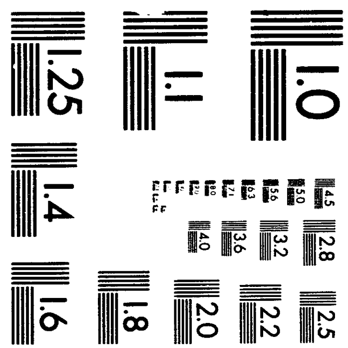
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CHEMICAL COMPOSITION OF HANFORD TANK SY-102

by

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ABSTRACT

The US Department of Energy established the Tank Waste Remediation System (TWRS) to safely manage and dispose of the radioactive waste, both current and future, stored in double-shell and single-shell tanks at the Hanford sites. One major program element in TWRS is pretreatment which was established to process the waste prior to disposal using the Hanford Waste Vitrification Plant. In support of this program, Los Alamos National Laboratory has developed a conceptual process flow sheet which will remediate the entire contents of a selected double-shelled underground waste tank, including supernatant and sludge, into forms that allow storage and final disposal in a safe, cost-effective and environmentally sound manner. The specific tank selected for remediation is 241-SY-102 located in the 200 West Area.

As part of the flow sheet development effort, the composition of the tank was defined and documented. This database was built by examining the history of liquid waste transfers to the tank and by performing careful analysis of all of the analytical data that have been gathered during the tank's lifetime. In order to more completely understand the variances in analytical results, material and charge balances were done to help define the chemistry of the various components in the tank. This methodology of defining the tank composition and the final results are documented in this report.

Introduction and Brief Tank History

As part of our efforts to develop a flow sheet capable of completely remediating the more than 600,000 gallons of supernatant and sludge contained in the SY-102 waste storage tank at Hanford, we have attempted to develop as accurate an understanding as possible of the composition of that tank. These efforts have considered the waste stream going into and out of the tank during the tank lifetime (determined by Steve Agnew at Los Alamos National Laboratory), as well as consideration of the analytical results from core and grab samples taken from the tank.

SY-102 was originally placed into service in the second quarter of 1977 as a primary receiver for supernatants from various process sites at Hanford, and served as the feed tank for the 242-S evaporator. The evaporator reduced the volume of the supernatants by a nominal 50%, after which the concentrated solution was returned to SY-102. The concentration of these supernatants produced a high nitrate salt waste and the resulting precipitates were allowed to accumulate in SY-102. The evaporator operation continued from 1977 through 1981, resulting in the formation of a "salt cake" at the bottom of the tank. This salt cake, estimated to be 38 in. high in 1981, is expected to contain the bulk of the radioactive cesium and strontium present in the tank.

In 1981, when the tank became a primary receiver of dilute wastes from T- and Z-Plant, the nature of the solids deposited in the tank changed dramatically with the influx of low levels of TRUs and fission products from reprocessing operations. In addition, a large portion of the salt cake accumulated earlier redissolved in these relatively dilute waste streams and was transferred to other tanks. As a result of the complexity of the waste stream transfers into and out of SY-102 during this period (Figures 1 and 2) and the lack of analytical data on the composition of the transferred liquids, more direct tank analytical data are needed to characterize the current tank composition.

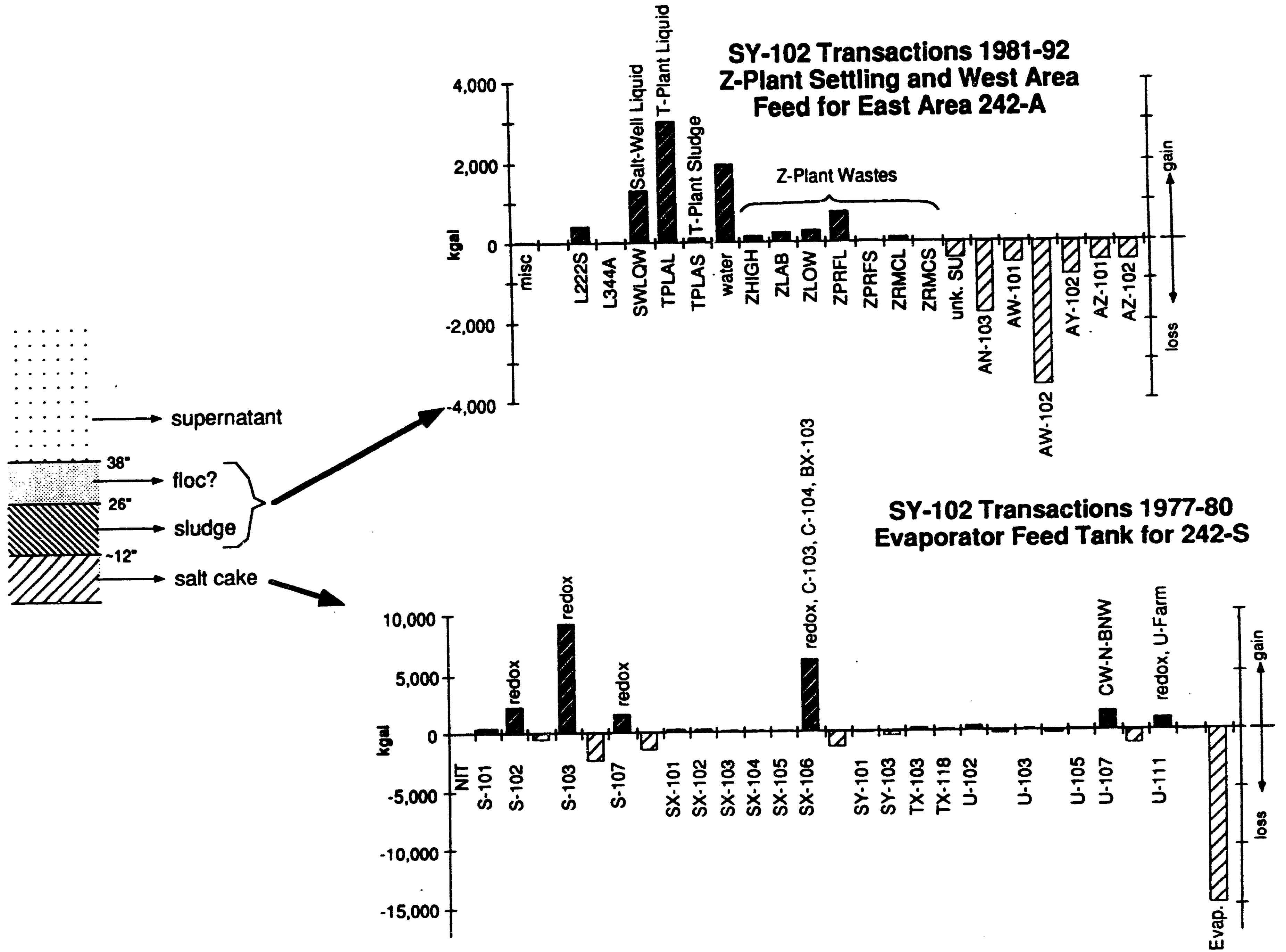

Fig. 1. SY-102 solids layering from waste stream transfers.

