.498678e+04 5.405808e-01  
## 8 68 Cr52 2.733375e+04 1.441860e+00  
## 9 69 Cr52 6.616733e+04 9.332371e-01  
## 10 70 Cr52 1.303144e+05 2.176385e-01  
## 11 71 Cr52 2.716008e+05 7.354312e-01  
## 12 72 Cr52 7.694588e+05 9.168668e-01  
## 13 73 Cr52 1.345846e+06 7.706362e-01  
## 14 74 Cr52 6.806556e+06 8.205068e-01  
## 15 75 Cr52 1.385369e+07 2.186808e-01  
## 16 0 Cr52 2.252463e+03 1.218767e+01  
## 17 0 Cr52 1.750170e+03 6.864146e-01  
## 18 0 Cr52 1.979087e+03 7.646155e+00  
## 19 0 Cr52 1.851290e+03 3.603566e+00  
## 20 NIST Cr52 4.798599e+04 1.272753e-01  
## 21 6 Cr52 1.414462e+05 4.998079e-01  
## 22 7 Cr52 7.664203e+03 1.242099e+00  
## 23 8 Cr52 6.477647e+04 1.640557e+00  
## 24 9 Cr52 7.542990e+03 2.150435e+00  
## 25 10 Cr52 2.152244e+04 1.436397e+00  
## 26 11 Cr52 8.698017e+03 5.690129e-01  
## 27 12 Cr52 6.704487e+04 7.261604e-01  
## 28 13 Cr52 2.582171e+05 4.688423e-01  
## 29 14 Cr52 7.397862e+04 5.164272e-01  
## 30 15 Cr52 2.602317e+05 1.326622e+00  
## 31 16 Cr52 9.562305e+04 1.063342e+00  
## 32 17 Cr52 2.972667e+05 1.439579e+00  
## 33 0 Cr52 1.834620e+03 4.619868e+00  
## 34 Check10 Cr52 1.422105e+05 5.758326e-01  
## 35 0 Cr52 1.707937e+03 8.499806e+00  
## 36 18 Cr52 7.717385e+04 2.030678e+00  
## 37 19 Cr52 2.159292e+05 5.421739e-01  
## 38 20 Cr52 8.237793e+03 3.202425e+00  
## 39 21 Cr52 4.260328e+04 1.182634e+00  
## 40 22 Cr52 1.363738e+05 1.603809e+00  
## 41 23 Cr52 2.287993e+05 5.350505e-01  
## 42 24 Cr52 2.763932e+05 1.322009e+00  
## 43 25 Cr52 1.070254e+04 2.772304e+00  
## 44 26 Cr52 1.534153e+05 8.025562e-01  
## 45 27 Cr52 3.137944e+05 2.868119e-01  
## 46 38 Cr52 1.888591e+05 5.008846e-01  
## 47 39 Cr52 2.361630e+05 5.921260e-01  
## 48 0 Cr52 1.795730e+03 3.983537e+00  
## 49 Check10 Cr52 1.468337e+05 1.108403e+00  
## 50 0 Cr52 2.066890e+03 3.073360e+00  
## 51 40 Cr52 7.073455e+04 1.358336e+00  
## 52 41 Cr52 9.832519e+04 6.907821e-01  
## 53 42 Cr52 8.278940e+03 2.131938e+00  
## 54 43 Cr52 7.977670e+03 2.202995e+00  
## 55 44 Cr52 3.271045e+05 6.585698e-01  
## 56 45 Cr52 9.963547e+04 1.823289e-01  
## 57 46 Cr52 1.362243e+05 8.517556e-01  
## 58 47 Cr52 3.435543e+05 3.490373e-01  
## 59 48 Cr52 1.736069e+05 5.834510e-01  
## 60 49 Cr52 8.469017e+03 3.000115e+00  
## 61 50 Cr52 8.334543e+03 7.488315e-01  
## 62 51 Cr52 6.034384e+04 1.177642e+00  
## 63 0 Cr52 1.812397e+03 8.090274e+00  
## 64 Check10 Cr52 1.485291e+05 1.052903e+00  
## 65 0 Cr52 1.892403e+03 5.695216e+00  
## 66 0 Cr52 2.064663e+03 4.697208e+00  
## 67 Check10 Cr52 1.544706e+05 1.874972e-01  
## 68 0 Cr52 2.099110e+03 5.484230e+00  
## 69 0 Cr52 1.724600e+03 5.400000e+00  
## 70 76 Cr52 1.360120e+03 4.070000e+01  
## 71 77 Cr52 8.276700e+03 3.900000e+00  
## 72 78 Cr52 1.498678e+04 5.000000e-01  
## 73 79 Cr52 2.733375e+04 1.400000e+00  
## 74 80 Cr52 6.616733e+04 9.000000e-01  
## 75 81 Cr52 1.303144e+05 2.000000e-01  
## 76 82 Cr52 2.716008e+05 7.000000e-01  
## 77 83 Cr52 7.694588e+05 9.000000e-01  
## 78 84 Cr52 1.345846e+06 8.000000e-01  
## 79 85 Cr52 6.806556e+06 8.000000e-01  
## 80 86 Cr52 1.385369e+07 2.000000e-01  
## 81 0 Cr52 2.240240e+03 4.800000e+00  
## 82 0 Cr52 2.235800e+03 7.800000e+00  
## 83 0 Cr52 2.480280e+03 3.400000e+00  
## 84 0 Cr52 2.107990e+03 4.400000e+00  
## 85 NIST Cr52 5.749653e+04 2.200000e+00  
## 86 Check10 Cr52 1.668949e+05 7.000000e-01  
## 87 0 Cr52 2.079110e+03 7.400000e+00  
## 88 52 Cr52 1.180807e+05 1.000000e+00  
## 89 53 Cr52 3.734691e+05 6.000000e-01  
## 90 54 Cr52 1.041738e+05 9.000000e-01  
## 91 55 Cr52 9.104900e+03 2.200000e+00  
## 92 0 Cr52 2.077990e+03 1.800000e+00  
## 93 0 Cr52 1.724600e+03 5.400000e+00  
## 94 87 Cr52 1.360120e+03 4.070000e+01  
## 95 88 Cr52 8.276700e+03 3.900000e+00  
## 96 89 Cr52 1.498678e+04 5.000000e-01  
## 97 90 Cr52 2.733375e+04 1.400000e+00  
## 98 91 Cr52 6.616733e+04 9.000000e-01  
## 99 92 Cr52 1.303144e+05 2.000000e-01  
## 100 93 Cr52 2.716008e+05 7.000000e-01  
## 101 94 Cr52 7.694588e+05 9.000000e-01  
## 102 95 Cr52 1.345846e+06 8.000000e-01  
## 103 96 Cr52 6.806556e+06 8.000000e-01  
## 104 97 Cr52 1.385369e+07 2.000000e-01  
## 105 56 Cr52 1.068536e+05 2.600000e+00  
## 106 57 Cr52 3.190569e+05 1.100000e+00  
## 107 58 Cr52 1.260956e+05 7.000000e-01  
## 108 59 Cr52 3.541408e+05 4.000000e-01  
## 109 H2O Cr52 1.027226e+04 6.000000e-01  
## 110 H2O Cr52 1.037229e+04 2.700000e+00  
## 111 0 Cr52 2.195790e+03 7.900000e+00  
## 112 Check10 Cr52 1.624084e+05 1.700000e+00  
## 113 0 Cr52 2.140220e+03 3.100000e+00  
## 114 0 Cr53 2.178900e+02 5.286990e+00  
## 115 0 Cr53 1.875567e+02 1.307827e+01  
## 116 0 Cr53 2.105567e+02 7.352082e+00  
## 117 0 Cr53 1.940033e+02 9.093396e+00  
## 118 65 Cr53 1.447767e+02 4.054332e+01  
## 119 66 Cr53 9.653633e+02 2.590283e+00  
## 120 67 Cr53 1.795540e+03 6.829767e-01  
## 121 68 Cr53 3.397220e+03 1.213436e+00  
## 122 69 Cr53 8.099483e+03 1.390781e+00  
## 123 70 Cr53 1.601014e+04 6.570360e-01  
## 124 71 Cr53 3.297050e+04 2.633507e-01  
## 125 72 Cr53 9.468235e+04 5.589255e-01  
## 126 73 Cr53 1.627114e+05 1.478827e-01  
## 127 74 Cr53 8.225690e+05 7.160108e-01  
## 128 75 Cr53 1.692230e+06 2.487280e-01  
## 129 0 Cr53 2.803367e+02 3.191588e+00  
## 130 0 Cr53 2.114467e+02 3.403459e+00  
## 131 0 Cr53 2.455567e+02 4.617253e+00  
## 132 0 Cr53 2.180000e+02 5.963303e+00  
## 133 NIST Cr53 5.917650e+03 1.584789e+00  
## 134 6 Cr53 1.727384e+04 4.539356e-01  
## 135 7 Cr53 9.434700e+02 1.489198e+00  
## 136 8 Cr53 7.884053e+03 3.187410e-01  
## 137 9 Cr53 9.099167e+02 1.885160e+00  
## 138 10 Cr53 2.610417e+03 8.073814e-01  
## 139 11 Cr53 1.028810e+03 1.722537e+00  
## 140 12 Cr53 8.160400e+03 6.310522e-01  
## 141 13 Cr53 3.144505e+04 2.824532e-01  
## 142 14 Cr53 9.107623e+03 4.447171e-01  
## 143 15 Cr53 3.196707e+04 5.330376e-01  
## 144 16 Cr53 1.156324e+04 5.082718e-01  
## 145 17 Cr53 3.650875e+04 8.349954e-01  
## 146 0 Cr53 2.244467e+02 1.072271e+01  
## 147 Check10 Cr53 1.733245e+04 3.723317e-01  
## 148 0 Cr53 2.216700e+02 7.813646e-01  
## 149 18 Cr53 9.429900e+03 1.667788e+00  
## 150 19 Cr53 2.642573e+04 1.283747e-01  
## 151 20 Cr53 1.006587e+03 3.243749e+00  
## 152 21 Cr53 5.163523e+03 1.119280e+00  
## 153 22 Cr53 1.673968e+04 8.473051e-01  
## 154 23 Cr53 2.778250e+04 7.205136e-01  
## 155 24 Cr53 3.396297e+04 4.894629e-01  
## 156 25 Cr53 1.347167e+03 1.869649e+00  
## 157 26 Cr53 1.881413e+04 6.246969e-01  
## 158 27 Cr53 3.822911e+04 2.906033e-01  
## 159 38 Cr53 2.296685e+04 8.969125e-01  
## 160 39 Cr53 2.890345e+04 3.720971e-01  
## 161 0 Cr53 2.265600e+02 4.644324e+00  
## 162 Check10 Cr53 1.787841e+04 6.626285e-01  
## 163 0 Cr53 2.332267e+02 1.057291e+01  
## 164 40 Cr53 8.596043e+03 6.942337e-01  
## 165 41 Cr53 1.206701e+04 5.986999e-01  
## 166 42 Cr53 9.850300e+02 4.082049e+00  
## 167 43 Cr53 9.920300e+02 3.127017e+00  
## 168 44 Cr53 4.008394e+04 2.531272e-01  
## 169 45 Cr53 1.223801e+04 3.991635e-01  
## 170 46 Cr53 1.685802e+04 6.254541e-01  
## 171 47 Cr53 4.192172e+04 9.467458e-01  
## 172 48 Cr53 2.131052e+04 1.600792e-01  
## 173 49 Cr53 1.056590e+03 2.019569e+00  
## 174 50 Cr53 1.021367e+03 1.498771e+00  
## 175 51 Cr53 7.410860e+03 3.917571e-02  
## 176 0 Cr53 2.228933e+02 9.347750e+00  
## 177 Check10 Cr53 1.821475e+04 8.186889e-01  
## 178 0 Cr53 2.277800e+02 7.379195e-01  
## 179 0 Cr53 2.440000e+02 2.168649e+00  
## 180 Check10 Cr53 1.872481e+04 1.146690e+00  
## 181 0 Cr53 2.438900e+02 1.460981e+00  
## 182 0 Cr53 1.940000e+02 9.100000e+00  
## 183 76 Cr53 1.447800e+02 4.050000e+01  
## 184 77 Cr53 9.653600e+02 2.600000e+00  
## 185 78 Cr53 1.795540e+03 7.000000e-01  
## 186 79 Cr53 3.397220e+03 1.200000e+00  
## 187 80 Cr53 8.099480e+03 1.400000e+00  
## 188 81 Cr53 1.601014e+04 7.000000e-01  
## 189 82 Cr53 3.297050e+04 3.000000e-01  
## 190 83 Cr53 9.468235e+04 6.000000e-01  
## 191 84 Cr53 1.627114e+05 1.000000e-01  
## 192 85 Cr53 8.225690e+05 7.000000e-01  
## 193 86 Cr53 1.692230e+06 2.000000e-01  
## 194 0 Cr53 2.762200e+02 1.800000e+00  
## 195 0 Cr53 2.604500e+02 5.900000e+00  
## 196 0 Cr53 2.961100e+02 3.000000e+00  
## 197 0 Cr53 2.585600e+02 4.200000e+00  
## 198 NIST Cr53 7.087280e+03 4.000000e-01  
## 199 Check10 Cr53 2.022341e+04 1.300000e+00  
## 200 0 Cr53 2.687200e+02 4.900000e+00  
## 201 52 Cr53 1.434409e+04 5.000000e-01  
## 202 53 Cr53 4.551119e+04 7.000000e-01  
## 203 54 Cr53 1.260648e+04 7.000000e-01  
## 204 55 Cr53 1.117820e+03 1.700000e+00  
## 205 0 Cr53 2.485600e+02 3.800000e+00  
## 206 0 Cr53 1.940000e+02 9.100000e+00  
## 207 87 Cr53 1.447800e+02 4.050000e+01  
## 208 88 Cr53 9.653600e+02 2.600000e+00  
## 209 89 Cr53 1.795540e+03 7.000000e-01  
## 210 90 Cr53 3.397220e+03 1.200000e+00  
## 211 91 Cr53 8.099480e+03 1.400000e+00  
## 212 92 Cr53 1.601014e+04 7.000000e-01  
## 213 93 Cr53 3.297050e+04 3.000000e-01  
## 214 94 Cr53 9.468235e+04 6.000000e-01  
## 215 95 Cr53 1.627114e+05 1.000000e-01  
## 216 96 Cr53 8.225690e+05 7.000000e-01  
## 217 97 Cr53 1.692230e+06 2.000000e-01  
## 218 56 Cr53 1.315565e+04 9.000000e-01  
## 219 57 Cr53 3.892300e+04 6.000000e-01  
## 220 58 Cr53 1.537993e+04 9.000000e-01  
## 221 59 Cr53 4.317080e+04 3.000000e-01  
## 222 H2O Cr53 1.251270e+03 1.800000e+00  
## 223 H2O Cr53 1.247270e+03 2.200000e+00  
## 224 0 Cr53 2.572300e+02 6.400000e+00  
## 225 Check10 Cr53 1.952442e+04 1.800000e+00  
## 226 0 Cr53 2.622300e+02 6.400000e+00  
## 227 0 As75 4.653433e+02 5.885899e+00  
## 228 0 As75 3.328933e+02 3.750263e+00  
## 229 0 As75 3.521133e+02 3.419095e+00  
## 230 0 As75 3.972300e+02 5.297126e+00  
## 231 65 As75 3.982300e+02 1.767364e+01  
## 232 66 As75 1.197267e+03 1.656124e+00  
## 233 67 As75 1.977783e+03 1.373984e+00  
## 234 68 As75 3.445233e+03 1.616618e+00  
## 235 69 As75 8.293940e+03 2.094664e+00  
## 236 70 As75 1.605163e+04 4.140387e-01  
## 237 71 As75 3.308167e+04 1.237437e+00  
## 238 72 As75 8.195548e+04 2.473291e-01  
## 239 73 As75 1.626539e+05 5.667939e-01  
## 240 74 As75 8.231175e+05 7.361890e-01  
## 241 75 As75 1.714248e+06 7.400396e-01  
## 242 0 As75 8.182433e+02 3.164488e+00  
## 243 0 As75 6.249033e+02 7.283886e+00  
## 244 0 As75 5.006733e+02 3.822819e+00  
## 245 0 As75 5.379000e+02 5.025319e+00  
## 246 NIST As75 1.899349e+04 1.131433e+00  
## 247 6 As75 2.456960e+03 2.292928e+00  
## 248 7 As75 4.002300e+02 7.555913e-01  
## 249 8 As75 1.931447e+03 1.751432e+00  
## 250 9 As75 4.297833e+02 7.027989e+00  
## 251 10 As75 9.212500e+02 1.161618e-01  
## 252 11 As75 4.294533e+02 9.600515e+00  
## 253 12 As75 2.653983e+03 2.392080e+00  
## 254 13 As75 7.754473e+03 1.482523e+00  
## 255 14 As75 1.613523e+03 1.485255e+00  
## 256 15 As75 7.846293e+03 7.960724e-01  
## 257 16 As75 3.599597e+03 1.610325e-01  
## 258 17 As75 8.928353e+03 1.075809e+00  
## 259 0 As75 5.789033e+02 2.470246e+00  
## 260 Check10 As75 1.647957e+04 1.287286e+00  
## 261 0 As75 3.232267e+02 4.032992e+00  
## 262 18 As75 1.933557e+03 1.908726e+00  
## 263 19 As75 6.509090e+03 1.113305e+00  
## 264 20 As75 4.935667e+02 1.363930e+00  
## 265 21 As75 1.317833e+03 2.715879e+00  
## 266 22 As75 3.624050e+03 2.532908e+00  
## 267 23 As75 6.605903e+03 1.365218e-01  
## 268 24 As75 3.896327e+03 1.759183e+00  
## 269 25 As75 3.817867e+02 5.000048e+00  
## 270 26 As75 1.904777e+03 1.671568e+00  
## 271 27 As75 9.168590e+03 7.573548e-01  
## 272 38 As75 1.954003e+03 2.486400e+00  
## 273 39 As75 7.095423e+03 1.942674e+00  
## 274 0 As75 4.471200e+02 3.639211e+00  
## 275 Check10 As75 1.706001e+04 8.759368e-01  
## 276 0 As75 5.303433e+02 5.533604e+00  
## 277 40 As75 1.932780e+03 2.479692e+00  
## 278 41 As75 2.883463e+03 1.307374e+00  
## 279 42 As75 5.543433e+02 5.121280e+00  
## 280 43 As75 4.840067e+02 2.245792e+00  
## 281 44 As75 9.495650e+03 9.131825e-01  
## 282 45 As75 2.469847e+03 9.618290e-01  
## 283 46 As75 1.878440e+03 2.592777e+00  
## 284 47 As75 9.730993e+03 2.671300e-01  
## 285 48 As75 1.766427e+03 2.614201e+00  
## 286 49 As75 4.056733e+02 3.207708e+00  
## 287 50 As75 3.947833e+02 3.555100e+00  
## 288 51 As75 2.457290e+03 2.833738e+00  
## 289 0 As75 3.561167e+02 8.254621e+00  
## 290 Check10 As75 1.706657e+04 4.828330e-01  
## 291 0 As75 3.588933e+02 1.035817e+00  
## 292 0 As75 5.896800e+02 2.981006e+00  
## 293 Check10 As75 1.800091e+04 6.228512e-01  
## 294 0 As75 5.604567e+02 3.569577e+00  
## 295 0 As75 3.972300e+02 5.300000e+00  
## 296 76 As75 3.982300e+02 1.770000e+01  
## 297 77 As75 1.197270e+03 1.700000e+00  
## 298 78 As75 1.977780e+03 1.400000e+00  
## 299 79 As75 3.445230e+03 1.600000e+00  
## 300 80 As75 8.293940e+03 2.100000e+00  
## 301 81 As75 1.605163e+04 4.000000e-01  
## 302 82 As75 3.308167e+04 1.200000e+00  
## 303 83 As75 8.195548e+04 2.000000e-01  
## 304 84 As75 1.626539e+05 6.000000e-01  
## 305 85 As75 8.231175e+05 7.000000e-01  
## 306 86 As75 1.714248e+06 7.000000e-01  
## 307 0 As75 9.618100e+02 1.900000e+00  
## 308 0 As75 8.743600e+02 2.000000e+00  
## 309 0 As75 9.763600e+02 1.510000e+01  
## 310 0 As75 7.938000e+02 4.500000e+00  
## 311 NIST As75 2.274372e+04 4.000000e-01  
## 312 Check10 As75 1.926400e+04 1.000000e+00  
## 313 0 As75 6.400100e+02 2.400000e+00  
## 314 52 As75 2.936700e+03 6.000000e-01  
## 315 53 As75 1.093936e+04 5.000000e-01  
## 316 54 As75 2.180360e+03 4.200000e+00  
## 317 55 As75 7.319100e+02 4.200000e+00  
## 318 0 As75 6.202300e+02 3.000000e-01  
## 319 0 As75 3.972300e+02 5.300000e+00  
## 320 87 As75 3.982300e+02 1.770000e+01  
## 321 88 As75 1.197270e+03 1.700000e+00  
## 322 89 As75 1.977780e+03 1.400000e+00  
## 323 90 As75 3.445230e+03 1.600000e+00  
## 324 91 As75 8.293940e+03 2.100000e+00  
## 325 92 As75 1.605163e+04 4.000000e-01  
## 326 93 As75 3.308167e+04 1.200000e+00  
## 327 94 As75 8.195548e+04 2.000000e-01  
## 328 95 As75 1.626539e+05 6.000000e-01  
## 329 96 As75 8.231175e+05 7.000000e-01  
## 330 97 As75 1.714248e+06 7.000000e-01  
## 331 56 As75 3.210640e+03 4.000000e-01  
## 332 57 As75 9.384260e+03 1.300000e+00  
## 333 58 As75 2.337160e+03 1.700000e+00  
## 334 59 As75 1.042438e+04 4.000000e-01  
## 335 H2O As75 5.633500e+02 3.900000e+00  
## 336 H2O As75 5.186800e+02 8.400000e+00  
## 337 0 As75 5.331200e+02 4.100000e+00  
## 338 Check10 As75 1.854314e+04 1.200000e+00  
## 339 0 As75 4.848400e+02 5.800000e+00  
## 340 0 Cd111 0.000000e+00 NA  
## 341 0 Cd111 0.000000e+00 NA  
## 342 0 Cd111 2.223333e+00 1.732051e+02  
## 343 0 Cd111 3.333333e+00 1.000500e+02  
## 344 65 Cd111 2.223333e+00 1.732051e+02  
## 345 66 Cd111 2.121343e+03 5.274208e+00  
## 346 67 Cd111 4.109570e+03 6.196763e-01  
## 347 68 Cd111 8.275717e+03 2.982682e+00  
## 348 69 Cd111 2.011471e+04 1.388150e+00  
## 349 70 Cd111 4.048754e+04 2.322128e+00  
## 350 71 Cd111 8.440363e+04 4.899394e-01  
## 351 72 Cd111 2.425954e+05 5.311060e-01  
## 352 73 Cd111 4.177049e+05 5.792408e-01  
## 353 74 Cd111 2.105879e+06 8.345537e-01  
## 354 75 Cd111 4.298395e+06 4.823506e-01  
## 355 0 Cd111 1.455633e+02 3.834238e+01  
## 356 0 Cd111 2.333667e+01 3.780185e+01  
## 357 0 Cd111 5.444667e+01 9.350480e+00  
## 358 0 Cd111 2.222333e+01 4.821895e+01  
## 359 NIST Cd111 4.590830e+03 4.090906e+00  
## 360 6 Cd111 2.444567e+02 7.752058e+00  
## 361 7 Cd111 2.778000e+01 3.020248e+01  
## 362 8 Cd111 1.744533e+02 3.446667e+01  
## 363 9 Cd111 2.555667e+01 2.716770e+01  
## 364 10 Cd111 8.111667e+01 4.815973e+01  
## 365 11 Cd111 1.111333e+01 4.581987e+01  
## 366 12 Cd111 1.644533e+02 1.438107e+01  
## 367 13 Cd111 3.508307e+03 2.389894e+00  
## 368 14 Cd111 2.211200e+02 7.436564e+00  
## 369 15 Cd111 3.416053e+03 3.639763e+00  
## 370 16 Cd111 2.044567e+02 6.589804e+00  
## 371 17 Cd111 3.958423e+03 3.207613e+00  
## 372 0 Cd111 1.889000e+01 3.674725e+01  
## 373 Check10 Cd111 4.179062e+04 8.542749e-01  
## 374 0 Cd111 1.333333e+01 1.145644e+02  
## 375 18 Cd111 2.077867e+02 2.558619e+01  
## 376 19 Cd111 3.733913e+03 4.528778e+00  
## 377 20 Cd111 2.000333e+01 2.886270e+01  
## 378 21 Cd111 2.289000e+02 2.548839e+01  
## 379 22 Cd111 2.177900e+02 1.486697e+01  
## 380 23 Cd111 2.903717e+03 4.421315e+00  
## 381 24 Cd111 3.444667e+02 1.117436e+01  
## 382 25 Cd111 9.556000e+01 1.321091e+01  
## 383 26 Cd111 2.633500e+02 4.562823e+00  
## 384 27 Cd111 4.157373e+03 3.713291e+00  
## 385 38 Cd111 3.055733e+02 1.319805e+01  
## 386 39 Cd111 3.091530e+03 2.696806e+00  
## 387 0 Cd111 6.666667e+00 1.323254e+02  
## 388 Check10 Cd111 4.177270e+04 3.843831e-01  
## 389 0 Cd111 1.889000e+01 2.035549e+01  
## 390 40 Cd111 1.822300e+02 1.467333e+01  
## 391 41 Cd111 2.766833e+02 1.149205e+01  
## 392 42 Cd111 1.555667e+01 6.186691e+01  
## 393 43 Cd111 2.333667e+01 3.780185e+01  
## 394 44 Cd111 4.124013e+03 2.971787e+00  
## 395 45 Cd111 3.389133e+02 3.413513e+01  
## 396 46 Cd111 2.266833e+02 1.549247e+01  
## 397 47 Cd111 4.347413e+03 2.212561e+00  
## 398 48 Cd111 2.077867e+02 6.074569e+00  
## 399 49 Cd111 1.111000e+01 9.165741e+01  
## 400 50 Cd111 1.000000e+01 3.330000e+01  
## 401 51 Cd111 2.055667e+02 1.471337e+01  
## 402 0 Cd111 3.333333e+00 1.732051e+02  
## 403 Check10 Cd111 4.163137e+04 8.885703e-01  
## 404 0 Cd111 3.333333e+00 1.000500e+02  
## 405 0 Cd111 5.556667e+00 9.163974e+01  
## 406 Check10 Cd111 4.382125e+04 1.715270e+00  
## 407 0 Cd111 2.000000e+01 3.335000e+01  
## 408 0 Cd111 3.330000e+00 1.001000e+02  
## 409 76 Cd111 2.220000e+00 1.732000e+02  
## 410 77 Cd111 2.121340e+03 5.300000e+00  
## 411 78 Cd111 4.109570e+03 6.000000e-01  
## 412 79 Cd111 8.275720e+03 3.000000e+00  
## 413 80 Cd111 2.011471e+04 1.400000e+00  
## 414 81 Cd111 4.048754e+04 2.300000e+00  
## 415 82 Cd111 8.440363e+04 5.000000e-01  
## 416 83 Cd111 2.425954e+05 5.000000e-01  
## 417 84 Cd111 4.177049e+05 6.000000e-01  
## 418 85 Cd111 2.105879e+06 8.000000e-01  
## 419 86 Cd111 4.298395e+06 5.000000e-01  
## 420 0 Cd111 6.222000e+01 1.720000e+01  
## 421 0 Cd111 1.889000e+01 2.040000e+01  
## 422 0 Cd111 4.445000e+01 4.880000e+01  
## 423 0 Cd111 8.890000e+00 5.730000e+01  
## 424 NIST Cd111 4.976490e+03 4.600000e+00  
## 425 Check10 Cd111 4.347594e+04 1.800000e+00  
## 426 0 Cd111 1.222000e+01 9.580000e+01  
## 427 52 Cd111 3.489100e+02 6.400000e+00  
## 428 53 Cd111 4.458550e+03 2.200000e+00  
## 429 54 Cd111 1.955700e+02 7.700000e+00  
## 430 55 Cd111 1.000000e+01 5.770000e+01  
## 431 0 Cd111 1.444000e+01 8.740000e+01  
## 432 0 Cd111 3.330000e+00 1.001000e+02  
## 433 87 Cd111 2.220000e+00 1.732000e+02  
## 434 88 Cd111 2.121340e+03 5.300000e+00  
## 435 89 Cd111 4.109570e+03 6.000000e-01  
## 436 90 Cd111 8.275720e+03 3.000000e+00  
## 437 91 Cd111 2.011471e+04 1.400000e+00  
## 438 92 Cd111 4.048754e+04 2.300000e+00  
## 439 93 Cd111 8.440363e+04 5.000000e-01  
## 440 94 Cd111 2.425954e+05 5.000000e-01  
## 441 95 Cd111 4.177049e+05 6.000000e-01  
## 442 96 Cd111 2.105879e+06 8.000000e-01  
## 443 97 Cd111 4.298395e+06 5.000000e-01  
## 444 56 Cd111 2.611300e+02 1.600000e+01  
## 445 57 Cd111 3.816160e+03 1.600000e+00  
## 446 58 Cd111 2.355700e+02 1.020000e+01  
## 447 59 Cd111 4.361870e+03 1.600000e+00  
## 448 H2O Cd111 4.440000e+00 1.732000e+02  
## 449 H2O Cd111 3.330000e+00 1.001000e+02  
## 450 0 Cd111 8.890000e+00 1.145000e+02  
## 451 Check10 Cd111 4.185983e+04 1.300000e+00  
## 452 0 Cd111 8.890000e+00 9.440000e+01  
## 453 0 Cd114 6.666667e+00 2.787028e+01  
## 454 0 Cd114 6.553333e+00 2.058400e+01  
## 455 0 Cd114 6.113333e+00 8.334934e+00  
## 456 0 Cd114 5.776667e+00 2.967481e+01  
## 457 65 Cd114 6.223333e+00 4.323169e+01  
## 458 66 Cd114 5.016853e+03 1.448323e+00  
## 459 67 Cd114 1.035400e+04 3.363097e-01  
## 460 68 Cd114 2.026614e+04 7.761039e-01  
## 461 69 Cd114 5.078245e+04 2.701645e-01  
## 462 70 Cd114 1.009423e+05 1.615268e-01  
## 463 71 Cd114 2.113009e+05 5.935784e-01  
## 464 72 Cd114 6.036589e+05 5.462463e-01  
## 465 73 Cd114 1.048247e+06 2.239205e-01  
## 466 74 Cd114 5.410833e+06 4.407081e-01  
## 467 75 Cd114 1.096414e+07 2.176914e-01  
## 468 0 Cd114 3.464500e+02 2.218807e+01  
## 469 0 Cd114 8.700000e+01 1.203931e+01  
## 470 0 Cd114 1.505533e+02 6.777275e+00  
## 471 0 Cd114 6.522333e+01 6.306354e+00  
## 472 NIST Cd114 1.154887e+04 8.583556e-01  
## 473 6 Cd114 8.510267e+02 2.218120e+00  
## 474 7 Cd114 5.744667e+01 1.046615e+01  
## 475 8 Cd114 4.693433e+02 2.399613e+00  
## 476 9 Cd114 7.422333e+01 1.817404e+00  
## 477 10 Cd114 2.034467e+02 2.136798e+00  
## 478 11 Cd114 4.044333e+01 7.916026e+00  
## 479 12 Cd114 4.803400e+02 4.518161e+00  
## 480 13 Cd114 9.178340e+03 7.973273e-01  
## 481 14 Cd114 8.432467e+02 3.578916e+00  
## 482 15 Cd114 9.031590e+03 6.185520e-01  
## 483 16 Cd114 6.106800e+02 3.498964e+00  
## 484 17 Cd114 1.008851e+04 7.797758e-01  
## 485 0 Cd114 4.711000e+01 7.886935e+00  
## 486 Check10 Cd114 1.020526e+05 8.511260e-01  
## 487 0 Cd114 2.977667e+01 1.336163e+01  
## 488 18 Cd114 8.934700e+02 2.119357e+00  
## 489 19 Cd114 9.471377e+03 4.315135e-01  
## 490 20 Cd114 5.633667e+01 1.284098e+01  
## 491 21 Cd114 5.482300e+02 2.968032e+00  
## 492 22 Cd114 7.030167e+02 2.545185e+00  
## 493 23 Cd114 7.630480e+03 1.081185e+00  
## 494 24 Cd114 1.291387e+03 1.625366e+00  
## 495 25 Cd114 2.837833e+02 4.442849e-01  
## 496 26 Cd114 8.071333e+02 4.701255e-01  
## 497 27 Cd114 1.039324e+04 2.365168e-01  
## 498 38 Cd114 7.381333e+02 2.111483e+00  
## 499 39 Cd114 7.986637e+03 1.419217e+00  
## 500 0 Cd114 3.522000e+01 1.182876e+01  
## 501 Check10 Cd114 1.034857e+05 6.291373e-01  
## 502 0 Cd114 5.355667e+01 2.156401e+01  
## 503 40 Cd114 8.645800e+02 8.624784e-01  
## 504 41 Cd114 1.630530e+03 1.466621e+00  
## 505 42 Cd114 5.277667e+01 1.490018e+01  
## 506 43 Cd114 7.566667e+01 1.750252e+01  
## 507 44 Cd114 1.090923e+04 1.151281e+00  
## 508 45 Cd114 1.276163e+03 1.570172e+00  
## 509 46 Cd114 9.581433e+02 3.132081e+00  
## 510 47 Cd114 1.117907e+04 4.509668e-01  
## 511 48 Cd114 8.822467e+02 2.937611e+00  
## 512 49 Cd114 5.911000e+01 8.483334e+00  
## 513 50 Cd114 2.866667e+01 8.388235e+00  
## 514 51 Cd114 2.054463e+03 2.049520e+00  
## 515 0 Cd114 3.222333e+01 1.396798e+01  
## 516 Check10 Cd114 1.042399e+05 5.175753e-01  
## 517 0 Cd114 3.044333e+01 6.448016e-01  
## 518 0 Cd114 1.811000e+01 3.128738e+01  
## 519 Check10 Cd114 1.073371e+05 1.197666e+00  
## 520 0 Cd114 3.144667e+01 2.325735e+01  
## 521 0 Cd114 5.780000e+00 2.970000e+01  
## 522 76 Cd114 6.220000e+00 4.320000e+01  
## 523 77 Cd114 5.016850e+03 1.400000e+00  
## 524 78 Cd114 1.035400e+04 3.000000e-01  
## 525 79 Cd114 2.026614e+04 8.000000e-01  
## 526 80 Cd114 5.078245e+04 3.000000e-01  
## 527 81 Cd114 1.009423e+05 2.000000e-01  
## 528 82 Cd114 2.113009e+05 6.000000e-01  
## 529 83 Cd114 6.036589e+05 5.000000e-01  
## 530 84 Cd114 1.048247e+06 2.000000e-01  
## 531 85 Cd114 5.410833e+06 4.000000e-01  
## 532 