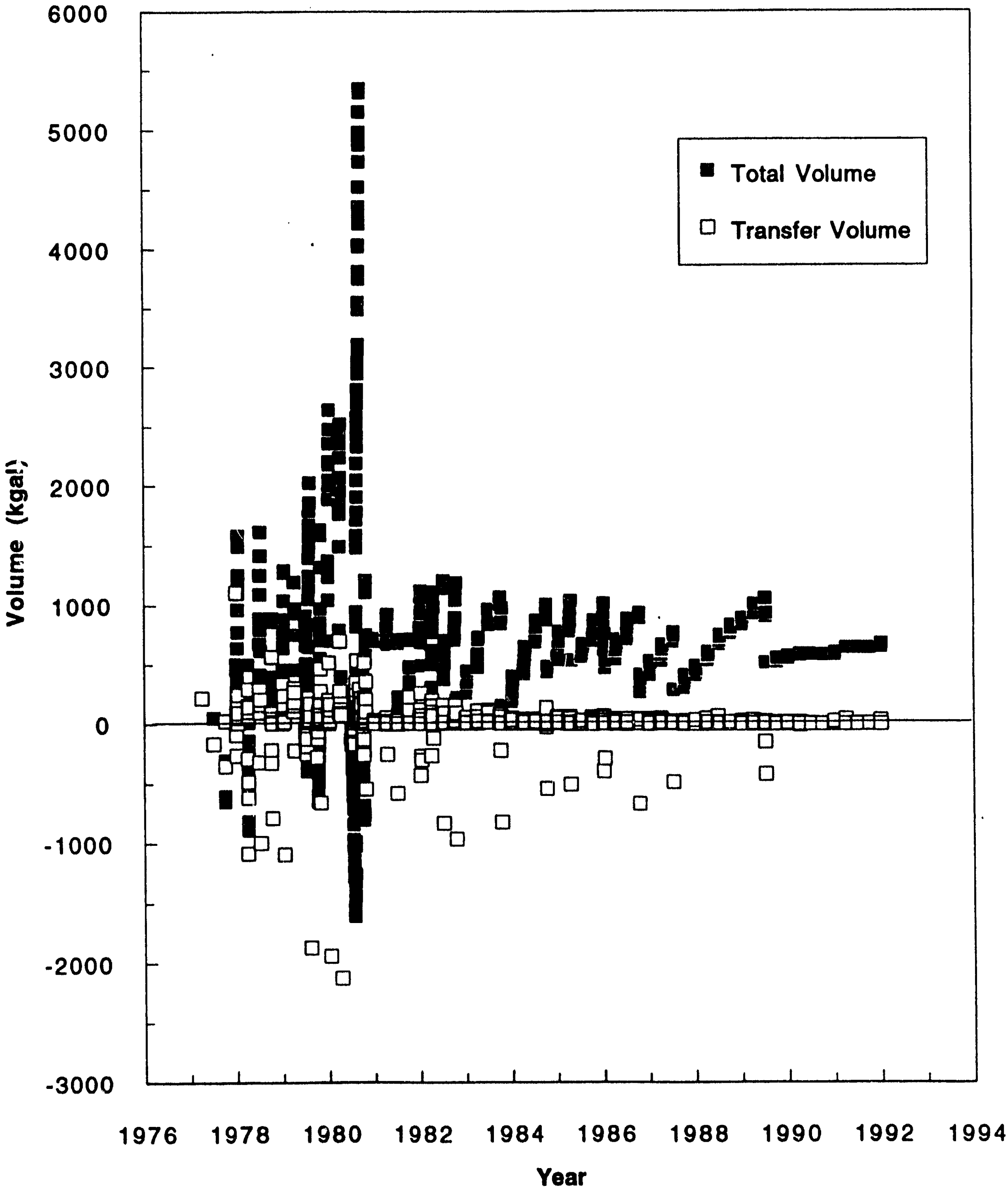

Fig. 2. SY-102 tank history from waste stream transfers.

Description of Available Analytical Reports

After the evaporator campaign ended in 1981, several grab samples were taken from various locations in SY-102 and a limited elemental analysis was performed on both the supernatant and solid portions of the sludge sample. In addition, americium, cesium, strontium, plutonium and neptunium levels in the samples were also monitored by radiochemical analysis, although the isotopic distribution is often unknown. We have also received analytical results on grab samples taken in 1984, 1985, 1988 and 1989.

The most detailed analytical results on the SY-102 tank composition comes from a core sample taken at the end of October 1988. At this time, a 1-in. diameter core sampling pipe was pressed into the sludge of the tank reaching close to the bottom of the tank. Four separate core segments were obtained, each of which should have been 19 in. long. The bottom core segment recovered was 4 in. shorter than expected and we have assumed that the missing 4 in. is from the bottom of the tank, since the recovered sludge from the lowest portion of the bottom 19-in. segment is quite dense and hard. As a result, the core sampler may have become jammed at the bottom of the tank, preventing recovery of the last 4 in. of the sludge.

A color, density, and hardness demarcation exists in the bottom segment, 4 in. from the lowest portion of the segment recovered. We have assumed that this lowest 4 in. represents the salt cake in the tank, and if we include the missing 4-in. portion of the bottom segment, we can estimate a total of 8 in. of salt cake left in the tank compared to the 38 in. present in 1981. The remainder of the sludge recovered, i.e., the upper 11 in. of the fourth core segment and the 19 in. of the third segment are primarily wastes from plutonium reprocessing in which iron hydroxide was used to precipitate the TRU content. Figure 3 shows a breakdown of the core segments as well as some of the physical characterization data available.

Due to the limited amount of material recovered in the core operation, the decision was made to combine and/or homogenize various sections of the core prior to submitting samples for analysis. Six different sample types were sent for analysis either to Batelle's Pacific Northwest Laboratories (PNL) and/or to the Process Chemistry Laboratory (PCL) currently operated by Westinghouse. These sample types include: 4B, the bottom 4 in. of the fourth core segment, presumably representative of the salt cake; 4C, the homogenized, remaining 11 in. of the fourth segment; 3C, the homogenized third segment; 3T4S, the solid portion of an homogenized mixture of the third core segment (3C) and the remainder of the fourth core segment (4C) after centrifugation; 3T4L, the liquid portion of the same mixture after centrifugation; and 1-2, a composite of the first and second core segments which were both liquids. A flow sheet describing the preparation of these samples types is also shown in Figure 3.