86 Cd114 1.096414e+07 2.000000e-01  
## 533 0 Cd114 1.520000e+02 4.500000e+00  
## 534 0 Cd114 4.678000e+01 1.500000e+00  
## 535 0 Cd114 1.474500e+02 4.900000e+00  
## 536 0 Cd114 3.956000e+01 2.750000e+01  
## 537 NIST Cd114 1.227447e+04 1.100000e+00  
## 538 Check10 Cd114 1.075440e+05 1.200000e+00  
## 539 0 Cd114 3.956000e+01 1.360000e+01  
## 540 52 Cd114 1.735540e+03 8.000000e-01  
## 541 53 Cd114 1.107233e+04 5.000000e-01  
## 542 54 Cd114 7.463500e+02 2.100000e+00  
## 543 55 Cd114 3.789000e+01 4.000000e+00  
## 544 0 Cd114 3.333000e+01 1.110000e+01  
## 545 0 Cd114 5.780000e+00 2.970000e+01  
## 546 87 Cd114 6.220000e+00 4.320000e+01  
## 547 88 Cd114 5.016850e+03 1.400000e+00  
## 548 89 Cd114 1.035400e+04 3.000000e-01  
## 549 90 Cd114 2.026614e+04 8.000000e-01  
## 550 91 Cd114 5.078245e+04 3.000000e-01  
## 551 92 Cd114 1.009423e+05 2.000000e-01  
## 552 93 Cd114 2.113009e+05 6.000000e-01  
## 553 94 Cd114 6.036589e+05 5.000000e-01  
## 554 95 Cd114 1.048247e+06 2.000000e-01  
## 555 96 Cd114 5.410833e+06 4.000000e-01  
## 556 97 Cd114 1.096414e+07 2.000000e-01  
## 557 56 Cd114 1.716980e+03 2.700000e+00  
## 558 57 Cd114 9.822350e+03 6.000000e-01  
## 559 58 Cd114 9.877000e+02 1.100000e+00  
## 560 59 Cd114 1.094959e+04 3.000000e-01  
## 561 H2O Cd114 1.200000e+01 9.600000e+00  
## 562 H2O Cd114 9.670000e+00 2.260000e+01  
## 563 0 Cd114 2.300000e+01 7.500000e+00  
## 564 Check10 Cd114 1.041232e+05 1.000000e+00  
## 565 0 Cd114 2.489000e+01 6.900000e+00  
## 566 0 Pb208 6.833833e+02 1.125139e+01  
## 567 0 Pb208 3.155733e+02 6.189618e+00  
## 568 0 Pb208 6.022667e+02 1.668232e+01  
## 569 0 Pb208 3.344633e+02 1.492757e+01  
## 570 65 Pb208 5.989333e+02 8.427985e+00  
## 571 66 Pb208 2.739260e+03 3.740424e+00  
## 572 67 Pb208 5.115520e+03 3.337076e+00  
## 573 68 Pb208 9.227503e+03 3.253740e+00  
## 574 69 Pb208 2.291183e+04 2.650687e+00  
## 575 70 Pb208 4.474160e+04 4.187964e-01  
## 576 71 Pb208 9.127560e+04 2.056945e+00  
## 577 72 Pb208 2.316954e+05 1.111096e+00  
## 578 73 Pb208 4.541545e+05 5.239838e-01  
## 579 74 Pb208 2.358811e+06 4.708663e-01  
## 580 75 Pb208 4.687902e+06 2.587369e-01  
## 581 0 Pb208 1.335677e+03 9.802347e+00  
## 582 0 Pb208 7.589500e+02 2.126826e+01  
## 583 0 Pb208 7.933900e+02 1.065513e+01  
## 584 0 Pb208 4.978167e+02 3.019302e+00  
## 585 NIST Pb208 1.652509e+05 5.209947e-01  
## 586 6 Pb208 4.000386e+05 1.142195e+00  
## 587 7 Pb208 7.733933e+02 1.584288e+01  
## 588 8 Pb208 1.704828e+05 1.821880e+00  
## 589 9 Pb208 1.430140e+03 2.627063e+00  
## 590 10 Pb208 4.045369e+04 1.373422e+00  
## 591 11 Pb208 1.101203e+03 3.334595e+00  
## 592 12 Pb208 1.800297e+05 5.624186e-01  
## 593 13 Pb208 1.841731e+06 1.614917e+00  
## 594 14 Pb208 2.048409e+05 7.839948e-01  
## 595 15 Pb208 1.870583e+06 1.367406e+00  
## 596 16 Pb208 2.472870e+05 9.938879e-01  
## 597 17 Pb208 2.104811e+06 9.544795e-01  
## 598 0 Pb208 7.856133e+02 1.006308e+01  
## 599 Check10 Pb208 4.390261e+04 2.209387e+00  
## 600 0 Pb208 3.511333e+02 5.722256e+00  
## 601 18 Pb208 1.971181e+05 5.431740e-01  
## 602 19 Pb208 2.017960e+06 7.523759e-01  
## 603 20 Pb208 1.127880e+03 5.323331e+00  
## 604 21 Pb208 4.670668e+05 9.376427e-01  
## 605 22 Pb208 2.100672e+05 1.249741e+00  
## 606 23 Pb208 1.504430e+06 1.406859e+00  
## 607 24 Pb208 5.151570e+05 1.059441e+00  
## 608 25 Pb208 1.209512e+04 2.578568e+00  
## 609 26 Pb208 4.197178e+05 7.093555e-01  
## 610 27 Pb208 2.259779e+06 1.072128e+00  
## 611 38 Pb208 4.866116e+05 6.174154e-01  
## 612 39 Pb208 1.616628e+06 1.086232e+00  
## 613 0 Pb208 5.344800e+02 5.658849e+00  
## 614 Check10 Pb208 4.478618e+04 2.484225e+00  
## 615 0 Pb208 4.811433e+02 9.608151e+00  
## 616 40 Pb208 2.286652e+05 1.755028e+00  
## 617 41 Pb208 1.465302e+06 1.824309e+00  
## 618 42 Pb208 1.000083e+03 9.404900e+00  
## 619 43 Pb208 2.450310e+03 2.384069e+00  
## 620 44 Pb208 2.200120e+06 8.679372e-02  
## 621 45 Pb208 4.207086e+05 8.814001e-01  
## 622 46 Pb208 5.520821e+05 5.662736e-01  
## 623 47 Pb208 2.314487e+06 6.955838e-01  
## 624 48 Pb208 4.220388e+05 9.092147e-01  
## 625 49 Pb208 1.217890e+03 8.640539e+00  
## 626 50 Pb208 9.056267e+02 6.052145e+00  
## 627 51 Pb208 3.585994e+05 7.236162e-01  
## 628 0 Pb208 4.100267e+02 1.227536e+01  
## 629 Check10 Pb208 4.383034e+04 1.481390e+00  
## 630 0 Pb208 3.278000e+02 1.540010e+01  
## 631 0 Pb208 2.766867e+02 3.188333e+00  
## 632 Check10 Pb208 4.463219e+04 2.141594e+00  
## 633 0 Pb208 3.811367e+02 9.269346e+00  
## 634 0 Pb208 3.344600e+02 1.490000e+01  
## 635 76 Pb208 5.989300e+02 8.400000e+00  
## 636 77 Pb208 2.739260e+03 3.700000e+00  
## 637 78 Pb208 5.115520e+03 3.300000e+00  
## 638 79 Pb208 9.227500e+03 3.300000e+00  
## 639 80 Pb208 2.291183e+04 2.700000e+00  
## 640 81 Pb208 4.474160e+04 4.000000e-01  
## 641 82 Pb208 9.127560e+04 2.100000e+00  
## 642 83 Pb208 2.316954e+05 1.100000e+00  
## 643 84 Pb208 4.541545e+05 5.000000e-01  
## 644 85 Pb208 2.358811e+06 5.000000e-01  
## 645 86 Pb208 4.687902e+06 3.000000e-01  
## 646 0 Pb208 6.013770e+03 2.990000e+01  
## 647 0 Pb208 3.317270e+03 5.100000e+00  
## 648 0 Pb208 3.808530e+03 5.800000e+00  
## 649 0 Pb208 3.569580e+03 7.500000e+00  
## 650 NIST Pb208 1.463425e+05 1.300000e+00  
## 651 Check10 Pb208 4.192762e+04 1.100000e+00  
## 652 0 Pb208 3.511740e+03 4.700000e+00  
## 653 52 Pb208 8.825791e+05 1.100000e+00  
## 654 53 Pb208 2.089301e+06 1.000000e+00  
## 655 54 Pb208 3.176920e+05 4.000000e-01  
## 656 55 Pb208 5.098940e+03 2.900000e+00  
## 657 0 Pb208 8.293280e+03 2.500000e+00  
## 658 0 Pb208 3.344600e+02 1.490000e+01  
## 659 87 Pb208 5.989300e+02 8.400000e+00  
## 660 88 Pb208 2.739260e+03 3.700000e+00  
## 661 89 Pb208 5.115520e+03 3.300000e+00  
## 662 90 Pb208 9.227500e+03 3.300000e+00  
## 663 91 Pb208 2.291183e+04 2.700000e+00  
## 664 92 Pb208 4.474160e+04 4.000000e-01  
## 665 93 Pb208 9.127560e+04 2.100000e+00  
## 666 94 Pb208 2.316954e+05 1.100000e+00  
## 667 95 Pb208 4.541545e+05 5.000000e-01  
## 668 96 Pb208 2.358811e+06 5.000000e-01  
## 669 97 Pb208 4.687902e+06 3.000000e-01  
## 670 56 Pb208 1.485125e+06 4.800000e+00  
## 671 57 Pb208 1.707354e+06 1.000000e+00  
## 672 58 Pb208 3.461418e+05 7.000000e-01  
## 673 59 Pb208 1.913109e+06 7.000000e-01  
## 674 H2O Pb208 7.970880e+03 3.100000e+00  
## 675 H2O Pb208 7.949930e+03 1.140000e+01  
## 676 0 Pb208 8.536070e+03 5.000000e+00  
## 677 Check10 Pb208 4.359780e+04 1.300000e+00  
## 678 0 Pb208 9.033940e+03 2.800000e+00  
## 679 0 Ge72 7.392395e+04 7.392395e+04  
## 680 0 Ge72 7.333281e+04 7.333281e+04  
## 681 0 Ge72 7.308365e+04 7.308365e+04  
## 682 0 Ge72 7.271374e+04 7.271374e+04  
## 683 65 Ge72 8.065182e+04 8.065182e+04  
## 684 66 Ge72 7.310766e+04 7.310766e+04  
## 685 67 Ge72 7.349920e+04 7.349920e+04  
## 686 68 Ge72 7.341969e+04 7.341969e+04  
## 687 69 Ge72 7.356037e+04 7.356037e+04  
## 688 70 Ge72 7.414258e+04 7.414258e+04  
## 689 71 Ge72 7.748021e+04 7.748021e+04  
## 690 72 Ge72 7.446098e+04 7.446098e+04  
## 691 73 Ge72 7.483330e+04 7.483330e+04  
## 692 74 Ge72 7.536762e+04 7.536762e+04  
## 693 75 Ge72 7.280290e+04 7.280290e+04  
## 694 0 Ge72 7.239528e+04 7.239528e+04  
## 695 0 Ge72 7.113158e+04 7.113158e+04  
## 696 0 Ge72 7.051397e+04 7.051397e+04  
## 697 0 Ge72 7.076550e+04 7.076550e+04  
## 698 NIST Ge72 7.335715e+04 7.335715e+04  
## 699 6 Ge72 7.197850e+04 7.197850e+04  
## 700 7 Ge72 7.153670e+04 7.153670e+04  
## 701 8 Ge72 7.545058e+04 7.545058e+04  
## 702 9 Ge72 7.141664e+04 7.141664e+04  
## 703 10 Ge72 7.234343e+04 7.234343e+04  
## 704 11 Ge72 7.158436e+04 7.158436e+04  
## 705 12 Ge72 7.282975e+04 7.282975e+04  
## 706 13 Ge72 7.337635e+04 7.337635e+04  
## 707 14 Ge72 7.326119e+04 7.326119e+04  
## 708 15 Ge72 7.409607e+04 7.409607e+04  
## 709 16 Ge72 7.507321e+04 7.507321e+04  
## 710 17 Ge72 7.427560e+04 7.427560e+04  
## 711 0 Ge72 7.322681e+04 7.322681e+04  
## 712 Check10 Ge72 7.483212e+04 7.483212e+04  
## 713 0 Ge72 7.362314e+04 7.362314e+04  
## 714 18 Ge72 7.446579e+04 7.446579e+04  
## 715 19 Ge72 7.572230e+04 7.572230e+04  
## 716 20 Ge72 7.371973e+04 7.371973e+04  
## 717 21 Ge72 7.509326e+04 7.509326e+04  
## 718 22 Ge72 7.491367e+04 7.491367e+04  
## 719 23 Ge72 7.528301e+04 7.528301e+04  
## 720 24 Ge72 7.587338e+04 7.587338e+04  
## 721 25 Ge72 7.647379e+04 7.647379e+04  
## 722 26 Ge72 7.666444e+04 7.666444e+04  
## 723 27 Ge72 7.702512e+04 7.702512e+04  
## 724 38 Ge72 7.607209e+04 7.607209e+04  
## 725 39 Ge72 7.799106e+04 7.799106e+04  
## 726 0 Ge72 7.671230e+04 7.671230e+04  
## 727 Check10 Ge72 7.633509e+04 7.633509e+04  
## 728 0 Ge72 7.587355e+04 7.587355e+04  
## 729 40 Ge72 7.493837e+04 7.493837e+04  
## 730 41 Ge72 7.743872e+04 7.743872e+04  
## 731 42 Ge72 7.487320e+04 7.487320e+04  
## 732 43 Ge72 7.695801e+04 7.695801e+04  
## 733 44 Ge72 7.702603e+04 7.702603e+04  
## 734 45 Ge72 7.652604e+04 7.652604e+04  
## 735 46 Ge72 7.673141e+04 7.673141e+04  
## 736 47 Ge72 7.905725e+04 7.905725e+04  
## 737 48 Ge72 7.747120e+04 7.747120e+04  
## 738 49 Ge72 7.722796e+04 7.722796e+04  
## 739 50 Ge72 7.351837e+04 7.351837e+04  
## 740 51 Ge72 7.656361e+04 7.656361e+04  
## 741 0 Ge72 7.712728e+04 7.712728e+04  
## 742 Check10 Ge72 7.758727e+04 7.758727e+04  
## 743 0 Ge72 7.890213e+04 7.890213e+04  
## 744 0 Ge72 8.180494e+04 8.180494e+04  
## 745 Check10 Ge72 8.148719e+04 8.148719e+04  
## 746 0 Ge72 8.109479e+04 8.109479e+04  
## 747 0 Ge72 7.271374e+04 7.271374e+04  
## 748 76 Ge72 8.065182e+04 8.065182e+04  
## 749 77 Ge72 7.310766e+04 7.310766e+04  
## 750 78 Ge72 7.349920e+04 7.349920e+04  
## 751 79 Ge72 7.341969e+04 7.341969e+04  
## 752 80 Ge72 7.356037e+04 7.356037e+04  
## 753 81 Ge72 7.414258e+04 7.414258e+04  
## 754 82 Ge72 7.748021e+04 7.748021e+04  
## 755 83 Ge72 7.446098e+04 7.446098e+04  
## 756 84 Ge72 7.483330e+04 7.483330e+04  
## 757 85 Ge72 7.536762e+04 7.536762e+04  
## 758 86 Ge72 7.280290e+04 7.280290e+04  
## 759 0 Ge72 8.172135e+04 8.172135e+04  
## 760 0 Ge72 8.393151e+04 8.393151e+04  
## 761 0 Ge72 8.391437e+04 8.391437e+04  
## 762 0 Ge72 8.295544e+04 8.295544e+04  
## 763 NIST Ge72 8.373475e+04 8.373475e+04  
## 764 Check10 Ge72 8.449737e+04 8.449737e+04  
## 765 0 Ge72 8.246552e+04 8.246552e+04  
## 766 52 Ge72 8.067176e+04 8.067176e+04  
## 767 53 Ge72 8.261199e+04 8.261199e+04  
## 768 54 Ge72 8.073560e+04 8.073560e+04  
## 769 55 Ge72 8.127572e+04 8.127572e+04  
## 770 0 Ge72 7.158896e+04 7.158896e+04  
## 771 0 Ge72 7.271374e+04 7.271374e+04  
## 772 87 Ge72 8.065182e+04 8.065182e+04  
## 773 88 Ge72 7.310766e+04 7.310766e+04  
## 774 89 Ge72 7.349920e+04 7.349920e+04  
## 775 90 Ge72 7.341969e+04 7.341969e+04  
## 776 91 Ge72 7.356037e+04 7.356037e+04  
## 777 92 Ge72 7.414258e+04 7.414258e+04  
## 778 93 Ge72 7.748021e+04 7.748021e+04  
## 779 94 Ge72 7.446098e+04 7.446098e+04  
## 780 95 Ge72 7.483330e+04 7.483330e+04  
## 781 96 Ge72 7.536762e+04 7.536762e+04  
## 782 97 Ge72 7.280290e+04 7.280290e+04  
## 783 56 Ge72 8.508116e+04 8.508116e+04  
## 784 57 Ge72 7.984046e+04 7.984046e+04  
## 785 58 Ge72 8.057508e+04 8.057508e+04  
## 786 59 Ge72 8.190104e+04 8.190104e+04  
## 787 H2O Ge72 8.086680e+04 8.086680e+04  
## 788 H2O Ge72 8.034373e+04 8.034373e+04  
## 789 0 Ge72 8.254157e+04 8.254157e+04  
## 790 Check10 Ge72 8.102893e+04 8.102893e+04  
## 791 0 Ge72 8.131153e+04 8.131153e+04

1. Merging in the Sample Key

#Merging together the ICPMS Data and the Sample Key  
ICPMS\_merged <- merge(ICPMS\_tidy, sample\_key)  
  
#Previewing the merged data  
ICPMS\_merged

## Sample.Key metal CPS RSD Type Site Analyst Mass.of.Soil  
## 1 10 Cr52 2.152244e+04 1.436397e+00 Sample F CYT 1.49350  
## 2 10 Cr53 2.610417e+03 8.073814e-01 Sample F CYT 1.49350  
## 3 10 Pb208 4.045369e+04 1.373422e+00 Sample F CYT 1.49350  
## 4 10 As75 9.212500e+02 1.161618e-01 Sample F CYT 1.49350  
## 5 10 Cd111 8.111667e+01 4.815973e+01 Sample F CYT 1.49350  
## 6 10 Cd114 2.034467e+02 2.136798e+00 Sample F CYT 1.49350  
## 7 10 Ge72 7.234343e+04 7.234343e+04 Sample F CYT 1.49350  
## 8 11 As75 4.294533e+02 9.600515e+00 Sample MB CYT 0.00000  
## 9 11 Cd114 4.044333e+01 7.916026e+00 Sample MB CYT 0.00000  
## 10 11 Cr52 8.698017e+03 5.690129e-01 Sample MB CYT 0.00000  
## 11 11 Pb208 1.101203e+03 3.334595e+00 Sample MB CYT 0.00000  
## 12 11 Cr53 1.028810e+03 1.722537e+00 Sample MB CYT 0.00000  
## 13 11 Ge72 7.158436e+04 7.158436e+04 Sample MB CYT 0.00000  
## 14 11 Cd111 1.111333e+01 4.581987e+01 Sample MB CYT 0.00000  
## 15 12 Cr52 6.704487e+04 7.261604e-01 Sample F DJHR 1.51600  
## 16 12 Cr53 8.160400e+03 6.310522e-01 Sample F DJHR 1.51600  
## 17 12 Cd114 4.803400e+02 4.518161e+00 Sample F DJHR 1.51600  
## 18 12 Cd111 1.644533e+02 1.438107e+01 Sample F DJHR 1.51600  
## 19 12 Pb208 1.800297e+05 5.624186e-01 Sample F DJHR 1.51600  
## 20 12 As75 2.653983e+03 2.392080e+00 Sample F DJHR 1.51600  
## 21 12 Ge72 7.282975e+04 7.282975e+04 Sample F DJHR 1.51600  
## 22 13 Cr52 2.582171e+05 4.688423e-01 Sample QC DJHR 1.49230  
## 23 13 As75 7.754473e+03 1.482523e+00 Sample QC DJHR 1.49230  
## 24 13 Cd114 9.178340e+03 7.973273e-01 Sample QC DJHR 1.49230  
## 25 13 Pb208 1.841731e+06 1.614917e+00 Sample QC DJHR 1.49230  
## 26 13 Cd111 3.508307e+03 2.389894e+00 Sample QC DJHR 1.49230  
## 27 13 Cr53 3.144505e+04 2.824532e-01 Sample QC DJHR 1.49230  
## 28 13 Ge72 7.337635e+04 7.337635e+04 Sample QC DJHR 1.49230  
## 29 14 Cr52 7.397862e+04 5.164272e-01 Sample D CAG 1.50621  
## 30 14 Cd114 8.432467e+02 3.578916e+00 Sample D CAG 1.50621  
## 31 14 Cr53 9.107623e+03 4.447171e-01 Sample D CAG 1.50621  
## 32 14 Pb208 2.048409e+05 7.839948e-01 Sample D CAG 1.50621  
## 33 14 As75 1.613523e+03 1.485255e+00 Sample D CAG 1.50621  
## 34 14 Cd111 2.211200e+02 7.436564e+00 Sample D CAG 1.50621  
## 35 14 Ge72 7.326119e+04 7.326119e+04 Sample D CAG 1.50621  
## 36 15 As75 7.846293e+03 7.960724e-01 Sample QC CAG 1.48989  
## 37 15 Cr52 2.602317e+05 1.326622e+00 Sample QC CAG 1.48989  
## 38 15 Cr53 3.196707e+04 5.330376e-01 Sample QC CAG 1.48989  
## 39 15 Ge72 7.409607e+04 7.409607e+04 Sample QC CAG 1.48989  
## 40 15 Cd114 9.031590e+03 6.185520e-01 Sample QC CAG 1.48989  
## 41 15 Cd111 3.416053e+03 3.639763e+00 Sample QC CAG 1.48989  
## 42 15 Pb208 1.870583e+06 1.367406e+00 Sample QC CAG 1.48989  
## 43 16 Cr52 9.562305e+04 1.063342e+00 Sample F JHV 1.50630  
## 44 16 Cd114 6.106800e+02 3.498964e+00 Sample F JHV 1.50630  
## 45 16 As75 3.599597e+03 1.610325e-01 Sample F JHV 1.50630  
## 46 16 Pb208 2.472870e+05 9.938879e-01 Sample F JHV 1.50630  
## 47 16 Cr53 1.156324e+04 5.082718e-01 Sample F JHV 1.50630  
## 48 16 Cd111 2.044567e+02 6.589804e+00 Sample F JHV 1.50630  
## 49 16 Ge72 7.507321e+04 7.507321e+04 Sample F JHV 1.50630  
## 50 17 Cd114 1.008851e+04 7.797758e-01 Sample QC JHV 1.52360  
## 51 17 Ge72 7.427560e+04 7.427560e+04 Sample QC JHV 1.52360  
## 52 17 Cd111 3.958423e+03 3.207613e+00 Sample QC JHV 1.52360  
## 53 17 Cr53 3.650875e+04 8.349954e-01 Sample QC JHV 1.52360  
## 54 17 Pb208 2.104811e+06 9.544795e-01 Sample QC JHV 1.52360  
## 55 17 Cr52 2.972667e+05 1.439579e+00 Sample QC JHV 1.52360  
## 56 17 As75 8.928353e+03 1.075809e+00 Sample QC JHV 1.52360  
## 57 18 Cd111 2.077867e+02 2.558619e+01 Sample D SJB 1.55000  
## 58 18 As75 1.933557e+03 1.908726e+00 Sample D SJB 1.55000  
## 59 18 Cr53 9.429900e+03 1.667788e+00 Sample D SJB 1.55000  
## 60 18 Cr52 7.717385e+04 2.030678e+00 Sample D SJB 1.55000  
## 61 18 Cd114 8.934700e+02 2.119357e+00 Sample D SJB 1.55000  
## 62 18 Pb208 1.971181e+05 5.431740e-01 Sample D SJB 1.55000  
## 63 18 Ge72 7.446579e+04 7.446579e+04 Sample D SJB 1.55000  
## 64 19 As75 6.509090e+03 1.113305e+00 Sample QC SJB 1.53000  
## 65 19 Cr53 2.642573e+04 1.283747e-01 Sample QC SJB 1.53000  
## 66 19 Cr52 2.159292e+05 5.421739e-01 Sample QC SJB 1.53000  
## 67 19 Pb208 2.017960e+06 7.523759e-01 Sample QC SJB 1.53000  
## 68 19 Cd114 9.471377e+03 4.315135e-01 Sample QC SJB 1.53000  
## 69 19 Cd111 3.733913e+03 4.528778e+00 Sample QC SJB 1.53000  
## 70 19 Ge72 7.572230e+04 7.572230e+04 Sample QC SJB 1.53000  
## 71 20 Pb208 1.127880e+03 5.323331e+00 Sample MB MD 0.00000  
## 72 20 Cd111 2.000333e+01 2.886270e+01 Sample MB MD 0.00000  
## 73 20 Cr53 1.006587e+03 3.243749e+00 Sample MB MD 0.00000  
## 74 20 Cd114 5.633667e+01 1.284098e+01 Sample MB MD 0.00000  
## 75 20 As75 4.935667e+02 1.363930e+00 Sample MB MD 0.00000  
## 76 20 Cr52 8.237793e+03 3.202425e+00 Sample MB MD 0.00000  
## 77 20 Ge72 7.371973e+04 7.371973e+04 Sample MB MD 0.00000  
## 78 21 Cd111 2.289000e+02 2.548839e+01 Sample D MD 1.57560  
## 79 21 Pb208 4.670668e+05 9.376427e-01 Sample D MD 1.57560  
## 80 21 Cr52 4.260328e+04 1.182634e+00 Sample D MD 1.57560  
## 81 21 Cr53 5.163523e+03 1.119280e+00 Sample D MD 1.57560  
## 82 21 Ge72 7.509326e+04 7.509326e+04 Sample D MD 1.57560  
## 83 21 As75 1.317833e+03 2.715879e+00 Sample D MD 1.57560  
## 84 21 Cd114 5.482300e+02 2.968032e+00 Sample D MD 1.57560  
## 85 22 Cd111 2.177900e+02 1.486697e+01 Sample E SEP 1.60000  
## 86 22 As75 3.624050e+03 2.532908e+00 Sample E SEP 1.60000  
## 87 22 Cd114 7.030167e+02 2.545185e+00 Sample E SEP 1.60000  
## 88 22 Ge72 7.491367e+04 7.491367e+04 Sample E SEP 1.60000  
## 89 22 Cr52 1.363738e+05 1.603809e+00 Sample E SEP 1.60000  
## 90 22 Cr53 1.673968e+04 8.473051e-01 Sample E SEP 1.60000  
## 91 22 Pb208 2.100672e+05 1.249741e+00 Sample E SEP 1.60000  
## 92 23 Ge72 7.528301e+04 7.528301e+04 Sample QC SEP 1.01360  
## 93 23 Cd114 7.630480e+03 1.081185e+00 Sample QC SEP 1.01360  
## 94 23 Cr52 2.287993e+05 5.350505e-01 Sample QC SEP 1.01360  
## 95 23 Pb208 1.504430e+06 1.406859e+00 Sample QC SEP 1.01360  
## 96 23 As75 6.605903e+03 1.365218e-01 Sample QC SEP 1.01360  
## 97 23 Cr53 2.778250e+04 7.205136e-01 Sample QC SEP 1.01360  
## 98 23 Cd111 2.903717e+03 4.421315e+00 Sample QC SEP 1.01360  
## 99 24 Cr52 2.763932e+05 1.322009e+00 Sample C SGB 1.50740  
## 100 24 Cr53 3.396297e+04 4.894629e-01 Sample C SGB 1.50740  
## 101 24 As75 3.896327e+03 1.759183e+00 Sample C SGB 1.50740  
## 102 24 Pb208 5.151570e+05 1.059441e+00 Sample C SGB 1.50740  
## 103 24 Cd111 3.444667e+02 1.117436e+01 Sample C SGB 1.50740  
## 104 24 Cd114 1.291387e+03 1.625366e+00 Sample C SGB 1.50740  
## 105 24 Ge72 7.587338e+04 7.587338e+04 Sample C SGB 1.50740  
## 106 25 As75 3.817867e+02 5.000048e+00 Sample MB SGB 0.00000  
## 107 25 Cd114 2.837833e+02 4.442849e-01 Sample MB SGB 0.00000  
## 108 25 Cr53 1.347167e+03 1.869649e+00 Sample MB SGB 0.00000  
## 109 25 Cr52 1.070254e+04 2.772304e+00 Sample MB SGB 0.00000  
## 110 25 Ge72 7.647379e+04 7.647379e+04 Sample MB SGB 0.00000  
## 111 25 Cd111 9.556000e+01 1.321091e+01 Sample MB SGB 0.00000  
## 112 25 Pb208 1.209512e+04 2.578568e+00 Sample MB SGB 0.00000  
## 113 26 Cd111 2.633500e+02 4.562823e+00 Sample C AWB 1.51150  
## 114 26 As75 1.904777e+03 1.671568e+00 Sample C AWB 1.51150  
## 115 26 Ge72 7.666444e+04 7.666444e+04 Sample C AWB 1.51150  
## 116 26 Cr53 1.881413e+04 6.246969e-01 Sample C AWB 1.51150  
## 117 26 Cd114 8.071333e+02 4.701255e-01 Sample C AWB 1.51150  
## 118 26 Pb208 4.197178e+05 7.093555e-01 Sample C AWB 1.51150  
## 119 26 Cr52 1.534153e+05 8.025562e-01 Sample C AWB 1.51150  
## 120 27 As75 9.168590e+03 7.573548e-01 Sample QC AWB 1.57940  
## 121 27 Cr52 3.137944e+05 2.868119e-01 Sample QC AWB 1.57940  
## 122 27 Cd111 4.157373e+03 3.713291e+00 Sample QC AWB 1.57940  
## 123 27 Cd114 1.039324e+04 2.365168e-01 Sample QC AWB 1.57940  
## 124 27 Cr53 3.822911e+04 2.906033e-01 Sample QC AWB 1.57940  
## 125 27 Ge72 7.702512e+04 7.702512e+04 Sample QC AWB 1.57940  
## 126 27 Pb208 2.259779e+06 1.072128e+00 Sample QC AWB 1.57940  
## 127 38 As75 1.954003e+03 2.486400e+00 Sample C GB 1.51270  
## 128 38 Cd111 3.055733e+02 1.319805e+01 Sample C GB 1.51270  
## 129 38 Ge72 7.607209e+04 7.607209e+04 Sample C GB 1.51270  
## 130 38 Cr52 1.888591e+05 5.008846e-01 Sample C GB 1.51270  
## 131 38 Cr53 2.296685e+04 8.969125e-01 Sample C GB 1.51270  
## 132 38 Cd114 7.381333e+02 2.111483e+00 Sample C GB 1.51270  
## 133 38 Pb208 4.866116e+05 6.174154e-01 Sample C GB 1.51270  
## 134 39 As75 7.095423e+03 1.942674e+00 Sample QC GB 1.55540  
## 135 39 Pb208 1.616628e+06 1.086232e+00 Sample QC GB 1.55540  
## 136 39 Cd114 7.986637e+03 1.419217e+00 Sample QC GB 1.55540  
## 137 39 Cr52 2.361630e+05 5.921260e-01 Sample QC GB 1.55540  
## 138 39 Cr53 2.890345e+04 3.720971e-01 Sample QC GB 1.55540  
## 139 39 Cd111 3.091530e+03 2.696806e+00 Sample QC GB 1.55540  
## 140 39 Ge72 7.799106e+04 7.799106e+04 Sample QC GB 1.55540  
## 141 40 Cr52 7.073455e+04 1.358336e+00 Sample B AB 1.53780  
## 142 40 Cr53 8.596043e+03 6.942337e-01 Sample B AB 1.53780  
## 143 40 Cd111 1.822300e+02 1.467333e+01 Sample B AB 1.53780  
## 144 40 Cd114 8.645800e+02 8.624784e-01 Sample B AB 1.53780  
## 145 40 Ge72 7.493837e+04 7.493837e+04 Sample B AB 1.53780  
## 146 40 Pb208 2.286652e+05 1.755028e+00 Sample B AB 1.53780  
## 147 40 As75 1.932780e+03 2.479692e+00 Sample B AB 1.53780  
## 148 41 Cr53 1.206701e+04 5.986999e-01 Sample B LF 1.45870  
## 149 41 Pb208 1.465302e+06 1.824309e+00 Sample B LF 1.45870  
## 150 41 As75 2.883463e+03 1.307374e+00 Sample B LF 1.45870  
## 151 41 Cd111 2.766833e+02 1.149205e+01 Sample B LF 1.45870  
## 152 41 Cr52 9.832519e+04 6.907821e-01 Sample B LF 1.45870  
## 153 41 Cd114 1.630530e+03 1.466621e+00 Sample B LF 1.45870  
## 154 41 Ge72 7.743872e+04 7.743872e+04 Sample B LF 1.45870  
## 155 42 Cr53 9.850300e+02 4.082049e+00 Sample MB LF 0.00000  
## 156 42 Pb208 1.000083e+03 9.404900e+00 Sample MB LF 0.00000  
## 157 42 Ge72 7.487320e+04 7.487320e+04 Sample MB LF 0.00000  
## 158 42 Cd114 5.277667e+01 1.490018e+01 Sample MB LF 0.00000  
## 159 42 Cr52 8.278940e+03 2.131938e+00 Sample MB LF 0.00000  
## 160 42 Cd111 1.555667e+01 6.186691e+01 Sample MB LF 0.00000  
## 161 42 As75 5.543433e+02 5.121280e+00 Sample MB LF 0.00000  
## 162 43 Cd111 2.333667e+01 3.780185e+01 Sample MB AB 0.00000  
## 163 43 Cr52 7.977670e+03 2.202995e+00 Sample MB AB 0.00000  
## 164 43 Pb208 2.450310e+03 2.384069e+00 Sample MB AB 0.00000  
## 165 43 Ge72 7.695801e+04 7.695801e+04 Sample MB AB 0.00000  
## 166 43 Cd114 7.566667e+01 1.750252e+01 Sample MB AB 0.00000  
## 167 43 As75 4.840067e+02 2.245792e+00 Sample MB AB 0.00000  
## 168 43 Cr53 9.920300e+02 3.127017e+00 Sample MB AB 0.00000  
## 169 44 Cr52 3.271045e+05 6.585698e-01 Sample QC KAD 1.55980  
## 170 44 Cd111 4.124013e+03 2.971787e+00 Sample QC KAD 1.55980  
## 171 44 Pb208 2.200120e+06 8.679372e-02 Sample QC KAD 1.55980  
## 172 44 Cr53 4.008394e+04 2.531272e-01 Sample QC KAD 1.55980  
## 173 44 Ge72 7.702603e+04 7.702603e+04 Sample QC KAD 1.55980  
## 174 44 Cd114 1.090923e+04 1.151281e+00 Sample QC KAD 1.55980  
## 175 44 As75 9.495650e+03 9.131825e-01 Sample QC KAD 1.55980  
## 176 45 Cr52 9.963547e+04 1.823289e-01 Sample B KAD 1.54000  
## 177 45 Ge72 7.652604e+04 7.652604e+04 Sample B KAD 1.54000  
## 178 45 Cd111 3.389133e+02 3.413513e+01 Sample B KAD 1.54000  
## 179 45 Cr53 1.223801e+04 3.991635e-01 Sample B KAD 1.54000  
## 180 45 As75 2.469847e+03 9.618290e-01 Sample B KAD 1.54000  
## 181 45 Pb208 4.207086e+05 8.814001e-01 Sample B KAD 1.54000  
## 182 45 Cd114 1.276163e+03 1.570172e+00 Sample B KAD 1.54000  
## 183 46 Cd111 2.266833e+02 1.549247e+01 Sample A LML 1.57641  
## 184 46 As75 1.878440e+03 2.592777e+00 Sample A LML 1.57641  
## 185 46 Cd114 9.581433e+02 3.132081e+00 Sample A LML 1.57641  
## 186 46 Cr52 1.362243e+05 8.517556e-01 Sample A LML 1.57641  
## 187 46 Pb208 5.520821e+05 5.662736e-01 Sample A LML 1.57641  
## 188 46 Cr53 1.685802e+04 6.254541e-01 Sample A LML 1.57641  
## 189 46 Ge72 7.673141e+04 7.673141e+04 Sample A LML 1.57641  
## 190 47 As75 9.730993e+03 2.671300e-01 Sample QC LML 1.54717  
## 191 47 Cd111 4.347413e+03 2.212561e+00 Sample QC LML 1.54717  
## 192 47 Cd114 1.117907e+04 4.509668e-01 Sample QC LML 1.54717  
## 193 47 Cr52 3.435543e+05 3.490373e-01 Sample QC LML 1.54717  
## 194 47 Cr53 4.192172e+04 9.467458e-01 Sample QC LML 1.54717  
## 195 47 Ge72 7.905725e+04 7.905725e+04 Sample QC LML 1.54717  
## 196 47 Pb208 2.314487e+06 6.955838e-01 Sample QC LML 1.54717  
## 197 48 Cr53 2.131052e+04 1.600792e-01 Sample A AH 1.50000  
## 198 48 Ge72 7.747120e+04 7.747120e+04 Sample A AH 1.50000  
## 199 48 Cd114 8.822467e+02 2.937611e+00 Sample A AH 1.50000  
## 200 48 As75 1.766427e+03 2.614201e+00 Sample A AH 1.50000  
## 201 48 Cr52 1.736069e+05 5.834510e-01 Sample A AH 1.50000  
## 202 48 Pb208 4.220388e+05 9.092147e-01 Sample A AH 1.50000  
## 203 48 Cd111 2.077867e+02 6.074569e+00 Sample A AH 1.50000  
## 204 49 Cd114 5.911000e+01 8.483334e+00 Sample MB AH 0.00000  
## 205 49 Pb208 1.217890e+03 8.640539e+00 Sample MB AH 0.00000  
## 206 49 Ge72 7.722796e+04 7.722796e+04 Sample MB AH 0.00000  
## 207 49 Cr53 1.056590e+03 2.019569e+00 Sample MB AH 0.00000  
## 208 49 Cr52 8.469017e+03 3.000115e+00 Sample MB AH 0.00000  
## 209 49 As75 4.056733e+02 3.207708e+00 Sample MB AH 0.00000  
## 210 49 Cd111 1.111000e+01 9.165741e+01 Sample MB AH 0.00000  
## 211 50 Cd111 1.000000e+01 3.330000e+01 Sample MB LG 0.00000  
## 212 50 Cd114 2.866667e+01 8.388235e+00 Sample MB LG 0.00000  
## 213 50 Cr53 1.021367e+03 1.498771e+00 Sample MB LG 0.00000  
## 214 50 Cr52 8.334543e+03 7.488315e-01 Sample MB LG 0.00000  
## 215 50 Ge72 7.351837e+04 7.351837e+04 Sample MB LG 0.00000  
## 216 50 Pb208 9.056267e+02 6.052145e+00 Sample MB LG 0.00000  
## 217 50 As75 3.947833e+02 3.555100e+00 Sample MB LG 0.00000  
## 218 51 Pb208 3.585994e+05 7.236162e-01 Sample C LG 1.50380  
## 219 51 Cd114 2.054463e+03 2.049520e+00 Sample C LG 1.50380  
## 220 51 Ge72 7.656361e+04 7.656361e+04 Sample C LG 1.50380  
## 221 51 As75 2.457290e+03 2.833738e+00 Sample C LG 1.50380  
## 222 51 Cr53 7.410860e+03 3.917571e-02 Sample C LG 1.50380  
## 223 51 Cr52 6.034384e+04 1.177642e+00 Sample C LG 1.50380  
## 224 51 Cd111 2.055667e+02 1.471337e+01 Sample C LG 1.50380  
## 225 52 Cd114 1.735540e+03 8.000000e-01 Sample B MF 1.45810  
## 226 52 As75 2.936700e+03 6.000000e-01 Sample B MF 1.45810  
## 227 52 Ge72 8.067176e+04 8.067176e+04 Sample B MF 1.45810  
## 228 52 Cr52 1.180807e+05 1.000000e+00 Sample B MF 1.45810  
## 229 52 Cr53 1.434409e+04 5.000000e-01 Sample B MF 1.45810  
## 230 52 Pb208 8.825791e+05 1.100000e+00 Sample B MF 1.45810  
## 231 52 Cd111 3.489100e+02 6.400000e+00 Sample B MF 1.45810  
## 232 53 Ge72 8.261199e+04 8.261199e+04 Sample QC MF 1.59160  
## 233 53 Pb208 2.089301e+06 1.000000e+00 Sample QC MF 1.59160  
## 234 53 Cd114 1.107233e+04 5.000000e-01 Sample QC MF 1.59160  
## 235 53 Cr52 3.734691e+05 6.000000e-01 Sample QC MF 1.59160  
## 236 53 Cd111 4.458550e+03 2.200000e+00 Sample QC MF 1.59160  
## 237 53 As75 1.093936e+04 5.000000e-01 Sample QC MF 1.59160  
## 238 53 Cr53 4.551119e+04 7.000000e-01 Sample QC MF 1.59160  
## 239 54 Cd111 1.955700e+02 7.700000e+00 Sample A LAK 1.52350  
## 240 54 Cr53 1.260648e+04 7.000000e-01 Sample A LAK 1.52350  
## 241 54 As75 2.180360e+03 4.200000e+00 Sample A LAK 1.52350  
## 242 54 Ge72 8.073560e+04 8.073560e+04 Sample A LAK 1.52350  
## 243 54 Cr52 1.041738e+05 9.000000e-01 Sample A LAK 