A limited amount of information is also available on the analytical results from the core taken in February 1990, in particular the 34COMP sample from that core, which is a composite of the third and fourth segments from the bottom of the tank. A limited set of analytic data for this 1990 core sample is included in Lumetta and Swanson's sludge washing report. In addition, the analysis on the same sample, reported by Gray at the Process Chemistry Laboratory, includes nearly 20 metals, 3 anions and activity measurement of 6 radioactive metals. Unfortunately, we do not have any information on the core characterization, or how the sample composites were prepared. This lack of information increases the uncertainty associated with any detailed comparison between the 1988 and 1990 cores.

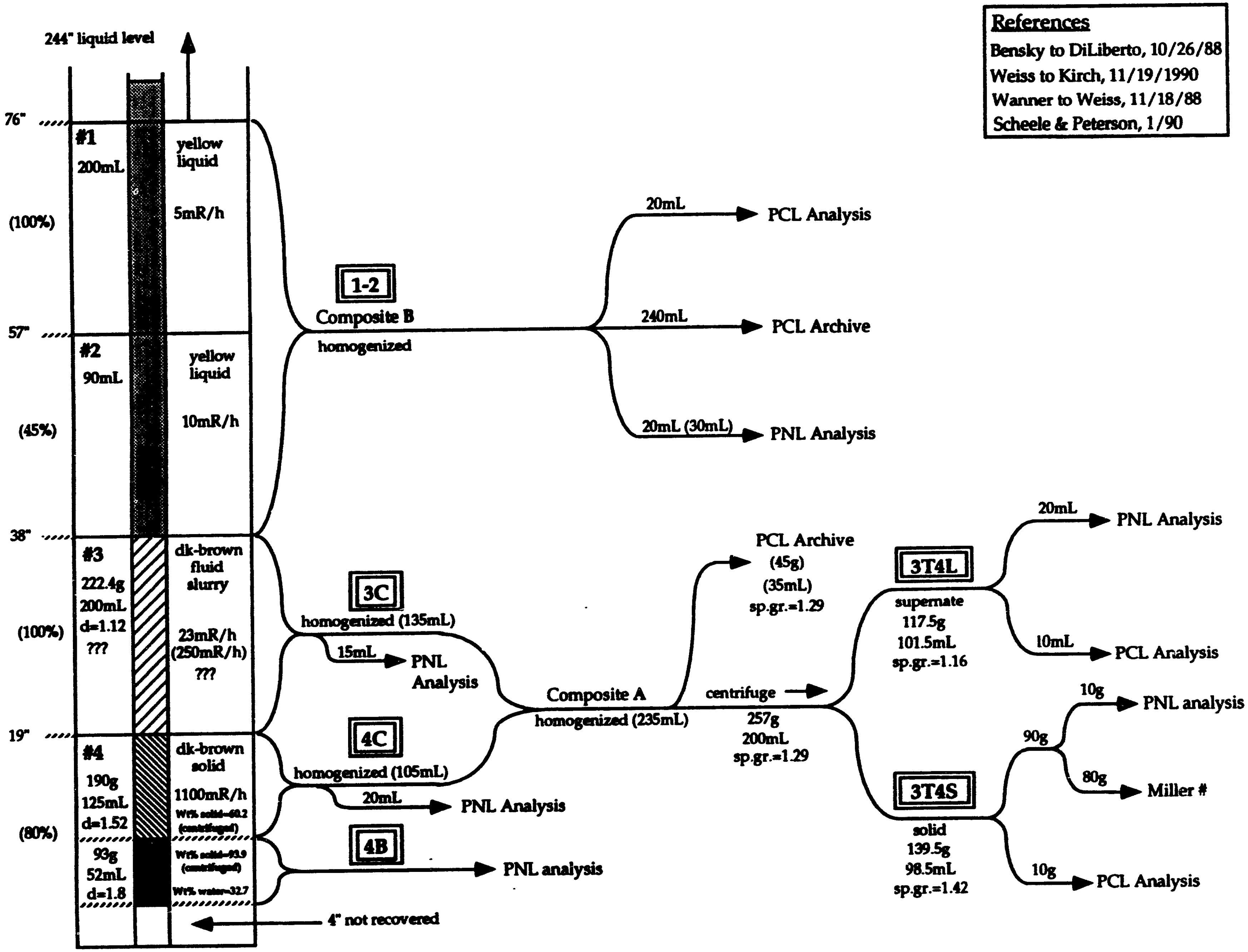

Fig. 3. Breakdown of the core segments, physical characteristics, and sample preparation.

The analytical data available to us have been inserted into five Macintosh Excel spreadsheets attached in Appendix A. The first of these spreadsheets (filename: Comp.SL.final) lists the analytical and radiochemical data by element for each of the core and grab analyses performed in the original units reported and in wt % (nonradioactive) or g/g (radioactive). It also includes information regarding the physical characterization of the sample, such as density, and notes needed to properly interpret the analytical results. Two spreadsheets, one for solids (filename = Solid.Values) and one for supernatants (filename = Liquid.Values), are derived from the first spreadsheet by stripping away the original data and notes in order to permit a direct comparison to be made between all the analyses available in units of wt %, g/L and M for nonradioactive elements and g/g, μCi/g and μCi/L for radioactive elements. An additional spreadsheet (filename = 3T4S.Data.Solid) summarizes the analytical results from Lumetta and Swanson's sludge washing experiment on the 3T4S sample from the 1988 core and the 34COMP sample from the 1990 core. Finally, we have presented a fifth spreadsheet (filename = 88/90 CoreComp3) which includes the analytical data for the 34COMP sample (1990 core) from Gray's report and compares it to the data available for the 4B and 3T4S (1988 core) for the same elements. The data for the 1990 34COMP samples are not included in the Comp.SL.final spreadsheet. The charts presented on the supernatant in the tank are derived from the Liquid.Values spreadsheet, those on the tank sludge from the Solid.Values spreadsheet, those on the 3T4S sample from the 3T4S.Data.Solid spreadsheet and those on the 34COMP sample from the 88/90 CoreComp3 spreadsheet.

Potential Problems in the Interpretation of the Analytical Data

Before using the analytical results available to define the composition of SY-102, it is important to recognize the implicit limitations on their utility and accuracy. First let us consider the sampling problem, using the tank sludge as an example. A similar, although less serious sampling problem, will exist for the tank supernatants due to density variations of the liquid layer. We have available ten sets of analytical results listed in the Comp.SL.final spreadsheet for tank sludge. One of these (Kirkbride) is not a true analytical result since it is an undocumented estimate of tank sludge composition based on the other analytical data. Of the remaining nine sets of data, one is on sample 4B from the 1988 core, two are on sample 3T4S from the 1988 core, one is simply labeled as "solids" and five are grab samples taken from a point reported to be 6 in. from the bottom of the tank. In contrast to the core, which was obtained in October of 1988, the grab samples were obtained in November of 1984.

Considering the size of the tank and the time frame over which the sludges were accumulated, it must be recognized that the nine sets of analytical data presently available represent an extremely limited sampling program which is incapable of determining the magnitude of any horizontal inhomogeneity in tank composition that may be present. Horizontal inhomogeneities are likely to result from pumping slurries into the tank and supernatants out of the tank, since the sluicing action of the pump will tend to preferentially deposit or remove sludge from the region close to the riser used for the transfer. If different risers were used to carry out the transfers over the years, then we can expect horizontal inhomogeneities to be present over a large portion of the tank. Temperature gradients between the tank contents already present and the incoming slurry can also induce significant horizontal inhomogeneities to form. In the absence of horizontal inhomogeneities, the analyses of grab samples taken 6 in. from the bottom of the tank in 1984 might be expected to closely match the analyses of the 4B and 3T4S samples taken from the 1988 core. However, it should be noted that differences between the grab and core results can be ascribed either to mixing of the bottom sludge layer between 1984 and 1988, horizontal inhomogeneities in the tank composition, errors in the estimated depth of the grab sample, or analytical errors.

The utility of the analytical data obtained for the grab samples is severely limited by the selectivity of the analyses that were carried out. Although the sludge is an extremely complex mixture, analyses for up to only ten elements and two to three anions were reported. Analyses for sodium, nitrate and nitrite, the largest components in the sludge were not reported. A much more detailed analysis was carried out on the 1988 core samples, but serious omissions also occur here. For example no anion analyses were carried out by Scheele and Peterson for the 3T4S sample whereas Herting reports a limited anion analysis but almost no radiochemical information on the same sample. These differences in what analytical information is available from the various analytical reports makes comparison of the reports to confirm the reliability of the data inconclusive.

The radiochemical results reported depend to a significant extent on the isotope mixture present in the sample. For example, Scheele and Peterson report individual alpha activities for Pu-238, Pu-239, Pu-240, and Pu-241, whereas Weiss reports only the sum of Pu-239 and Pu-240 activities. Similar problems occur for other radiochemical measurements where more than one isotope of the same element is present in the sludge.

Finally there is the question of the accuracy of the analytical data. In a complex mixture, such as the Hanford tank sludge, matrix interferences can dramatically affect ICP (inductively coupled plasma) or AA (atomic absorption) results. Without having access to the analytical protocols used to carry out these analyses, it is difficult to assess the extent to which matrix interferences have affected the results reported. A memo from R. L. Weiss of the Office of Sample Management (November 19, 1990) indicates that no matrix-specific standards or spikes were run for the 1988 core analyses carried out by PCL. No mention of analytical controls are reported for any of the other analyses on the SY-102 samples, suggesting that there may be large errors in the reported analytical results. It should also be noted with regard to the anion analytical results reported, that Scheele and Peterson's data for the October 1988 core were obtained by ion chromatography on a solution obtained by extraction of the sludge with water. This implies that anions found in the sludge in the form of insoluble salts (e.g., aluminum phosphate and chromium(III) fluoride) went undetected by this analytical technique. Other reported anion analyses may be similarly affected.

Tank Supernatant Composition

Sixteen different analyses are listed in the Comp.SL.final and Liquid.Values spreadsheets on supernatants from tank SY-102. These include analyses on supernatants from twelve grab samples between 1984 and 1989, and four analyses of supernatants from the 1988 core, i.e., the 1-2 and 3T4L samples. Each of the core samples was analyzed by PNL and by PCL, although the PCL analyses were less comprehensive, whereas the grab samples were analyzed only by PCL. In addition to the grab samples being dispersed over time, they were also taken from different depths in the tank and possibly from different risers, making direct comparisons difficult.

The most recent analyses of the homogenized supernatants from the 1988 core generally show relatively low levels (below 1%) of all elements and radionuclides, except for sodium which was reported to be in excess of 8% by weight in the 3T4L core sample and 2% in the 1-2 sample. One analysis of the 3T4L sample also reports anion concentrations, in which high levels (in excess of 1%) of nitrate, nitrite, carbonate and hydroxide were found. Lesser amounts, but still significant levels of chloride, phosphate and sulfate were also found in these supernatant samples. The only other elements present in significant amounts in the supernatants from the core samples were aluminum and potassium (~ 0.3% by weight). All other elements analyzed were found at levels of 0.05% or less. Earlier grab samples taken in 1984 are reported to have a higher level of aluminum (~0.7 wt %).

The variation in the reported abundance of an element in the supernatant can be illustrated using a bar chart in which a plot is made of the concentration of that element for each sample taken from the tank. Bar charts showing the variation in the analytical results for three of the major elements found in the supernatant, aluminum, sodium and potassium are shown in Figures 4–6, respectively. It is reassuring to note the analytical results, presented in adjacent bars, for the 3T4L and 1-2 samples by PNL and PCL are very similar for all three metals.

Although an analytical report for these three elements is not available for every sample taken, it is clear that the analytical pattern is not the same for each element. For example, in the aluminum chart (Figure 4), the aluminum content of the R4656 sample is more than 20 times that of the R5027 sample. For sodium (Figure 5), the sodium content in the R4656 sample is only 10 times that of the R5027 sample, and for potassium (Figure 6), the potassium content of the R4656 sample is only 1.5 times that of the R5027 sample. Similar fluctuations in the relative elemental content are apparent when comparing other pairs of samples. These fluctuations could be associated with the difference in the sampling date, or the sampling depth, or the riser used to obtain the sample. In some instances, the sample was obtained as a liquid; in others it is the supernatant resulting from centrifugation of a slurry. Extraction of the solid fraction by the supernatant during sample preparation may be responsible for the higher aluminum concentration found in the R3316, R3317 and R3318 slurry samples obtained 6 in. from the bottom of the tank. The somewhat smaller elevation in the aluminum concentration found for the 3T4L sample may be due to the same phenomenon, since