1.52350  
## 244 54 Pb208 3.176920e+05 4.000000e-01 Sample A LAK 1.52350  
## 245 54 Cd114 7.463500e+02 2.100000e+00 Sample A LAK 1.52350  
## 246 55 Cd114 3.789000e+01 4.000000e+00 Sample MB LAK 0.00000  
## 247 55 Cr53 1.117820e+03 1.700000e+00 Sample MB LAK 0.00000  
## 248 55 Cd111 1.000000e+01 5.770000e+01 Sample MB LAK 0.00000  
## 249 55 As75 7.319100e+02 4.200000e+00 Sample MB LAK 0.00000  
## 250 55 Cr52 9.104900e+03 2.200000e+00 Sample MB LAK 0.00000  
## 251 55 Ge72 8.127572e+04 8.127572e+04 Sample MB LAK 0.00000  
## 252 55 Pb208 5.098940e+03 2.900000e+00 Sample MB LAK 0.00000  
## 253 56 Cd114 1.716980e+03 2.700000e+00 Sample A AVM 1.53750  
## 254 56 Ge72 8.508116e+04 8.508116e+04 Sample A AVM 1.53750  
## 255 56 Cr53 1.315565e+04 9.000000e-01 Sample A AVM 1.53750  
## 256 56 Cd111 2.611300e+02 1.600000e+01 Sample A AVM 1.53750  
## 257 56 Pb208 1.485125e+06 4.800000e+00 Sample A AVM 1.53750  
## 258 56 As75 3.210640e+03 4.000000e-01 Sample A AVM 1.53750  
## 259 56 Cr52 1.068536e+05 2.600000e+00 Sample A AVM 1.53750  
## 260 57 Cr52 3.190569e+05 1.100000e+00 Sample QC AVM 1.51670  
## 261 57 Pb208 1.707354e+06 1.000000e+00 Sample QC AVM 1.51670  
## 262 57 Ge72 7.984046e+04 7.984046e+04 Sample QC AVM 1.51670  
## 263 57 Cr53 3.892300e+04 6.000000e-01 Sample QC AVM 1.51670  
## 264 57 Cd114 9.822350e+03 6.000000e-01 Sample QC AVM 1.51670  
## 265 57 Cd111 3.816160e+03 1.600000e+00 Sample QC AVM 1.51670  
## 266 57 As75 9.384260e+03 1.300000e+00 Sample QC AVM 1.51670  
## 267 58 Cd114 9.877000e+02 1.100000e+00 Sample B SS 1.53630  
## 268 58 Pb208 3.461418e+05 7.000000e-01 Sample B SS 1.53630  
## 269 58 Cr52 1.260956e+05 7.000000e-01 Sample B SS 1.53630  
## 270 58 Ge72 8.057508e+04 8.057508e+04 Sample B SS 1.53630  
## 271 58 Cd111 2.355700e+02 1.020000e+01 Sample B SS 1.53630  
## 272 58 As75 2.337160e+03 1.700000e+00 Sample B SS 1.53630  
## 273 58 Cr53 1.537993e+04 9.000000e-01 Sample B SS 1.53630  
## 274 59 Cd111 4.361870e+03 1.600000e+00 Sample QC SS 1.55780  
## 275 59 Cr52 3.541408e+05 4.000000e-01 Sample QC SS 1.55780  
## 276 59 Ge72 8.190104e+04 8.190104e+04 Sample QC SS 1.55780  
## 277 59 Cd114 1.094959e+04 3.000000e-01 Sample QC SS 1.55780  
## 278 59 Cr53 4.317080e+04 3.000000e-01 Sample QC SS 1.55780  
## 279 59 As75 1.042438e+04 4.000000e-01 Sample QC SS 1.55780  
## 280 59 Pb208 1.913109e+06 7.000000e-01 Sample QC SS 1.55780  
## 281 6 Ge72 7.197850e+04 7.197850e+04 Sample C MRMJ 1.50090  
## 282 6 Cd114 8.510267e+02 2.218120e+00 Sample C MRMJ 1.50090  
## 283 6 Cr52 1.414462e+05 4.998079e-01 Sample C MRMJ 1.50090  
## 284 6 Cr53 1.727384e+04 4.539356e-01 Sample C MRMJ 1.50090  
## 285 6 Cd111 2.444567e+02 7.752058e+00 Sample C MRMJ 1.50090  
## 286 6 Pb208 4.000386e+05 1.142195e+00 Sample C MRMJ 1.50090  
## 287 6 As75 2.456960e+03 2.292928e+00 Sample C MRMJ 1.50090  
## 288 65 Pb208 5.989333e+02 8.427985e+00 Cal1 NA  
## 289 65 Cr52 1.360123e+03 4.069560e+01 Cal1 NA  
## 290 65 Cd114 6.223333e+00 4.323169e+01 Cal1 NA  
## 291 65 Cd111 2.223333e+00 1.732051e+02 Cal1 NA  
## 292 65 Ge72 8.065182e+04 8.065182e+04 Cal1 NA  
## 293 65 As75 3.982300e+02 1.767364e+01 Cal1 NA  
## 294 65 Cr53 1.447767e+02 4.054332e+01 Cal1 NA  
## 295 66 Cd114 5.016853e+03 1.448323e+00 Cal1 NA  
## 296 66 Cr53 9.653633e+02 2.590283e+00 Cal1 NA  
## 297 66 Cr52 8.276697e+03 3.899334e+00 Cal1 NA  
## 298 66 Cd111 2.121343e+03 5.274208e+00 Cal1 NA  
## 299 66 Pb208 2.739260e+03 3.740424e+00 Cal1 NA  
## 300 66 As75 1.197267e+03 1.656124e+00 Cal1 NA  
## 301 66 Ge72 7.310766e+04 7.310766e+04 Cal1 NA  
## 302 67 Cd114 1.035400e+04 3.363097e-01 Cal1 NA  
## 303 67 Cr52 1.498678e+04 5.405808e-01 Cal1 NA  
## 304 67 As75 1.977783e+03 1.373984e+00 Cal1 NA  
## 305 67 Ge72 7.349920e+04 7.349920e+04 Cal1 NA  
## 306 67 Cr53 1.795540e+03 6.829767e-01 Cal1 NA  
## 307 67 Pb208 5.115520e+03 3.337076e+00 Cal1 NA  
## 308 67 Cd111 4.109570e+03 6.196763e-01 Cal1 NA  
## 309 68 Cr53 3.397220e+03 1.213436e+00 Cal1 NA  
## 310 68 Cd111 8.275717e+03 2.982682e+00 Cal1 NA  
## 311 68 As75 3.445233e+03 1.616618e+00 Cal1 NA  
## 312 68 Cd114 2.026614e+04 7.761039e-01 Cal1 NA  
## 313 68 Ge72 7.341969e+04 7.341969e+04 Cal1 NA  
## 314 68 Cr52 2.733375e+04 1.441860e+00 Cal1 NA  
## 315 68 Pb208 9.227503e+03 3.253740e+00 Cal1 NA  
## 316 69 Ge72 7.356037e+04 7.356037e+04 Cal1 NA  
## 317 69 Cd111 2.011471e+04 1.388150e+00 Cal1 NA  
## 318 69 Cr53 8.099483e+03 1.390781e+00 Cal1 NA  
## 319 69 Pb208 2.291183e+04 2.650687e+00 Cal1 NA  
## 320 69 Cr52 6.616733e+04 9.332371e-01 Cal1 NA  
## 321 69 Cd114 5.078245e+04 2.701645e-01 Cal1 NA  
## 322 69 As75 8.293940e+03 2.094664e+00 Cal1 NA  
## 323 7 Cr53 9.434700e+02 1.489198e+00 Sample MB MRMJ 0.00000  
## 324 7 Ge72 7.153670e+04 7.153670e+04 Sample MB MRMJ 0.00000  
## 325 7 Cr52 7.664203e+03 1.242099e+00 Sample MB MRMJ 0.00000  
## 326 7 Pb208 7.733933e+02 1.584288e+01 Sample MB MRMJ 0.00000  
## 327 7 Cd114 5.744667e+01 1.046615e+01 Sample MB MRMJ 0.00000  
## 328 7 Cd111 2.778000e+01 3.020248e+01 Sample MB MRMJ 0.00000  
## 329 7 As75 4.002300e+02 7.555913e-01 Sample MB MRMJ 0.00000  
## 330 70 Cd111 4.048754e+04 2.322128e+00 Cal1 NA  
## 331 70 Ge72 7.414258e+04 7.414258e+04 Cal1 NA  
## 332 70 Cd114 1.009423e+05 1.615268e-01 Cal1 NA  
## 333 70 Cr53 1.601014e+04 6.570360e-01 Cal1 NA  
## 334 70 As75 1.605163e+04 4.140387e-01 Cal1 NA  
## 335 70 Cr52 1.303144e+05 2.176385e-01 Cal1 NA  
## 336 70 Pb208 4.474160e+04 4.187964e-01 Cal1 NA  
## 337 71 Cd114 2.113009e+05 5.935784e-01 Cal1 NA  
## 338 71 Pb208 9.127560e+04 2.056945e+00 Cal1 NA  
## 339 71 Cd111 8.440363e+04 4.899394e-01 Cal1 NA  
## 340 71 Cr53 3.297050e+04 2.633507e-01 Cal1 NA  
## 341 71 Cr52 2.716008e+05 7.354312e-01 Cal1 NA  
## 342 71 Ge72 7.748021e+04 7.748021e+04 Cal1 NA  
## 343 71 As75 3.308167e+04 1.237437e+00 Cal1 NA  
## 344 72 Cd111 2.425954e+05 5.311060e-01 Cal1 NA  
## 345 72 Ge72 7.446098e+04 7.446098e+04 Cal1 NA  
## 346 72 Pb208 2.316954e+05 1.111096e+00 Cal1 NA  
## 347 72 Cr52 7.694588e+05 9.168668e-01 Cal1 NA  
## 348 72 Cd114 6.036589e+05 5.462463e-01 Cal1 NA  
## 349 72 Cr53 9.468235e+04 5.589255e-01 Cal1 NA  
## 350 72 As75 8.195548e+04 2.473291e-01 Cal1 NA  
## 351 73 Pb208 4.541545e+05 5.239838e-01 Cal1 NA  
## 352 73 Cr53 1.627114e+05 1.478827e-01 Cal1 NA  
## 353 73 Ge72 7.483330e+04 7.483330e+04 Cal1 NA  
## 354 73 As75 1.626539e+05 5.667939e-01 Cal1 NA  
## 355 73 Cd111 4.177049e+05 5.792408e-01 Cal1 NA  
## 356 73 Cd114 1.048247e+06 2.239205e-01 Cal1 NA  
## 357 73 Cr52 1.345846e+06 7.706362e-01 Cal1 NA  
## 358 74 Ge72 7.536762e+04 7.536762e+04 Cal1 NA  
## 359 74 Cr53 8.225690e+05 7.160108e-01 Cal1 NA  
## 360 74 Pb208 2.358811e+06 4.708663e-01 Cal1 NA  
## 361 74 As75 8.231175e+05 7.361890e-01 Cal1 NA  
## 362 74 Cr52 6.806556e+06 8.205068e-01 Cal1 NA  
## 363 74 Cd114 5.410833e+06 4.407081e-01 Cal1 NA  
## 364 74 Cd111 2.105879e+06 8.345537e-01 Cal1 NA  
## 365 75 Cr53 1.692230e+06 2.487280e-01 Cal1 NA  
## 366 75 Cd111 4.298395e+06 4.823506e-01 Cal1 NA  
## 367 75 As75 1.714248e+06 7.400396e-01 Cal1 NA  
## 368 75 Ge72 7.280290e+04 7.280290e+04 Cal1 NA  
## 369 75 Cr52 1.385369e+07 2.186808e-01 Cal1 NA  
## 370 75 Pb208 4.687902e+06 2.587369e-01 Cal1 NA  
## 371 75 Cd114 1.096414e+07 2.176914e-01 Cal1 NA  
## 372 76 As75 3.982300e+02 1.770000e+01 Cal2 NA  
## 373 76 Cr52 1.360120e+03 4.070000e+01 Cal2 NA  
## 374 76 Ge72 8.065182e+04 8.065182e+04 Cal2 NA  
## 375 76 Cd114 6.220000e+00 4.320000e+01 Cal2 NA  
## 376 76 Cd111 2.220000e+00 1.732000e+02 Cal2 NA  
## 377 76 Cr53 1.447800e+02 4.050000e+01 Cal2 NA  
## 378 76 Pb208 5.989300e+02 8.400000e+00 Cal2 NA  
## 379 77 Cr52 8.276700e+03 3.900000e+00 Cal2 NA  
## 380 77 Pb208 2.739260e+03 3.700000e+00 Cal2 NA  
## 381 77 Cd111 2.121340e+03 5.300000e+00 Cal2 NA  
## 382 77 Ge72 7.310766e+04 7.310766e+04 Cal2 NA  
## 383 77 As75 1.197270e+03 1.700000e+00 Cal2 NA  
## 384 77 Cr53 9.653600e+02 2.600000e+00 Cal2 NA  
## 385 77 Cd114 5.016850e+03 1.400000e+00 Cal2 NA  
## 386 78 Cr52 1.498678e+04 5.000000e-01 Cal2 NA  
## 387 78 Pb208 5.115520e+03 3.300000e+00 Cal2 NA  
## 388 78 Cr53 1.795540e+03 7.000000e-01 Cal2 NA  
## 389 78 Cd111 4.109570e+03 6.000000e-01 Cal2 NA  
## 390 78 Cd114 1.035400e+04 3.000000e-01 Cal2 NA  
## 391 78 As75 1.977780e+03 1.400000e+00 Cal2 NA  
## 392 78 Ge72 7.349920e+04 7.349920e+04 Cal2 NA  
## 393 79 Cd114 2.026614e+04 8.000000e-01 Cal2 NA  
## 394 79 Cr53 3.397220e+03 1.200000e+00 Cal2 NA  
## 395 79 Ge72 7.341969e+04 7.341969e+04 Cal2 NA  
## 396 79 Pb208 9.227500e+03 3.300000e+00 Cal2 NA  
## 397 79 Cr52 2.733375e+04 1.400000e+00 Cal2 NA  
## 398 79 As75 3.445230e+03 1.600000e+00 Cal2 NA  
## 399 79 Cd111 8.275720e+03 3.000000e+00 Cal2 NA  
## 400 8 Ge72 7.545058e+04 7.545058e+04 Sample E ARG 1.54230  
## 401 8 As75 1.931447e+03 1.751432e+00 Sample E ARG 1.54230  
## 402 8 Pb208 1.704828e+05 1.821880e+00 Sample E ARG 1.54230  
## 403 8 Cd111 1.744533e+02 3.446667e+01 Sample E ARG 1.54230  
## 404 8 Cd114 4.693433e+02 2.399613e+00 Sample E ARG 1.54230  
## 405 8 Cr53 7.884053e+03 3.187410e-01 Sample E ARG 1.54230  
## 406 8 Cr52 6.477647e+04 1.640557e+00 Sample E ARG 1.54230  
## 407 80 Cr53 8.099480e+03 1.400000e+00 Cal2 NA  
## 408 80 As75 8.293940e+03 2.100000e+00 Cal2 NA  
## 409 80 Cd111 2.011471e+04 1.400000e+00 Cal2 NA  
## 410 80 Cr52 6.616733e+04 9.000000e-01 Cal2 NA  
## 411 80 Pb208 2.291183e+04 2.700000e+00 Cal2 NA  
## 412 80 Cd114 5.078245e+04 3.000000e-01 Cal2 NA  
## 413 80 Ge72 7.356037e+04 7.356037e+04 Cal2 NA  
## 414 81 Cr53 1.601014e+04 7.000000e-01 Cal2 NA  
## 415 81 As75 1.605163e+04 4.000000e-01 Cal2 NA  
## 416 81 Ge72 7.414258e+04 7.414258e+04 Cal2 NA  
## 417 81 Cd111 4.048754e+04 2.300000e+00 Cal2 NA  
## 418 81 Pb208 4.474160e+04 4.000000e-01 Cal2 NA  
## 419 81 Cd114 1.009423e+05 2.000000e-01 Cal2 NA  
## 420 81 Cr52 1.303144e+05 2.000000e-01 Cal2 NA  
## 421 82 As75 3.308167e+04 1.200000e+00 Cal2 NA  
## 422 82 Cr53 3.297050e+04 3.000000e-01 Cal2 NA  
## 423 82 Pb208 9.127560e+04 2.100000e+00 Cal2 NA  
## 424 82 Ge72 7.748021e+04 7.748021e+04 Cal2 NA  
## 425 82 Cd111 8.440363e+04 5.000000e-01 Cal2 NA  
## 426 82 Cd114 2.113009e+05 6.000000e-01 Cal2 NA  
## 427 82 Cr52 2.716008e+05 7.000000e-01 Cal2 NA  
## 428 83 Cd111 2.425954e+05 5.000000e-01 Cal2 NA  
## 429 83 Cr53 9.468235e+04 6.000000e-01 Cal2 NA  
## 430 83 Cr52 7.694588e+05 9.000000e-01 Cal2 NA  
## 431 83 Pb208 2.316954e+05 1.100000e+00 Cal2 NA  
## 432 83 Ge72 7.446098e+04 7.446098e+04 Cal2 NA  
## 433 83 As75 8.195548e+04 2.000000e-01 Cal2 NA  
## 434 83 Cd114 6.036589e+05 5.000000e-01 Cal2 NA  
## 435 84 Cr53 1.627114e+05 1.000000e-01 Cal2 NA  
## 436 84 Pb208 4.541545e+05 5.000000e-01 Cal2 NA  
## 437 84 Ge72 7.483330e+04 7.483330e+04 Cal2 NA  
## 438 84 Cd111 4.177049e+05 6.000000e-01 Cal2 NA  
## 439 84 Cd114 1.048247e+06 2.000000e-01 Cal2 NA  
## 440 84 Cr52 1.345846e+06 8.000000e-01 Cal2 NA  
## 441 84 As75 1.626539e+05 6.000000e-01 Cal2 NA  
## 442 85 Cd111 2.105879e+06 8.000000e-01 Cal2 NA  
## 443 85 As75 8.231175e+05 7.000000e-01 Cal2 NA  
## 444 85 Cr52 6.806556e+06 8.000000e-01 Cal2 NA  
## 445 85 Pb208 2.358811e+06 5.000000e-01 Cal2 NA  
## 446 85 Cd114 5.410833e+06 4.000000e-01 Cal2 NA  
## 447 85 Cr53 8.225690e+05 7.000000e-01 Cal2 NA  
## 448 85 Ge72 7.536762e+04 7.536762e+04 Cal2 NA  
## 449 86 Cr53 1.692230e+06 2.000000e-01 Cal2 NA  
## 450 86 Cr52 1.385369e+07 2.000000e-01 Cal2 NA  
## 451 86 Cd111 4.298395e+06 5.000000e-01 Cal2 NA  
## 452 86 Ge72 7.280290e+04 7.280290e+04 Cal2 NA  
## 453 86 Cd114 1.096414e+07 2.000000e-01 Cal2 NA  
## 454 86 As75 1.714248e+06 7.000000e-01 Cal2 NA  
## 455 86 Pb208 4.687902e+06 3.000000e-01 Cal2 NA  
## 456 87 Pb208 5.989300e+02 8.400000e+00 Cal3 NA  
## 457 87 Cd111 2.220000e+00 1.732000e+02 Cal3 NA  
## 458 87 Cr52 1.360120e+03 4.070000e+01 Cal3 NA  
## 459 87 Cd114 6.220000e+00 4.320000e+01 Cal3 NA  
## 460 87 As75 3.982300e+02 1.770000e+01 Cal3 NA  
## 461 87 Ge72 8.065182e+04 8.065182e+04 Cal3 NA  
## 462 87 Cr53 1.447800e+02 4.050000e+01 Cal3 NA  
## 463 88 Cd111 2.121340e+03 5.300000e+00 Cal3 NA  
## 464 88 Pb208 2.739260e+03 3.700000e+00 Cal3 NA  
## 465 88 Cr52 8.276700e+03 3.900000e+00 Cal3 NA  
## 466 88 As75 1.197270e+03 1.700000e+00 Cal3 NA  
## 467 88 Ge72 7.310766e+04 7.310766e+04 Cal3 NA  
## 468 88 Cd114 5.016850e+03 1.400000e+00 Cal3 NA  
## 469 88 Cr53 9.653600e+02 2.600000e+00 Cal3 NA  
## 470 89 Pb208 5.115520e+03 3.300000e+00 Cal3 NA  
## 471 89 As75 1.977780e+03 1.400000e+00 Cal3 NA  
## 472 89 Cd111 4.109570e+03 6.000000e-01 Cal3 NA  
## 473 89 Cd114 1.035400e+04 3.000000e-01 Cal3 NA  
## 474 89 Ge72 7.349920e+04 7.349920e+04 Cal3 NA  
## 475 89 Cr52 1.498678e+04 5.000000e-01 Cal3 NA  
## 476 89 Cr53 1.795540e+03 7.000000e-01 Cal3 NA  
## 477 9 Cd111 2.555667e+01 2.716770e+01 Sample MB ARG 0.00000  
## 478 9 Cr52 7.542990e+03 2.150435e+00 Sample MB ARG 0.00000  
## 479 9 As75 4.297833e+02 7.027989e+00 Sample MB ARG 0.00000  
## 480 9 Pb208 1.430140e+03 2.627063e+00 Sample MB ARG 0.00000  
## 481 9 Ge72 7.141664e+04 7.141664e+04 Sample MB ARG 0.00000  
## 482 9 Cr53 9.099167e+02 1.885160e+00 Sample MB ARG 0.00000  
## 483 9 Cd114 7.422333e+01 1.817404e+00 Sample MB ARG 0.00000  
## 484 90 Pb208 9.227500e+03 3.300000e+00 Cal3 NA  
## 485 90 Cr52 2.733375e+04 1.400000e+00 Cal3 NA  
## 486 90 Cd114 2.026614e+04 8.000000e-01 Cal3 NA  
## 487 90 As75 3.445230e+03 1.600000e+00 Cal3 NA  
## 488 90 Cd111 8.275720e+03 3.000000e+00 Cal3 NA  
## 489 90 Cr53 3.397220e+03 1.200000e+00 Cal3 NA  
## 490 90 Ge72 7.341969e+04 7.341969e+04 Cal3 NA  
## 491 91 Pb208 2.291183e+04 2.700000e+00 Cal3 NA  
## 492 91 Cd114 5.078245e+04 3.000000e-01 Cal3 NA  
## 493 91 Cr52 6.616733e+04 9.000000e-01 Cal3 NA  
## 494 91 Cd111 2.011471e+04 1.400000e+00 Cal3 NA  
## 495 91 As75 8.293940e+03 2.100000e+00 Cal3 NA  
## 496 91 Ge72 7.356037e+04 7.356037e+04 Cal3 NA  
## 497 91 Cr53 8.099480e+03 1.400000e+00 Cal3 NA  
## 498 92 Ge72 7.414258e+04 7.414258e+04 Cal3 NA  
## 499 92 Pb208 4.474160e+04 4.000000e-01 Cal3 NA  
## 500 92 Cd114 1.009423e+05 2.000000e-01 Cal3 NA  
## 501 92 Cd111 4.048754e+04 2.300000e+00 Cal3 NA  
## 502 92 Cr52 1.303144e+05 2.000000e-01 Cal3 NA  
## 503 92 As75 1.605163e+04 4.000000e-01 Cal3 NA  
## 504 92 Cr53 1.601014e+04 7.000000e-01 Cal3 NA  
## 505 93 Cd114 2.113009e+05 6.000000e-01 Cal3 NA  
## 506 93 Ge72 7.748021e+04 7.748021e+04 Cal3 NA  
## 507 93 Cr52 2.716008e+05 7.000000e-01 Cal3 NA  
## 508 93 As75 3.308167e+04 1.200000e+00 Cal3 NA  
## 509 93 Cd111 8.440363e+04 5.000000e-01 Cal3 NA  
## 510 93 Pb208 9.127560e+04 2.100000e+00 Cal3 NA  
## 511 93 Cr53 3.297050e+04 3.000000e-01 Cal3 NA  
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## 513 94 Cd114 6.036589e+05 5.000000e-01 Cal3 NA  
## 514 94 Cr52 7.694588e+05 9.000000e-01 Cal3 NA  
## 515 94 Cr53 9.468235e+04 6.000000e-01 Cal3 NA  
## 516 94 As75 8.195548e+04 2.000000e-01 Cal3 NA  
## 517 94 Cd111 2.425954e+05 5.000000e-01 Cal3 NA  
## 518 94 Pb208 2.316954e+05 1.100000e+00 Cal3 NA  
## 519 95 Cd114 1.048247e+06 2.000000e-01 Cal3 NA  
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## 524 95 Cr53 1.627114e+05 1.000000e-01 Cal3 NA  
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## 527 96 Cd114 5.410833e+06 4.000000e-01 Cal3 NA  
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## 532 96 Cr52 6.806556e+06 8.000000e-01 Cal3 NA  
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## 534 97 As75 1.714248e+06 7.000000e-01 Cal3 NA  
## 535 97 Pb208 4.687902e+06 3.000000e-01 Cal3 NA  
## 536 97 Cr53 1.692230e+06 2.000000e-01 Cal3 NA  
## 537 97 Cd114 1.096414e+07 2.000000e-01 Cal3 NA  
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## 539 97 Cr52 1.385369e+07 2.000000e-01 Cal3 NA  
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## 538 NA 1e+03  
## 539 NA 1e+03

#Data Processing

1. Correcting for internal standard *Incorrect code*

This was the original attempt for ISTD correction, unfortunately it improperly pairs the ISTD readings to the ICPMS Samples, later code is shown which utilizes a “for loop” to correct this mistake.

This code shows the danger of oversimplifying the data analysis; that it is important to confirm that the data is properly matching

ISTD\_Data <- filter(ICPMS\_Merged, Metal== “Ge72”) Sample\_Data <- filter(ICPMS\_Merged, Metal!= “Ge72”) ICPMS <- mutate(Sample\_Data, CPS\_corrected = Sample\_DataCPS, RSD\_corrected = Sample\_DataRSD)

*Correct Code: Utilizes “for loops” to insure proper matching*

#This code chunk also performs the ISTD correction, however it uses a for loop to insure proper matching of ISTD to sample reading  
#Note: There is a Ge72 CPS value for each sample key and the correct code sorts by Sample Key when subtracting the ISTD CPS Value  
  
##Designing a "for loop"  
  
#1) assign a blank dataframe; this allows the data to be combined together between iterations of the loop  
ICPMS <- NULL #This creates a blank dataframe for which the corrected data can be added to!  
  
  
#2) Find the unique iterations in the Sample Key  
unique\_IDs <- unique(ICPMS\_merged$Sample.Key)  
  
#3) Start the for loop   
for(ID in unique\_IDs){  
 #This loop performs the ISTD correction for each sample key and   
 #then adds the corrected data together between iterations  
  
 #4) Filter the sample data for ISTD data and by each iteration in the unique Sample Keys  
 #Note: The ISTD Data should ONLY consist of unique Sample Keys  
   
 ISTD <- filter(ICPMS\_merged, metal=="Ge72", Sample.Key ==ID)  
 sample <- filter(ICPMS\_merged, metal!="Ge72", Sample.Key==ID)  
   
 #5) Correct the CPS and RSD readings  
 corrected <- mutate(sample,  
 CPS.corrected = sample$CPS / ISTD$CPS,  
 RSD.corrected = sample$RSD / ISTD$RSD)  
   
 #6) Bind together the Corrected data  
 ICPMS <- rbind(ICPMS, corrected)  
   
  
}  
  
#7) Polish up the final ICPMS data by renaming all columns to "snake case" (w/ the exception of acronyms!) to fit with standard R practice:  
  
ICPMS <- ICPMS %>% rename(sample.key = Sample.Key,  
 type=Type,  
 site=Site,  
 analyst=Analyst,  
 mass.soil= Mass.of.Soil,  
 total.volume= Total.Volume,  
 concentration= Concentration)  
#8) Previewing Data  
ICPMS