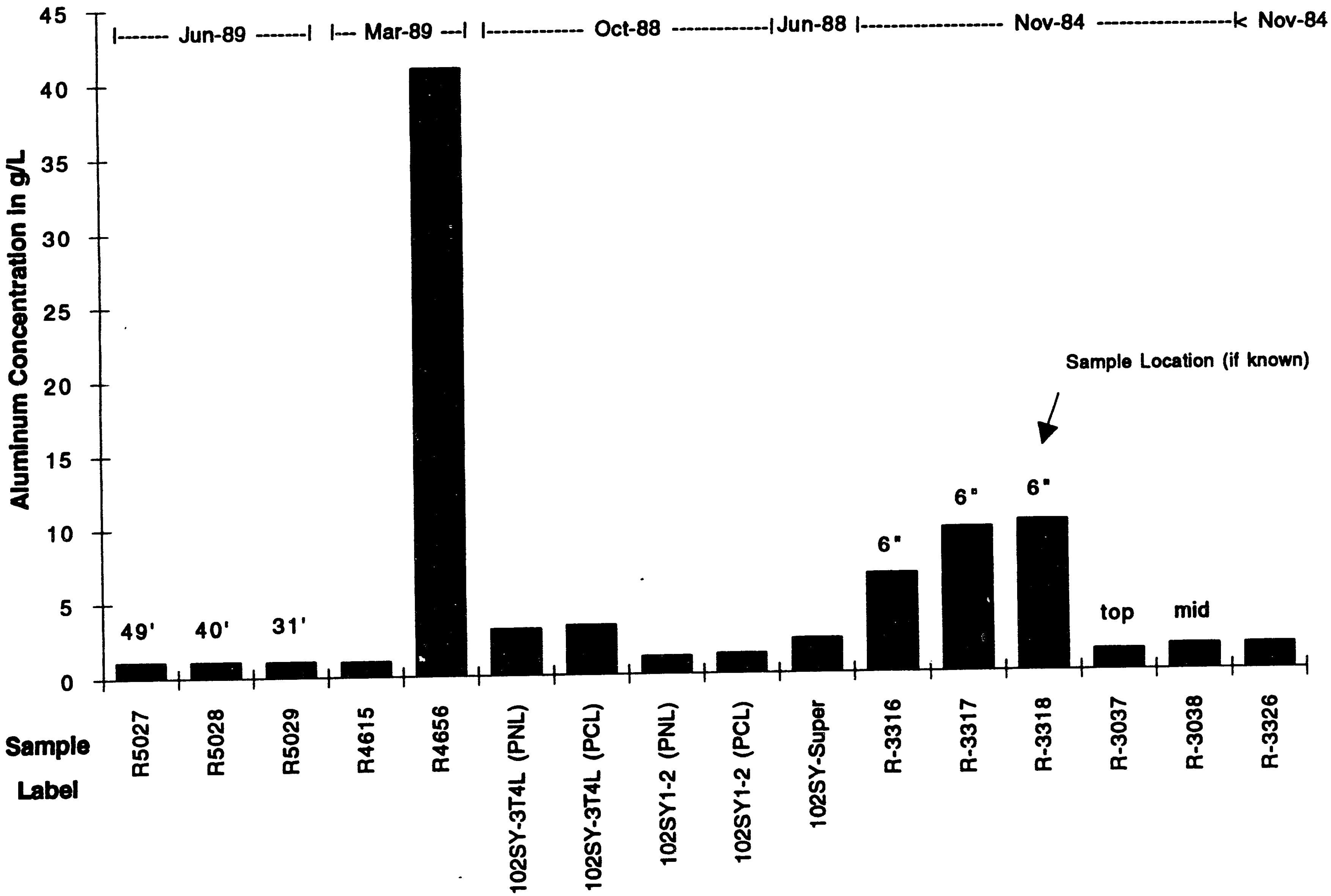

Fig. 4. Variation in aluminum analysis of SY-102 supernatant.

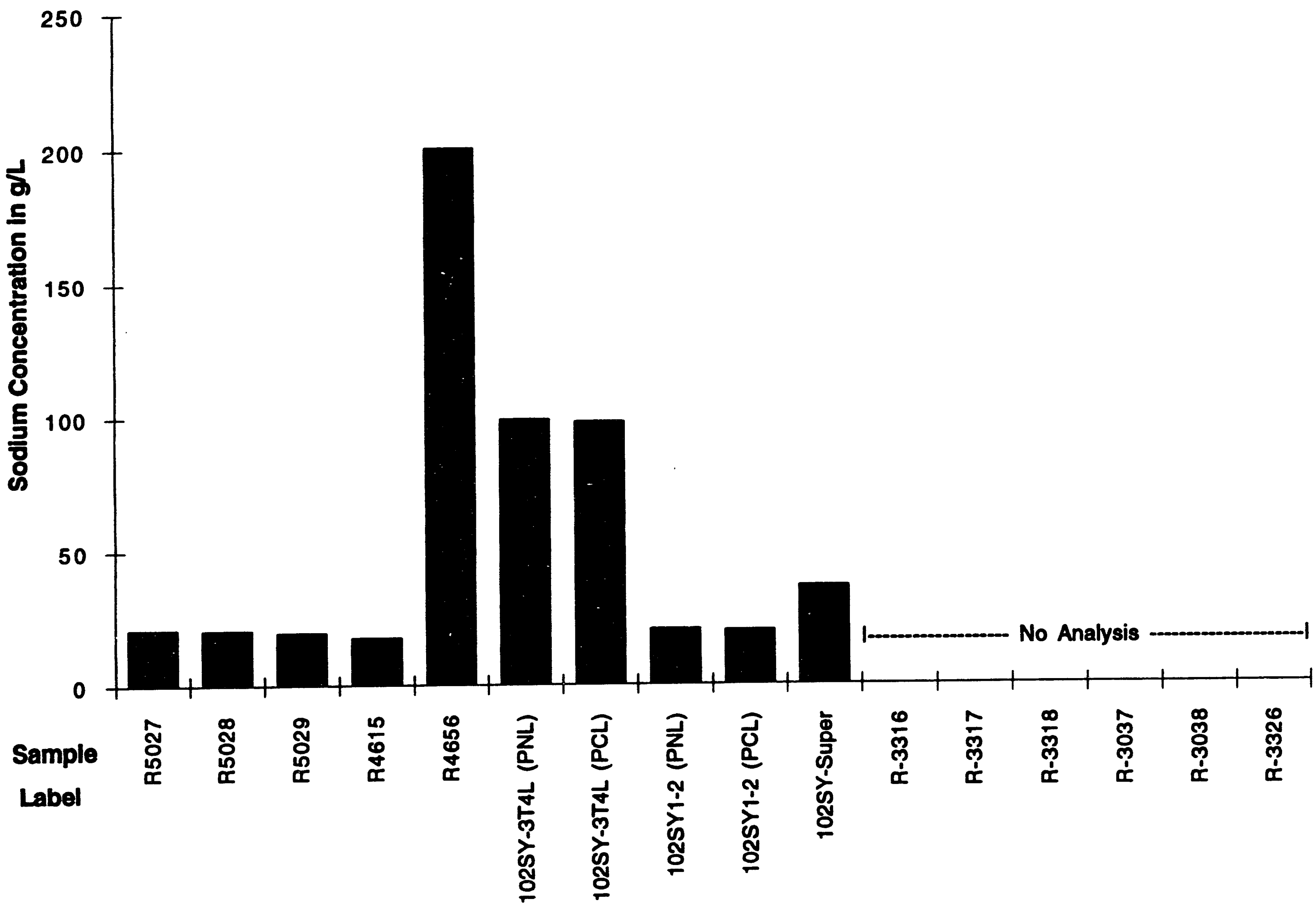

Fig. 5. Variation in sodium analysis of SY-102 supernatant.