## sample.key metal CPS RSD type site analyst mass.soil  
## 1 10 Cr52 2.152244e+04 1.43639737 Sample F CYT 1.49350  
## 2 10 Cr53 2.610417e+03 0.80738137 Sample F CYT 1.49350  
## 3 10 Pb208 4.045369e+04 1.37342249 Sample F CYT 1.49350  
## 4 10 As75 9.212500e+02 0.11616176 Sample F CYT 1.49350  
## 5 10 Cd111 8.111667e+01 48.15972933 Sample F CYT 1.49350  
## 6 10 Cd114 2.034467e+02 2.13679802 Sample F CYT 1.49350  
## 7 11 As75 4.294533e+02 9.60051516 Sample MB CYT 0.00000  
## 8 11 Cd114 4.044333e+01 7.91602618 Sample MB CYT 0.00000  
## 9 11 Cr52 8.698017e+03 0.56901291 Sample MB CYT 0.00000  
## 10 11 Pb208 1.101203e+03 3.33459467 Sample MB CYT 0.00000  
## 11 11 Cr53 1.028810e+03 1.72253707 Sample MB CYT 0.00000  
## 12 11 Cd111 1.111333e+01 45.81986940 Sample MB CYT 0.00000  
## 13 12 Cr52 6.704487e+04 0.72616042 Sample F DJHR 1.51600  
## 14 12 Cr53 8.160400e+03 0.63105224 Sample F DJHR 1.51600  
## 15 12 Cd114 4.803400e+02 4.51816097 Sample F DJHR 1.51600  
## 16 12 Cd111 1.644533e+02 14.38107111 Sample F DJHR 1.51600  
## 17 12 Pb208 1.800297e+05 0.56241857 Sample F DJHR 1.51600  
## 18 12 As75 2.653983e+03 2.39207995 Sample F DJHR 1.51600  
## 19 13 Cr52 2.582171e+05 0.46884228 Sample QC DJHR 1.49230  
## 20 13 As75 7.754473e+03 1.48252322 Sample QC DJHR 1.49230  
## 21 13 Cd114 9.178340e+03 0.79732729 Sample QC DJHR 1.49230  
## 22 13 Pb208 1.841731e+06 1.61491745 Sample QC DJHR 1.49230  
## 23 13 Cd111 3.508307e+03 2.38989403 Sample QC DJHR 1.49230  
## 24 13 Cr53 3.144505e+04 0.28245321 Sample QC DJHR 1.49230  
## 25 14 Cr52 7.397862e+04 0.51642716 Sample D CAG 1.50621  
## 26 14 Cd114 8.432467e+02 3.57891594 Sample D CAG 1.50621  
## 27 14 Cr53 9.107623e+03 0.44471713 Sample D CAG 1.50621  
## 28 14 Pb208 2.048409e+05 0.78399484 Sample D CAG 1.50621  
## 29 14 As75 1.613523e+03 1.48525549 Sample D CAG 1.50621  
## 30 14 Cd111 2.211200e+02 7.43656446 Sample D CAG 1.50621  
## 31 15 As75 7.846293e+03 0.79607240 Sample QC CAG 1.48989  
## 32 15 Cr52 2.602317e+05 1.32662211 Sample QC CAG 1.48989  
## 33 15 Cr53 3.196707e+04 0.53303762 Sample QC CAG 1.48989  
## 34 15 Cd114 9.031590e+03 0.61855201 Sample QC CAG 1.48989  
## 35 15 Cd111 3.416053e+03 3.63976259 Sample QC CAG 1.48989  
## 36 15 Pb208 1.870583e+06 1.36740602 Sample QC CAG 1.48989  
## 37 16 Cr52 9.562305e+04 1.06334158 Sample F JHV 1.50630  
## 38 16 Cd114 6.106800e+02 3.49896393 Sample F JHV 1.50630  
## 39 16 As75 3.599597e+03 0.16103246 Sample F JHV 1.50630  
## 40 16 Pb208 2.472870e+05 0.99388786 Sample F JHV 1.50630  
## 41 16 Cr53 1.156324e+04 0.50827177 Sample F JHV 1.50630  
## 42 16 Cd111 2.044567e+02 6.58980387 Sample F JHV 1.50630  
## 43 17 Cd114 1.008851e+04 0.77977582 Sample QC JHV 1.52360  
## 44 17 Cd111 3.958423e+03 3.20761283 Sample QC JHV 1.52360  
## 45 17 Cr53 3.650875e+04 0.83499542 Sample QC JHV 1.52360  
## 46 17 Pb208 2.104811e+06 0.95447947 Sample QC JHV 1.52360  
## 47 17 Cr52 2.972667e+05 1.43957880 Sample QC JHV 1.52360  
## 48 17 As75 8.928353e+03 1.07580937 Sample QC JHV 1.52360  
## 49 18 Cd111 2.077867e+02 25.58619375 Sample D SJB 1.55000  
## 50 18 As75 1.933557e+03 1.90872624 Sample D SJB 1.55000  
## 51 18 Cr53 9.429900e+03 1.66778751 Sample D SJB 1.55000  
## 52 18 Cr52 7.717385e+04 2.03067801 Sample D SJB 1.55000  
## 53 18 Cd114 8.934700e+02 2.11935688 Sample D SJB 1.55000  
## 54 18 Pb208 1.971181e+05 0.54317398 Sample D SJB 1.55000  
## 55 19 As75 6.509090e+03 1.11330479 Sample QC SJB 1.53000  
## 56 19 Cr53 2.642573e+04 0.12837467 Sample QC SJB 1.53000  
## 57 19 Cr52 2.159292e+05 0.54217391 Sample QC SJB 1.53000  
## 58 19 Pb208 2.017960e+06 0.75237591 Sample QC SJB 1.53000  
## 59 19 Cd114 9.471377e+03 0.43151352 Sample QC SJB 1.53000  
## 60 19 Cd111 3.733913e+03 4.52877773 Sample QC SJB 1.53000  
## 61 20 Pb208 1.127880e+03 5.32333134 Sample MB MD 0.00000  
## 62 20 Cd111 2.000333e+01 28.86270301 Sample MB MD 0.00000  
## 63 20 Cr53 1.006587e+03 3.24374925 Sample MB MD 0.00000  
## 64 20 Cd114 5.633667e+01 12.84097652 Sample MB MD 0.00000  
## 65 20 As75 4.935667e+02 1.36393006 Sample MB MD 0.00000  
## 66 20 Cr52 8.237793e+03 3.20242463 Sample MB MD 0.00000  
## 67 21 Cd111 2.289000e+02 25.48838789 Sample D MD 1.57560  
## 68 21 Pb208 4.670668e+05 0.93764272 Sample D MD 1.57560  
## 69 21 Cr52 4.260328e+04 1.18263390 Sample D MD 1.57560  
## 70 21 Cr53 5.163523e+03 1.11927973 Sample D MD 1.57560  
## 71 21 As75 1.317833e+03 2.71587913 Sample D MD 1.57560  
## 72 21 Cd114 5.482300e+02 2.96803184 Sample D MD 1.57560  
## 73 22 Cd111 2.177900e+02 14.86697139 Sample E SEP 1.60000  
## 74 22 As75 3.624050e+03 2.53290821 Sample E SEP 1.60000  
## 75 22 Cd114 7.030167e+02 2.54518544 Sample E SEP 1.60000  
## 76 22 Cr52 1.363738e+05 1.60380857 Sample E SEP 1.60000  
## 77 22 Cr53 1.673968e+04 0.84730512 Sample E SEP 1.60000  
## 78 22 Pb208 2.100672e+05 1.24974101 Sample E SEP 1.60000  
## 79 23 Cd114 7.630480e+03 1.08118476 Sample QC SEP 1.01360  
## 80 23 Cr52 2.287993e+05 0.53505049 Sample QC SEP 1.01360  
## 81 23 Pb208 1.504430e+06 1.40685866 Sample QC SEP 1.01360  
## 82 23 As75 6.605903e+03 0.13652182 Sample QC SEP 1.01360  
## 83 23 Cr53 2.778250e+04 0.72051359 Sample QC SEP 1.01360  
## 84 23 Cd111 2.903717e+03 4.42131495 Sample QC SEP 1.01360  
## 85 24 Cr52 2.763932e+05 1.32200927 Sample C SGB 1.50740  
## 86 24 Cr53 3.396297e+04 0.48946285 Sample C SGB 1.50740  
## 87 24 As75 3.896327e+03 1.75918272 Sample C SGB 1.50740  
## 88 24 Pb208 5.151570e+05 1.05944091 Sample C SGB 1.50740  
## 89 24 Cd111 3.444667e+02 11.17435914 Sample C SGB 1.50740  
## 90 24 Cd114 1.291387e+03 1.62536603 Sample C SGB 1.50740  
## 91 25 As75 3.817867e+02 5.00004793 Sample MB SGB 0.00000  
## 92 25 Cd114 2.837833e+02 0.44428494 Sample MB SGB 0.00000  
## 93 25 Cr53 1.347167e+03 1.86964922 Sample MB SGB 0.00000  
## 94 25 Cr52 1.070254e+04 2.77230356 Sample MB SGB 0.00000  
## 95 25 Cd111 9.556000e+01 13.21090993 Sample MB SGB 0.00000  
## 96 25 Pb208 1.209512e+04 2.57856763 Sample MB SGB 0.00000  
## 97 26 Cd111 2.633500e+02 4.56282257 Sample C AWB 1.51150  
## 98 26 As75 1.904777e+03 1.67156778 Sample C AWB 1.51150  
## 99 26 Cr53 1.881413e+04 0.62469690 Sample C AWB 1.51150  
## 100 26 Cd114 8.071333e+02 0.47012554 Sample C AWB 1.51150  
## 101 26 Pb208 4.197178e+05 0.70935550 Sample C AWB 1.51150  
## 102 26 Cr52 1.534153e+05 0.80255624 Sample C AWB 1.51150  
## 103 27 As75 9.168590e+03 0.75735476 Sample QC AWB 1.57940  
## 104 27 Cr52 3.137944e+05 0.28681190 Sample QC AWB 1.57940  
## 105 27 Cd111 4.157373e+03 3.71329141 Sample QC AWB 1.57940  
## 106 27 Cd114 1.039324e+04 0.23651685 Sample QC AWB 1.57940  
## 107 27 Cr53 3.822911e+04 0.29060325 Sample QC AWB 1.57940  
## 108 27 Pb208 2.259779e+06 1.07212830 Sample QC AWB 1.57940  
## 109 38 As75 1.954003e+03 2.48639971 Sample C GB 1.51270  
## 110 38 Cd111 3.055733e+02 13.19804518 Sample C GB 1.51270  
## 111 38 Cr52 1.888591e+05 0.50088458 Sample C GB 1.51270  
## 112 38 Cr53 2.296685e+04 0.89691247 Sample C GB 1.51270  
## 113 38 Cd114 7.381333e+02 2.11148282 Sample C GB 1.51270  
## 114 38 Pb208 4.866116e+05 0.61741545 Sample C GB 1.51270  
## 115 39 As75 7.095423e+03 1.94267430 Sample QC GB 1.55540  
## 116 39 Pb208 1.616628e+06 1.08623178 Sample QC GB 1.55540  
## 117 39 Cd114 7.986637e+03 1.41921723 Sample QC GB 1.55540  
## 118 39 Cr52 2.361630e+05 0.59212602 Sample QC GB 1.55540  
## 119 39 Cr53 2.890345e+04 0.37209712 Sample QC GB 1.55540  
## 120 39 Cd111 3.091530e+03 2.69680616 Sample QC GB 1.55540  
## 121 40 Cr52 7.073455e+04 1.35833645 Sample B AB 1.53780  
## 122 40 Cr53 8.596043e+03 0.69423375 Sample B AB 1.53780  
## 123 40 Cd111 1.822300e+02 14.67332885 Sample B AB 1.53780  
## 124 40 Cd114 8.645800e+02 0.86247839 Sample B AB 1.53780  
## 125 40 Pb208 2.286652e+05 1.75502840 Sample B AB 1.53780  
## 126 40 As75 1.932780e+03 2.47969153 Sample B AB 1.53780  
## 127 41 Cr53 1.206701e+04 0.59869990 Sample B LF 1.45870  
## 128 41 Pb208 1.465302e+06 1.82430931 Sample B LF 1.45870  
## 129 41 As75 2.883463e+03 1.30737410 Sample B LF 1.45870  
## 130 41 Cd111 2.766833e+02 11.49204595 Sample B LF 1.45870  
## 131 41 Cr52 9.832519e+04 0.69078207 Sample B LF 1.45870  
## 132 41 Cd114 1.630530e+03 1.46662148 Sample B LF 1.45870  
## 133 42 Cr53 9.850300e+02 4.08204934 Sample MB LF 0.00000  
## 134 42 Pb208 1.000083e+03 9.40490020 Sample MB LF 0.00000  
## 135 42 Cd114 5.277667e+01 14.90017935 Sample MB LF 0.00000  
## 136 42 Cr52 8.278940e+03 2.13193779 Sample MB LF 0.00000  
## 137 42 Cd111 1.555667e+01 61.86691014 Sample MB LF 0.00000  
## 138 42 As75 5.543433e+02 5.12127995 Sample MB LF 0.00000  
## 139 43 Cd111 2.333667e+01 37.80184718 Sample MB AB 0.00000  
## 140 43 Cr52 7.977670e+03 2.20299454 Sample MB AB 0.00000  
## 141 43 Pb208 2.450310e+03 2.38406919 Sample MB AB 0.00000  
## 142 43 Cd114 7.566667e+01 17.50251976 Sample MB AB 0.00000  
## 143 43 As75 4.840067e+02 2.24579248 Sample MB AB 0.00000  
## 144 43 Cr53 9.920300e+02 3.12701662 Sample MB AB 0.00000  
## 145 44 Cr52 3.271045e+05 0.65856980 Sample QC KAD 1.55980  
## 146 44 Cd111 4.124013e+03 2.97178686 Sample QC KAD 1.55980  
## 147 44 Pb208 2.200120e+06 0.08679372 Sample QC KAD 1.55980  
## 148 44 Cr53 4.008394e+04 0.25312723 Sample QC KAD 1.55980  
## 149 44 Cd114 1.090923e+04 1.15128096 Sample QC KAD 1.55980  
## 150 44 As75 9.495650e+03 0.91318249 Sample QC KAD 1.55980  
## 151 45 Cr52 9.963547e+04 0.18232893 Sample B KAD 1.54000  
## 152 45 Cd111 3.389133e+02 34.13512885 Sample B KAD 1.54000  
## 153 45 Cr53 1.223801e+04 0.39916349 Sample B KAD 1.54000  
## 154 45 As75 2.469847e+03 0.96182898 Sample B KAD 1.54000  
## 155 45 Pb208 4.207086e+05 0.88140011 Sample B KAD 1.54000  
## 156 45 Cd114 1.276163e+03 1.57017165 Sample B KAD 1.54000  
## 157 46 Cd111 2.266833e+02 15.49246931 Sample A LML 1.57641  
## 158 46 As75 1.878440e+03 2.59277664 Sample A LML 1.57641  
## 159 46 Cd114 9.581433e+02 3.13208103 Sample A LML 1.57641  
## 160 46 Cr52 1.362243e+05 0.85175562 Sample A LML 1.57641  
## 161 46 Pb208 5.520821e+05 0.56627365 Sample A LML 1.57641  
## 162 46 Cr53 1.685802e+04 0.62545405 Sample A LML 1.57641  
## 163 47 As75 9.730993e+03 0.26713001 Sample QC LML 1.54717  
## 164 47 Cd111 4.347413e+03 2.21256108 Sample QC LML 1.54717  
## 165 47 Cd114 1.117907e+04 0.45096680 Sample QC LML 1.54717  
## 166 47 Cr52 3.435543e+05 0.34903734 Sample QC LML 1.54717  
## 167 47 Cr53 4.192172e+04 0.94674585 Sample QC LML 1.54717  
## 168 47 Pb208 2.314487e+06 0.69558377 Sample QC LML 1.54717  
## 169 48 Cr53 2.131052e+04 0.16007919 Sample A AH 1.50000  
## 170 48 Cd114 8.822467e+02 2.93761107 Sample A AH 1.50000  
## 171 48 As75 1.766427e+03 2.61420085 Sample A AH 1.50000  
## 172 48 Cr52 1.736069e+05 0.58345099 Sample A AH 1.50000  
## 173 48 Pb208 4.220388e+05 0.90921470 Sample A AH 1.50000  
## 174 48 Cd111 2.077867e+02 6.07456906 Sample A AH 1.50000  
## 175 49 Cd114 5.911000e+01 8.48333442 Sample MB AH 0.00000  
## 176 49 Pb208 1.217890e+03 8.64053949 Sample MB AH 0.00000  
## 177 49 Cr53 1.056590e+03 2.01956852 Sample MB AH 0.00000  
## 178 49 Cr52 8.469017e+03 3.00011528 Sample MB AH 0.00000  
## 179 49 As75 4.056733e+02 3.20770756 Sample MB AH 0.00000  
## 180 49 Cd111 1.111000e+01 91.65740795 Sample MB AH 0.00000  
## 181 50 Cd111 1.000000e+01 33.30000000 Sample MB LG 0.00000  
## 182 50 Cd114 2.866667e+01 8.38823541 Sample MB LG 0.00000  
## 183 50 Cr53 1.021367e+03 1.49877126 Sample MB LG 0.00000  
## 184 50 Cr52 8.334543e+03 0.74883155 Sample MB LG 0.00000  
## 185 50 Pb208 9.056267e+02 6.05214508 Sample MB LG 0.00000  
## 186 50 As75 3.947833e+02 3.55510026 Sample MB LG 0.00000  
## 187 51 Pb208 3.585994e+05 0.72361625 Sample C LG 1.50380  
## 188 51 Cd114 2.054463e+03 2.04952004 Sample C LG 1.50380  
## 189 51 As75 2.457290e+03 2.83373781 Sample C LG 1.50380  
## 190 51 Cr53 7.410860e+03 0.03917571 Sample C LG 1.50380  
## 191 51 Cr52 6.034384e+04 1.17764154 Sample C LG 1.50380  
## 192 51 Cd111 2.055667e+02 14.71336974 Sample C LG 1.50380  
## 193 52 Cd114 1.735540e+03 0.80000000 Sample B MF 1.45810  
## 194 52 As75 2.936700e+03 0.60000000 Sample B MF 1.45810  
## 195 52 Cr52 1.180807e+05 1.00000000 Sample B MF 1.45810  
## 196 52 Cr53 1.434409e+04 0.50000000 Sample B MF 1.45810  
## 197 52 Pb208 8.825791e+05 1.10000000 Sample B MF 1.45810  
## 198 52 Cd111 3.489100e+02 6.40000000 Sample B MF 1.45810  
## 199 53 Pb208 2.089301e+06 1.00000000 Sample QC MF 1.59160  
## 200 53 Cd114 1.107233e+04 0.50000000 Sample QC MF 1.59160  
## 201 53 Cr52 3.734691e+05 0.60000000 Sample QC MF 1.59160  
## 202 53 Cd111 4.458550e+03 2.20000000 Sample QC MF 1.59160  
## 203 53 As75 1.093936e+04 0.50000000 Sample QC MF 1.59160  
## 204 53 Cr53 4.551119e+04 0.70000000 Sample QC MF 1.59160  
## 205 54 Cd111 1.955700e+02 7.70000000 Sample A LAK 1.52350  
## 206 54 Cr53 1.260648e+04 0.70000000 Sample A LAK 1.52350  
## 207 54 As75 2.180360e+03 4.20000000 Sample A LAK 1.52350  
## 208 54 Cr52 1.041738e+05 0.90000000 Sample A LAK 1.52350  
## 209 54 Pb208 3.176920e+05 0.40000000 Sample A LAK 1.52350  
## 210 54 Cd114 7.463500e+02 2.10000000 Sample A LAK 1.52350  
## 211 55 Cd114 3.789000e+01 4.00000000 Sample MB LAK 0.00000  
## 212 55 Cr53 1.117820e+03 1.70000000 Sample MB LAK 0.00000  
## 213 55 Cd111 1.000000e+01 57.70000000 Sample MB LAK 0.00000  
## 214 55 As75 7.319100e+02 4.20000000 Sample MB LAK 0.00000  
## 215 55 Cr52 9.104900e+03 2.20000000 Sample MB LAK 0.00000  
## 216 55 Pb208 5.098940e+03 2.90000000 Sample MB LAK 0.00000  
## 217 56 Cd114 1.716980e+03 2.70000000 Sample A AVM 1.53750  
## 218 56 Cr53 1.315565e+04 0.90000000 Sample A AVM 1.53750  
## 219 56 Cd111 2.611300e+02 16.00000000 Sample A AVM 1.53750  
## 220 56 Pb208 1.485125e+06 4.80000000 Sample A AVM 1.53750  
## 221 56 As75 3.210640e+03 0.40000000 Sample A AVM 1.53750  
## 222 56 Cr52 1.068536e+05 2.60000000 Sample A AVM 1.53750  
## 223 57 Cr52 3.190569e+05 1.10000000 Sample QC AVM 1.51670  
## 224 57 Pb208 1.707354e+06 1.00000000 Sample QC AVM 1.51670  
## 225 57 Cr53 3.892300e+04 0.60000000 Sample QC AVM 1.51670  
## 226 57 Cd114 9.822350e+03 0.60000000 Sample QC AVM 1.51670  
## 227 57 Cd111 3.816160e+03 1.60000000 Sample QC AVM 1.51670  
## 228 57 As75 9.384260e+03 1.30000000 Sample QC AVM 1.51670  
## 229 58 Cd114 9.877000e+02 1.10000000 Sample B SS 1.53630  
## 230 58 Pb208 3.461418e+05 0.70000000 Sample B SS 1.53630  
## 231 58 Cr52 1.260956e+05 0.70000000 Sample B SS 1.53630  
## 232 58 Cd111 2.355700e+02 10.20000000 Sample B SS 1.53630  
## 233 58 As75 2.337160e+03 1.70000000 Sample B SS 1.53630  
## 234 58 Cr53 1.537993e+04 0.90000000 Sample B SS 1.53630  
## 235 59 Cd111 4.361870e+03 1.60000000 Sample QC SS 1.55780  
## 236 59 Cr52 3.541408e+05 0.40000000 Sample QC SS 1.55780  
## 237 59 Cd114 1.094959e+04 0.30000000 Sample QC SS 1.55780  
## 238 59 Cr53 4.317080e+04 0.30000000 Sample QC SS 1.55780  
## 239 59 As75 1.042438e+04 0.40000000 Sample QC SS 1.55780  
## 240 59 Pb208 1.913109e+06 0.70000000 Sample QC SS 1.55780  
## 241 6 Cd114 8.510267e+02 2.21812010 Sample C MRMJ 1.50090  
## 242 6 Cr52 1.414462e+05 0.49980792 Sample C MRMJ 1.50090  
## 243 6 Cr53 1.727384e+04 0.45393561 Sample C MRMJ 1.50090  
## 244 6 Cd111 2.444567e+02 7.75205819 Sample C MRMJ 1.50090  
## 245 6 Pb208 4.000386e+05 1.14219472 Sample C MRMJ 1.50090  
## 246 6 As75 2.456960e+03 2.29292779 Sample C MRMJ 1.50090  
## 247 65 Pb208 5.989333e+02 8.42798498 Cal1 NA  
## 248 65 Cr52 1.360123e+03 40.69559970 Cal1 NA  
## 249 65 Cd114 6.223333e+00 43.23169129 Cal1 NA  
## 250 65 Cd111 2.223333e+00 173.20508080 Cal1 NA  
## 251 65 As75 3.982300e+02 17.67363546 Cal1 NA  
## 252 65 Cr53 1.447767e+02 40.54332265 Cal1 NA  
## 253 66 Cd114 5.016853e+03 1.44832293 Cal1 NA  
## 254 66 Cr53 9.653633e+02 2.59028318 Cal1 NA  
## 255 66 Cr52 8.276697e+03 3.89933374 Cal1 NA  
## 256 66 Cd111 2.121343e+03 5.27420762 Cal1 NA  
## 257 66 Pb208 2.739260e+03 3.74042448 Cal1 NA  
## 258 66 As75 1.197267e+03 1.65612442 Cal1 NA  
## 259 67 Cd114 1.035400e+04 0.33630972 Cal1 NA  
## 260 67 Cr52 1.498678e+04 0.54058080 Cal1 NA  
## 261 67 As75 1.977783e+03 1.37398351 Cal1 NA  
## 262 67 Cr53 1.795540e+03 0.68297668 Cal1 NA  
## 263 67 Pb208 5.115520e+03 3.33707601 Cal1 NA  
## 264 67 Cd111 4.109570e+03 0.61967627 Cal1 NA  
## 265 68 Cr53 3.397220e+03 1.21343632 Cal1 NA  
## 266 68 Cd111 8.275717e+03 2.98268238 Cal1 NA  
## 267 68 As75 3.445233e+03 1.61661785 Cal1 NA  
## 268 68 Cd114 2.026614e+04 0.77610386 Cal1 NA  
## 269 68 Cr52 2.733375e+04 1.44186036 Cal1 NA  
## 270 68 Pb208 9.227503e+03 3.25374029 Cal1 NA  
## 271 69 Cd111 2.011471e+04 1.38814955 Cal1 NA  
## 272 69 Cr53 8.099483e+03 1.39078083 Cal1 NA  
## 273 69 Pb208 2.291183e+04 2.65068717 Cal1 NA  
## 274 69 Cr52 6.616733e+04 0.93323713 Cal1 NA  
## 275 69 Cd114 5.078245e+04 0.27016450 Cal1 NA  
## 276 69 As75 8.293940e+03 2.09466432 Cal1 NA  
## 277 7 Cr53 9.434700e+02 1.48919788 Sample MB MRMJ 0.00000  
## 278 7 Cr52 7.664203e+03 1.24209908 Sample MB MRMJ 0.00000  
## 279 7 Pb208 7.733933e+02 15.84287964 Sample MB MRMJ 0.00000  
## 280 7 Cd114 5.744667e+01 10.46615385 Sample MB MRMJ 0.00000  
## 281 7 Cd111 2.778000e+01 30.20248486 Sample MB MRMJ 0.00000  
## 282 7 As75 4.002300e+02 0.75559133 Sample MB MRMJ 0.00000  
## 283 70 Cd111 4.048754e+04 2.32212846 Cal1 NA  
## 284 70 Cd114 1.009423e+05 0.16152685 Cal1 NA  
## 285 70 Cr53 1.601014e+04 0.65703596 Cal1 NA  
## 286 70 As75 1.605163e+04 0.41403870 Cal1 NA  
## 287 70 Cr52 1.303144e+05 0.21763853 Cal1 NA  
## 288 70 Pb208 4.474160e+04 0.41879644 Cal1 NA  
## 289 71 Cd114 2.113009e+05 0.59357842 Cal1 NA  
## 290 71 Pb208 9.127560e+04 2.05694486 Cal1 NA  
## 291 71 Cd111 8.440363e+04 0.48993939 Cal1 NA  
## 292 71 Cr53 3.297050e+04 0.26335067 Cal1 NA  
## 293 71 Cr52 2.716008e+05 0.73543123 Cal1 NA  
## 294 71 As75 3.308167e+04 1.23743669 Cal1 NA  
## 295 72 Cd111 2.425954e+05 0.53110599 Cal1 NA  
## 296 72 Pb208 2.316954e+05 1.11109592 Cal1 NA  
## 297 72 Cr52 7.694588e+05 0.91686679 Cal1 NA  
## 298 72 Cd114 6.036589e+05 0.54624629 Cal1 NA  
## 299 72 Cr53 9.468235e+04 0.55892553 Cal1 NA  
## 300 72 As75 8.195548e+04 0.24732909 Cal1 NA  
## 301 73 Pb208 4.541545e+05 0.52398376 Cal1 NA  
## 302 73 Cr53 1.627114e+05 0.14788271 Cal1 NA  
## 303 73 As75 1.626539e+05 0.56679387 Cal1 NA  
## 304 73 Cd111 4.177049e+05 0.57924081 Cal1 NA  
## 305 73 Cd114 1.048247e+06 0.22392048 Cal1 NA  
## 306 73 Cr52 1.345846e+06 0.77063616 Cal1 NA  
## 307 74 Cr53 8.225690e+05 0.71601082 Cal1 NA  
## 308 74 Pb208 2.358811e+06 0.47086628 Cal1 NA  
## 309 74 As75 8.231175e+05 0.73618903 Cal1 NA  
## 310 74 Cr52 6.806556e+06 0.82050682 Cal1 NA  
## 311 74 Cd114 5.410833e+06 0.44070808 Cal1 NA  
## 312 74 Cd111 2.105879e+06 0.83455374 Cal1 NA  
## 313 75 Cr53 1.692230e+06 0.24872799 Cal1 NA  
## 314 75 Cd111 4.298395e+06 0.48235057 Cal1 NA  
## 315 75 As75 1.714248e+06 0.74003958 Cal1 NA  
## 316 75 Cr52 1.385369e+07 0.21868081 Cal1 NA  
## 317 75 Pb208 4.687902e+06 0.25873691 Cal1 NA  
## 318 75 Cd114 1.096414e+07 0.21769141 Cal1 NA  
## 319 76 As75 3.982300e+02 17.70000000 Cal2 NA  
## 320 76 Cr52 1.360120e+03 40.70000000 Cal2 NA  
## 321 76 Cd114 6.220000e+00 43.20000000 Cal2 NA  
## 322 76 Cd111 2.220000e+00 173.20000000 Cal2 NA  
## 323 76 Cr53 1.447800e+02 40.50000000 Cal2 NA  
## 324 76 Pb208 5.989300e+02 8.40000000 Cal2 NA  
## 325 77 Cr52 8.276700e+03 3.90000000 Cal2 NA  
## 326 77 Pb208 2.739260e+03 3.70000000 Cal2 NA  
## 327 77 Cd111 2.121340e+03 5.30000000 Cal2 NA  
## 328 77 As75 1.197270e+03 1.70000000 Cal2 NA  
## 329 77 Cr53 9.653600e+02 2.60000000 Cal2 NA  
## 330 77 Cd114 5.016850e+03 1.40000000 Cal2 NA  
## 331 78 Cr52 1.498678e+04 0.50000000 Cal2 NA  
## 332 78 Pb208 5.115520e+03 3.30000000 Cal2 NA  
## 333 78 Cr53 1.795540e+03 0.70000000 Cal2 NA  
## 334 78 Cd111 4.109570e+03 0.60000000 Cal2 NA  
## 335 78 Cd114 1.035400e+04 0.30000000 Cal2 NA  
## 336 78 As75 1.977780e+03 1.40000000 Cal2 NA  
## 337 79 Cd114 2.026614e+04 0.80000000 Cal2 NA  
## 338 79 Cr53 3.397220e+03 1.20000000 Cal2 NA  
## 339 79 Pb208 9.227500e+03 3.30000000 Cal2 NA  
## 340 79 Cr52 2.733375e+04 1.40000000 Cal2 NA  
## 341 79 As75 3.445230e+03 1.60000000 Cal2 NA  
## 342 79 Cd111 8.275720e+03 3.00000000 Cal2 NA  
## 343 8 As75 1.931447e+03 1.75143226 Sample E ARG 1.54230  
## 344 8 Pb208 1.704828e+05 1.82187966 Sample E ARG 1.54230  
## 345 8 Cd111 1.744533e+02 34.46667200 Sample E ARG 1.54230  
## 346 8 Cd114 4.693433e+02 2.39961344 Sample E ARG 1.54230  
## 347 8 Cr53 7.884053e+03 0.31874102 Sample E ARG 1.54230  
## 348 8 Cr52 6.477647e+04 1.64055707 Sample E ARG 1.54230  
## 349 80 Cr53 8.099480e+03 1.40000000 Cal2 NA  
## 350 80 As75 8.293940e+03 2.10000000 Cal2 NA  
## 351 80 Cd111 2.011471e+04 1.40000000 Cal2 NA  
## 352 80 Cr52 6.616733e+04 0.90000000 Cal2 NA  
## 353 80 Pb208 2.291183e+04 2.70000000 Cal2 NA  
## 354 80 Cd114 5.078245e+04 0.30000000 Cal2 NA  
## 355 81 Cr53 1.601014e+04 0.70000000 Cal2 NA  
## 356 81 As75 1.605163e+04 0.40000000 Cal2 NA  
## 357 81 Cd111 4.048754e+04 2.30000000 Cal2 NA  
## 358 81 Pb208 4.474160e+04 0.40000000 Cal2 NA  
## 359 81 Cd114 1.009423e+05 0.20000000 Cal2 NA  
## 360 81 Cr52 1.303144e+05 0.20000000 Cal2 NA  
## 361 82 As75 3.308167e+04 1.20000000 Cal2 NA  
## 362 82 Cr53 3.297050e+04 0.30000000 Cal2 NA  
## 363 82 Pb208 9.127560e+04 2.10000000 Cal2 NA  
## 364 82 Cd111 8.440363e+04 0.50000000 Cal2 NA  
## 365 82 Cd114 2.113009e+05 0.60000000 Cal2 NA  
## 366 82 Cr52 2.716008e+05 0.70000000 Cal2 NA  
## 367 83 Cd111 2.425954e+05 0.50000000 Cal2 NA  
## 368 83 Cr53 9.468235e+04 0.60000000 Cal2 NA  
## 369 83 Cr52 7.694588e+05 0.90000000 Cal2 NA  
## 370 83 Pb208 2.316954e+05 1.10000000 Cal2 NA  
## 371 83 As75 8.195548e+04 0.20000000 Cal2 NA  
## 372 83 Cd114 6.036589e+05 0.50000000 Cal2 NA  
## 373 84 Cr53 1.627114e+05 0.10000000 Cal2 NA  
## 374 84 Pb208 4.541545e+05 0.50000000 Cal2 NA  
## 375 84 Cd111 4.177049e+05 0.60000000 Cal2 NA  
## 376 84 Cd114 1.048247e+06 0.20000000 Cal2 NA  
## 377 84 Cr52 1.345846e+06 0.80000000 Cal2 NA  
## 378 84 As75 1.626539e+05 0.60000000 Cal2 NA  
## 379 85 Cd111 2.105879e+06 0.80000000 Cal2 NA  
## 380 85 As75 8.231175e+05 0.70000000 Cal2 NA  
## 381 85 Cr52 6.806556e+06 0.80000000 Cal2 NA  
## 382 85 Pb208 2.358811e+06 0.50000000 Cal2 NA  
## 383 85 Cd114 5.410833e+06 0.40000000 Cal2 NA  
## 384 85 Cr53 8.225690e+05 0.70000000 Cal2 NA  
## 385 86 Cr53 1.692230e+06 0.20000000 Cal2 NA  
## 386 86 Cr52 1.385369e+07 0.20000000 Cal2 NA  
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## 388 86 Cd114 1.096414e+07 0.20000000 Cal2 NA  
## 389 86 As75 1.714248e+06 0.70000000 Cal2 NA  
## 390 86 Pb208 4.687902e+06 0.30000000 Cal2 NA  
## 391 87 Pb208 5.989300e+02 8.40000000 Cal3 NA  
## 392 87 Cd111 2.220000e+00 173.20000000 Cal3 NA  
## 393 87 Cr52 1.360120e+03 40.70000000 Cal3 NA  
## 394 87 Cd114 6.220000e+00 43.20000000 Cal3 NA  
## 395 87 As75 3.982300e+02 17.70000000 Cal3 NA  
## 396 87 Cr53 1.447800e+02 40.50000000 Cal3 NA  
## 397 88 Cd111 2.121340e+03 5.30000000 Cal3 NA  
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## 400 88 As75 1.197270e+03 1.70000000 Cal3 NA  
## 401 88 Cd114 5.016850e+03 1.40000000 Cal3 NA  
## 402 88 Cr53 9.653600e+02 2.60000000 Cal3 NA  
## 403 89 Pb208 5.115520e+03 3.30000000 Cal3 NA  
## 404 89 As75 1.977780e+03 1.40000000 Cal3 NA  
## 405 89 Cd111 4.109570e+03 0.60000000 Cal3 NA  
## 406 89 Cd114 1.035400e+04 0.30000000 Cal3 NA  
## 407 89 Cr52 1.498678e+04 0.50000000 Cal3 NA  
## 408 89 Cr53 1.795540e+03 0.70000000 Cal3 NA  
## 409 9 Cd111 2.555667e+01 27.16769520 Sample MB ARG 0.00000  
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## 411 9 As75 4.297833e+02 7.02798913 Sample MB ARG 0.00000  
## 412 9 Pb208 1.430140e+03 2.62706272 Sample MB ARG 0.00000  
## 413 9 Cr53 9.099167e+02 1.88515973 Sample MB ARG 0.00000  
## 414 9 Cd114 7.422333e+01 1.81740403 Sample MB ARG 0.00000  
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## 416 90 Cr52 2.733375e+04 1.40000000 Cal3 NA  
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## 423 91 Cr52 6.616733e+04 0.90000000 Cal3 NA  
## 424 91 Cd111 2.011471e+04 1.40000000 Cal3 NA  
## 425 91 As75 8.293940e+03 2.10000000 Cal3 NA  
## 426 91 Cr53 8.099480e+03 1.40000000 Cal3 NA  
## 427 92 Pb208 4.474160e+04 0.40000000 Cal3 NA  
## 428 92 Cd114 1.009423e+05 0.20000000 Cal3 NA  
## 429 92 Cd111 4.048754e+04 2.30000000 Cal3 NA  
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## 437 93 Pb208 9.127560e+04 2.10000000 Cal3 NA  
## 438 93 Cr53 3.297050e+04 0.30000000 Cal3 NA  
## 439 94 Cd114 6.036589e+05 0.50000000 Cal3 NA  
## 440 94 Cr52 7.694588e+05 0.90000000 Cal3 NA  
## 441 94 Cr53 9.468235e+04 0.60000000 Cal3 NA  
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## 445 95 Cd114 1.048247e+06 0.20000000 Cal3 NA  
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## 447 95 Pb208 4.541545e+05 0.50000000 Cal3 NA  
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## 449 95 Cr53 1.627114e+05 0.10000000 Cal3 NA  
## 450 95 Cr52 1.345846e+06 0.80000000 Cal3 NA  
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## 452 96 Cd114 5.410833e+06 0.40000000 Cal3 NA  
## 453 96 As75 8.231175e+05 0.70000000 Cal3 NA  
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## 4 46.0 NA 1.273440e-02 1.605699e-06  
## 5 46.0 NA 1.121272e-03 6.657098e-04  
## 6 46.0 NA 2.812234e-03 2.953686e-05  
## 7 46.0 NA 5.999262e-03 1.341147e-04  
## 8 46.0 NA 5.649744e-04 1.105832e-04  
## 9 46.0 NA 1.215072e-01 7.948844e-06  
## 10 46.0 NA 1.538329e-02 4.658272e-05  
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## 19 43.0 NA 3.519078e+00 6.389556e-06  
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## 76 44.0 NA 1.820412e+00 2.140876e-05  
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## 97 42.5 NA 3.435100e-03 5.951680e-05  
## 98 42.5 NA 2.484563e-02 2.180369e-05  
## 99 42.5 NA 2.454089e-01 8.148457e-06  
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## 142 45.0 NA 9.832202e-04 2.274295e-04  
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## 161 43.0 NA 7.194995e+00 7.379945e-06  
## 162 43.0 NA 2.197016e-01 8.151212e-06  
## 163 43.0 NA 1.230879e-01 3.378944e-06  
## 164 43.0 NA 5.499070e-02 2.798682e-05  
## 165 43.0 NA 1.414047e-01 5.704307e-06  
## 166 43.0 NA 4.345639e+00 4.414995e-06  
## 167 43.0 NA 5.302705e-01 1.197545e-05  
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## 170 43.7 NA 1.138806e-02 3.791875e-05  
## 171 43.7 NA 2.280108e-02 3.374417e-05  
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## 173 43.7 NA 5.447687e+00 1.173616e-05  
## 174 43.7 NA 2.682115e-03 7.841068e-05  
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## 207 40.0 NA 2.700618e-02 5.202166e-05  
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## 210 40.0 NA 9.244373e-03 2.601083e-05  
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## 216 45.0 NA 6.273633e-02 3.568101e-05  
## 217 47.0 NA 2.018050e-02 3.173441e-05  
## 218 47.0 NA 1.546247e-01 1.057814e-05  
## 219 47.0 NA 3.069187e-03 1.880557e-04  
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## 224 45.0 NA 2.138457e+01 1.252498e-05  
## 225 45.0 NA 4.875097e-01 7.514987e-06  
## 226 45.0 NA 1.230247e-01 7.514987e-06  
## 227 45.0 NA 4.779732e-02 2.003996e-05  
## 228 45.0 NA 1.175376e-01 1.628247e-05  
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## 230 42.5 NA 4.295891e+00 8.687550e-06  
## 231 42.5 NA 1.564945e+00 8.687550e-06  
## 232 42.5 NA 2.923609e-03 1.265900e-04  
## 233 42.5 NA 2.900599e-02 2.109833e-05  
## 234 42.5 NA 1.908770e-01 1.116971e-05  
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## 236 42.8 NA 4.324008e+00 4.883943e-06  
## 237 42.8 NA 1.336929e-01 3.662957e-06  
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## 247 NA 0e+00 7.426160e-03 1.044984e-04  
## 248 NA 0e+00 1.686414e-02 5.045838e-04  
## 249 NA 0e+00 7.716296e-05 5.360287e-04  
## 250 NA 0e+00 2.756706e-05 2.147566e-03  
## 251 NA 0e+00 4.937644e-03 2.191350e-04  
## 252 NA 0e+00 1.795082e-03 5.026957e-04  
## 253 NA 5e-01 6.862281e-02 1.981082e-05  
## 254 NA 5e-01 1.320468e-02 3.543108e-05  
## 255 NA 5e-01 1.132124e-01 5.333687e-05  
## 256 NA 5e-01 2.901670e-02 7.214302e-05  
## 257 NA 5e-01 3.746885e-02 5.116324e-05  
## 258 NA 5e-01 1.637676e-02 2.265323e-05  
## 259 NA 1e+00 1.408722e-01 4.575692e-06  
## 260 NA 1e+00 2.039040e-01 7.354921e-06  
## 261 NA 1e+00 2.690891e-02 1.869386e-05  
## 262 NA 1e+00 2.442938e-02 9.292301e-06  
## 263 NA 1e+00 6.959967e-02 4.540289e-05  
## 264 NA 1e+00 5.591313e-02 8.431062e-06  
## 265 NA 2e+00 4.627124e-02 1.652740e-05  
## 266 NA 2e+00 1.127180e-01 4.062510e-05  
## 267 NA 2e+00 4.692520e-02 2.201886e-05  
## 268 NA 2e+00 2.760314e-01 1.057079e-05  
## 269 NA 2e+00 3.722946e-01 1.963861e-05  
## 270 NA 2e+00 1.256816e-01 4.431700e-05  
## 271 NA 5e+00 2.734449e-01 1.887089e-05  
## 272 NA 5e+00 1.101066e-01 1.890666e-05  
## 273 NA 5e+00 3.114698e-01 3.603418e-05  
## 274 NA 5e+00 8.994970e-01 1.268668e-05  
## 275 NA 5e+00 6.903506e-01 3.672691e-06  
## 276 NA 5e+00 1.127501e-01 2.847545e-05  
## 277 45.0 NA 1.318862e-02 2.081726e-05  
## 278 45.0 NA 1.071367e-01 1.736310e-05  
## 279 45.0 NA 1.081114e-02 2.214651e-04  
## 280 45.0 NA 8.030377e-04 1.463047e-04  
## 281 45.0 NA 3.883321e-04 4.221957e-04  
## 282 45.0 NA 5.594751e-03 1.056229e-05  
## 283 NA 1e+01 5.460768e-01 3.131977e-05  
## 284 NA 1e+01 1.361461e+00 2.178597e-06  
## 285 NA 1e+01 2.159371e-01 8.861789e-06  
## 286 NA 1e+01 2.164968e-01 5.584358e-06  
## 287 NA 1e+01 1.757618e+00 2.935405e-06  
## 288 NA 1e+01 6.034534e-01 5.648528e-06  
## 289 NA 2e+01 2.727159e+00 7.661032e-06  
## 290 NA 2e+01 1.178050e+00 2.654800e-05  
## 291 NA 2e+01 1.089357e+00 6.323413e-06  
## 292 NA 2e+01 4.255344e-01 3.398941e-06  
## 293 NA 2e+01 3.505422e+00 9.491859e-06  
## 294 NA 2e+01 4.269692e-01 1.597100e-05  
## 295 NA 5e+01 3.258021e+00 7.132675e-06  
## 296 NA 5e+01 3.111634e+00 1.492185e-05  
## 297 NA 5e+01 1.033372e+01 1.231339e-05  
## 298 NA 5e+01 8.107049e+00 7.336007e-06  
## 299 NA 5e+01 1.271570e+00 7.506287e-06  
## 300 NA 5e+01 1.100650e+00 3.321593e-06  
## 301 NA 1e+02 6.068883e+00 7.002014e-06  
## 302 NA 1e+02 2.174319e+00 1.976162e-06  
## 303 NA 1e+02 2.173550e+00 7.574087e-06  
## 304 NA 1e+02 5.581806e+00 7.740415e-06  
## 305 NA 1e+02 1.400776e+01 2.992257e-06  
## 306 NA 1e+02 1.798459e+01 1.029804e-05  
## 307 NA 5e+02 1.091409e+01 9.500245e-06  
## 308 NA 5e+02 3.129741e+01 6.247594e-06  
## 309 NA 5e+02 1.092137e+01 9.767976e-06  
## 310 NA 5e+02 9.031141e+01 1.088673e-05  
## 311 NA 5e+02 7.179255e+01 5.847446e-06  
## 312 NA 5e+02 2.794143e+01 1.107311e-05  
## 313 NA 1e+03 2.324399e+01 3.416457e-06  
## 314 NA 1e+03 5.904153e+01 6.625431e-06  
## 315 NA 1e+03 2.354642e+01 1.016497e-05  
## 316 NA 1e+03 1.902903e+02 3.003738e-06  
## 317 NA 1e+03 6.439169e+01 3.553937e-06  
## 318 NA 1e+03 1.506004e+02 2.990147e-06  
## 319 NA 0e+00 4.937644e-03 2.194619e-04  
## 320 NA 0e+00 1.686410e-02 5.046383e-04  
## 321 NA 0e+00 7.712163e-05 5.356358e-04  
## 322 NA 0e+00 2.752573e-05 2.147503e-03  
## 323 NA 0e+00 1.795124e-03 5.021585e-04  
## 324 NA 0e+00 7.426119e-03 1.041514e-04  
## 325 NA 5e-01 1.132125e-01 5.334598e-05  
## 326 NA 5e-01 3.746885e-02 5.061029e-05  
## 327 NA 5e-01 2.901666e-02 7.249582e-05  
## 328 NA 5e-01 1.637681e-02 2.325338e-05  
## 329 NA 5e-01 1.320464e-02 3.556399e-05  
## 330 NA 5e-01 6.862277e-02 1.914984e-05  
## 331 NA 1e+00 2.039040e-01 6.802795e-06  
## 332 NA 1e+00 6.959967e-02 4.489845e-05  
## 333 NA 1e+00 2.442938e-02 9.523913e-06  
## 334 NA 1e+00 5.591313e-02 8.163354e-06  
## 335 NA 1e+00 1.408723e-01 4.081677e-06  
## 336 NA 1e+00 2.690886e-02 1.904783e-05  
## 337 NA 2e+00 2.760314e-01 1.089626e-05  
## 338 NA 2e+00 4.627124e-02 1.634439e-05  
## 339 NA 2e+00 1.256815e-01 4.494707e-05  
## 340 NA 2e+00 3.722945e-01 1.906845e-05  
## 341 NA 2e+00 4.692515e-02 2.179252e-05  
## 342 NA 2e+00 1.127180e-01 4.086097e-05  
## 343 50.0 NA 2.559883e-02 2.321297e-05  
## 344 50.0 NA 2.259530e+00 2.414666e-05  
## 345 50.0 NA 2.312154e-03 4.568112e-04  
## 346 50.0 NA 6.220540e-03 3.180378e-05  
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## 348 50.0 NA 8.585284e-01 2.174347e-05  
## 349 NA 5e+00 1.101066e-01 1.903199e-05  
## 350 NA 5e+00 1.127501e-01 2.854798e-05  
## 351 NA 5e+00 2.734449e-01 1.903199e-05  
## 352 NA 5e+00 8.994970e-01 1.223485e-05  
## 353 NA 5e+00 3.114697e-01 3.670455e-05  
## 354 NA 5e+00 6.903507e-01 4.078283e-06  
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## 356 NA 1e+01 2.164968e-01 5.395011e-06  
## 357 NA 1e+01 5.460768e-01 3.102131e-05  
## 358 NA 1e+01 6.034535e-01 5.395011e-06  
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## 366 NA 2e+01 3.505422e+00 9.034565e-06  
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## 372 NA 5e+01 8.107050e+00 6.714926e-06  
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## 380 NA 5e+02 1.092137e+01 9.287808e-06  
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## 408 NA 1e+00 2.442938e-02 9.523913e-06  
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## 410 50.0 NA 1.056195e-01 3.011112e-05  
## 411 50.0 NA 6.017972e-03 9.840829e-05  
## 412 50.0 NA 2.002531e-02 3.678502e-05  
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## 444 NA 5e+01 3.111634e+00 1.477284e-05  
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## 447 NA 1e+02 6.068883e+00 6.681517e-06  
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## 453 NA 5e+02 1.092137e+01 9.287808e-06  
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## 455 NA 5e+02 1.091409e+01 9.287808e-06  
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## 458 NA 1e+03 2.354642e+01 9.615002e-06  
## 459 NA 1e+03 6.439169e+01 4.120715e-06  
## 460 NA 1e+03 2.324399e+01 2.747143e-06  
## 461 NA 1e+03 1.506004e+02 2.747143e-06  
## 462 NA 1e+03 1.902903e+02 2.747143e-06

#all(Data\_ICPMS==ICPMS\_Data) #This proves the original CPS correction code does not properly match the ISTD CPS readings to the Sample CPS readings! output= FALSE shows that the data improperly matches!!

1. Removing clutter from the environment!

#Set warning=FALSE so the chunk will not notify you when a package is already removed from the environment  
#This can be modified to keep any of the objects if you so choose.  
  
remove(corrected, ICPMS\_merged, ICPMS\_tidy, ISTD, RSD\_Data, sample, RSD\_data, ID, ICPMS\_imported)

#See file 2 for the ICPMS data analysis example code!