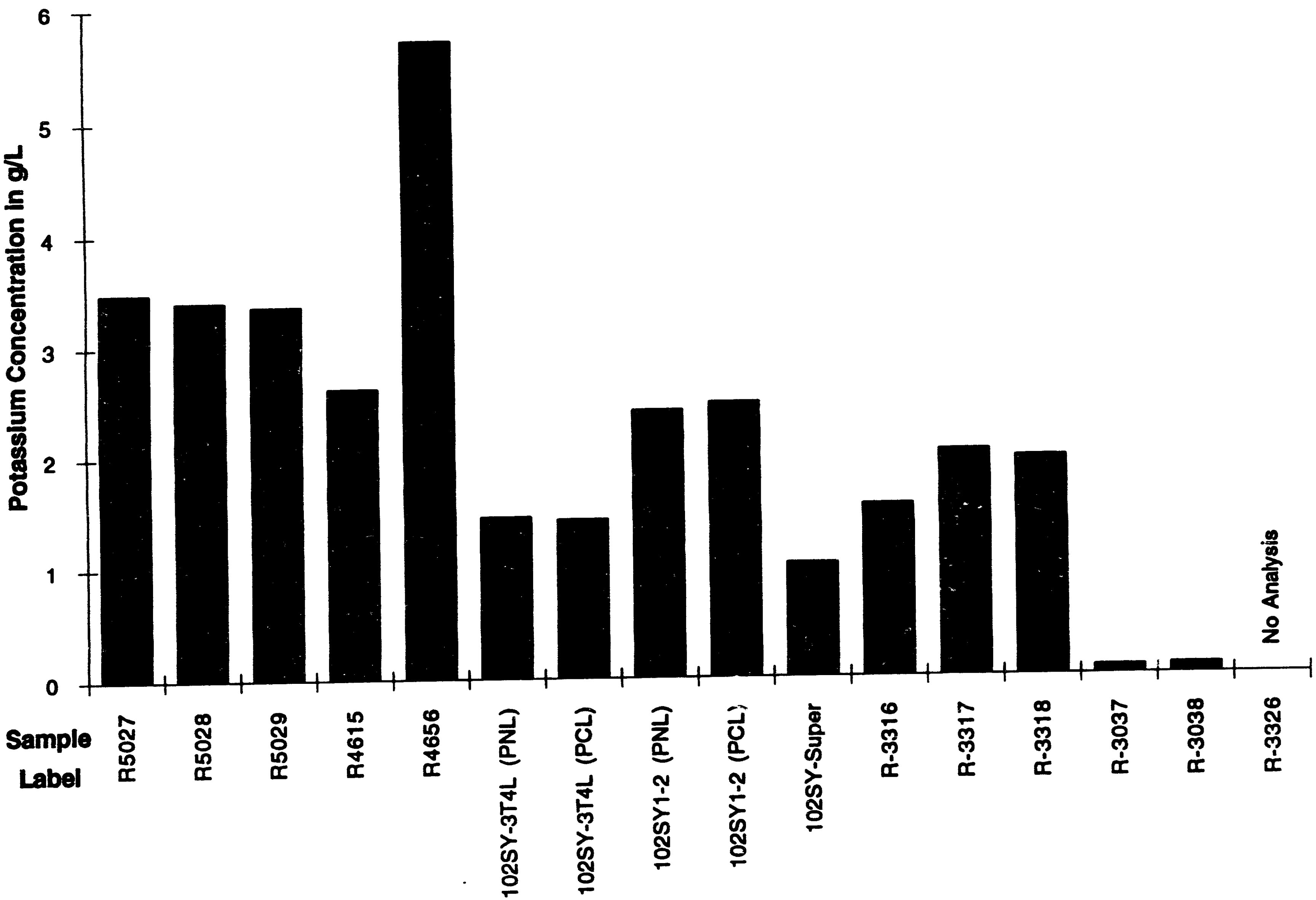

Fig. 6. Variation in potassium analysis of SY-102 supernatant.

this sample also results from centrifuging and separating the third and fourth segments into a solid and supernatant layer.

An estimate of layering in the supernatant can be made from a consideration of the R5027, R5028 and R5029 samples which were obtained in June 1989 from three different heights in the tank, but in the same sampling operation. The fact that the analyses reported for aluminum, sodium and potassium are nearly the same for each sample, suggests that, at least in June 1989, there are no major layers present in the supernatant that would lead to different elemental compositions at different depths in the tank. The analytical results for R3037 and R3038, obtained in November of 1984, are also consistent with a lack of layering in the supernatant in the tank.

In contrast, the large difference in the potassium levels that occurs in the June 1989 samples compared to the November 1984 samples suggests that a significant change in the nature of the waste stream occurred in the intervening years. Similar differences between the ratios of the elements on different dates are consistent with a variation in the waste stream flowing into the tank, as expected.

The two samples taken in March 1989 (R4615 and R4656) are of interest since they differ so markedly in their analytical results, but were obtained within five days of each other. The R4615 sample analytical results for these three elements are very similar to those of the June 1989 samples, whereas the analytical results on the R4656 grab sample indicate a much greater concentration of all three elements. Unfortunately, we have no information as to the depth or riser location at which this sample was taken. It may be that the R4656 sample represents an anomaly, either due to a sampling or analytical error. The possibility that sampling occurred shortly after introduction of a new waste stream into the tank seems unlikely since the record of tank transfers shows no unusual tank activity during March of 1989.

The variation in the supernatant nitrate levels is shown in Figure 7. As is the case with the metals, there are large differences in nitrate concentrations from sample to sample and the concentration pattern across the chart appears to be different from any of the metal concentration patterns. Although the grab samples obtained in June 1989 at different tank depths have the same nitrate concentrations, the grab samples obtained in November 1984 at two different tank heights have markedly different nitrate levels, with the R3038 sample nearly ten times the concentration of nitrate as the R3037 sample. Unlike the metal data, this large variation suggests that layering, based on the density associated with the nitrate concentration of the supernatant, may occur.

Concentration data for the same set of samples are shown for fluoride, chloride and sulfate in Figure 8. As can be readily seen from this combination chart, there is no consistency to the relative concentrations of the anions in the samples. Sometimes sulfate is present in the greatest concentration (e.g., R3316), sometimes fluoride (e.g., R5027), and sometimes chloride (e.g., R3318). Again it should be pointed out that the set of three June 1989 samples have similar concentrations of the three anions, but the R3037 and R3038 samples from November 1984 have markedly different concentrations of the same three anions. The difference between the behavior of the June 1989 and November 1984 samples may reflect the fact that layering did occur in 1984, but enough mixing occurred prior to the withdrawal of the 1989 samples to prevent layering.

Figure 9 shows the sodium, nitrate and nitrite concentration data together for the samples in which analytical data are reported for all three species. Since it might be expected that sodium and nitrate will track together in the waste stream, roughly

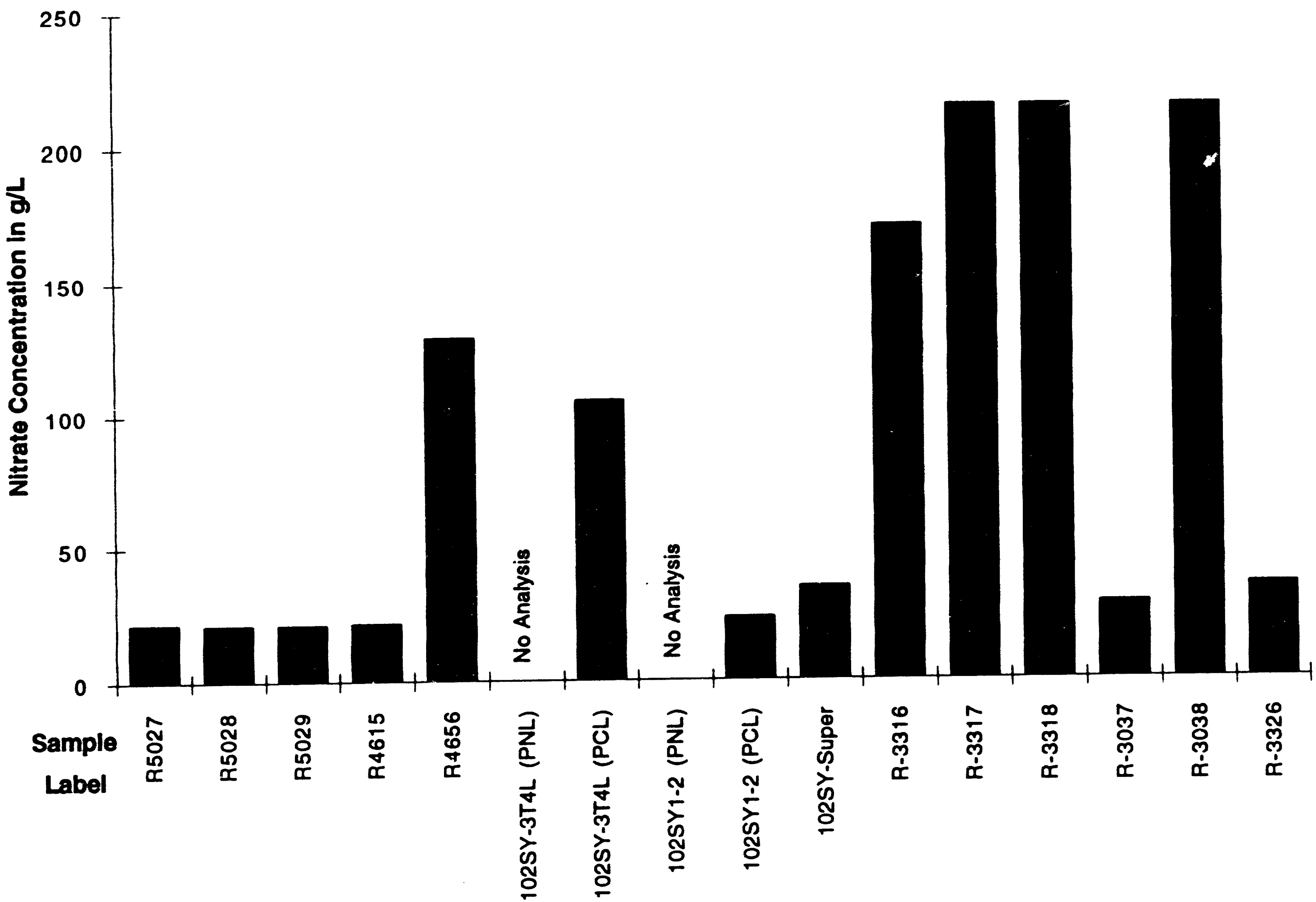

Fig. 7. Variation in nitrate analysis of SY-102 supernatant.

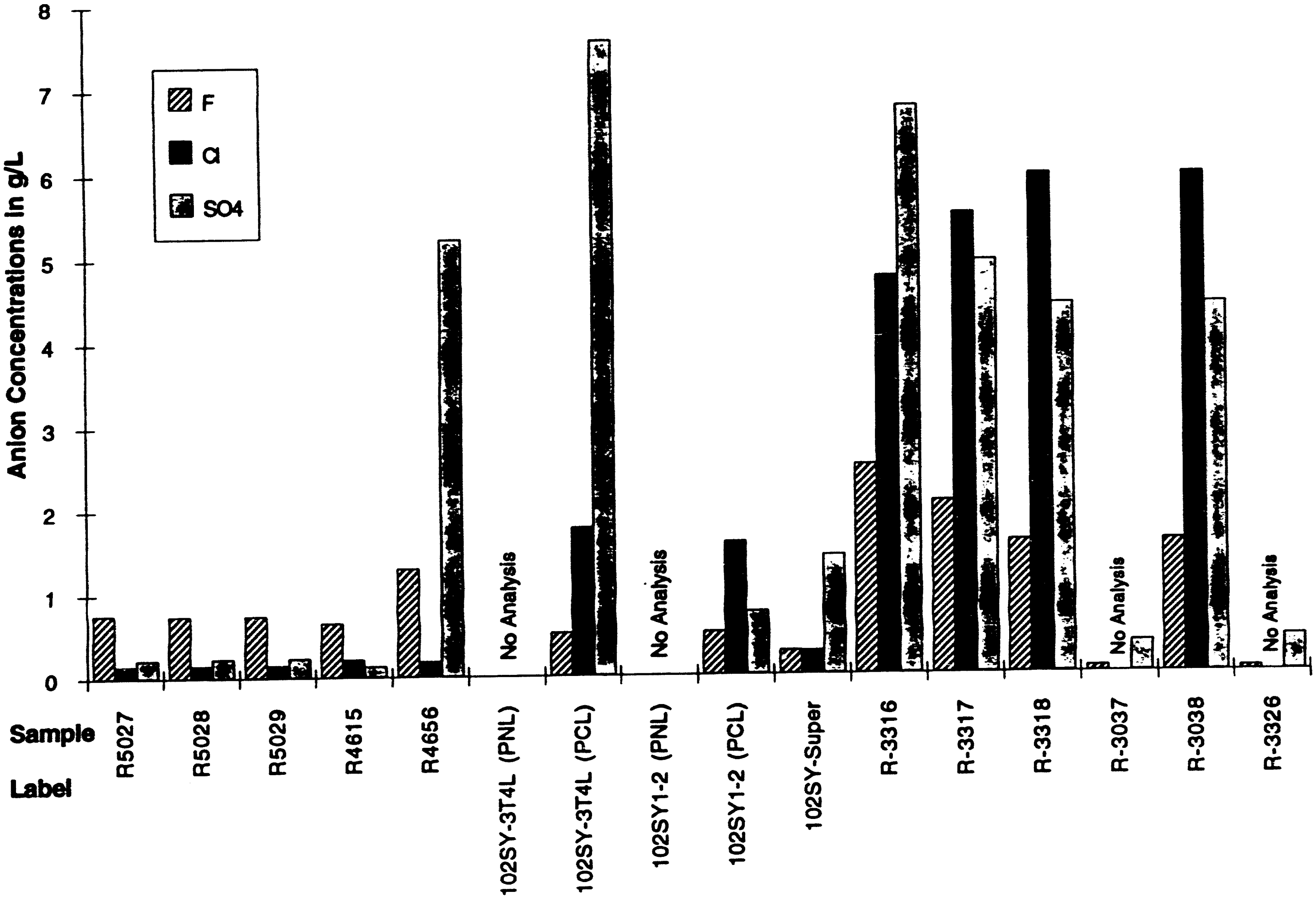

Fig. 8. Variation in anion analysis for fluoride, chloride and sulfate of SY-102 supernatant.

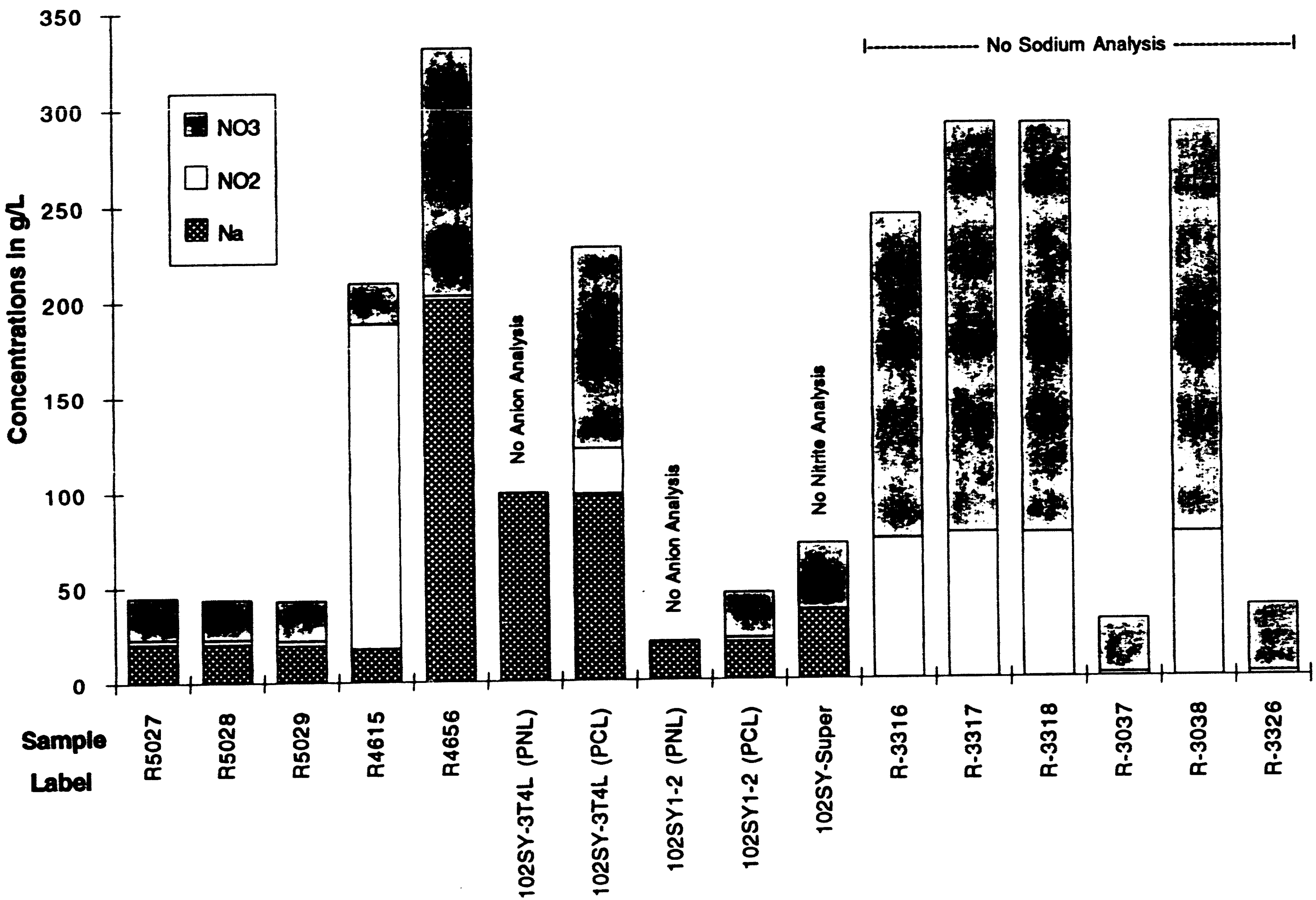

Fig. 9. Sodium-nitrate-nitrite analyses of SY-102 supernatant.

comparable concentrations of these species should be present in each sample. This appears to be the case for all the samples shown in Figure 8 with the exception of R4656, again suggesting that the analytical results for this sample may be an anomaly. Another unusual feature in this chart with no obvious explanation, is the very large nitrite level in R4615.

In general, radiation levels reported for the supernatant grab samples are typically less than one Curie per liter, with Cs-137 responsible for the majority of the activity. In nearly all samples, radiation levels of other radioactive isotopes are one hundred-fold or more lower than the Cs-137 activity level. The variation in the Cs-137 levels reported for the samples is shown in Figure 10. Again we note the large variation in radiation levels, with an especially anomalous value for the R4656 sample. Interestingly, the variation in Cs-137 levels reported follows the same pattern as that observed for the aluminum concentration in the samples (Figure 4), suggesting that the same waste stream may be responsible for the appearance of both cesium and aluminum in the tank supernatant. However, in view of the difference in the chemistries of the two elements, the similarity in behavior may only be a fortuitous occurrence.

Tank Sludge Composition

As mentioned earlier, there are nine analytical reports available for the 102-SY tank sludge. Three of these reports are on samples from the 1988 core, one is from a grab sample taken in July 1988 (102SY-Solids), and four of the last five are from grab samples taken in November 1984. No date is available for the fifth grab sample (R3036), but it appears to have been taken even earlier, since the analysis date is October 1984. It should also be noted that there are two reports on the analysis of the R3316 sample

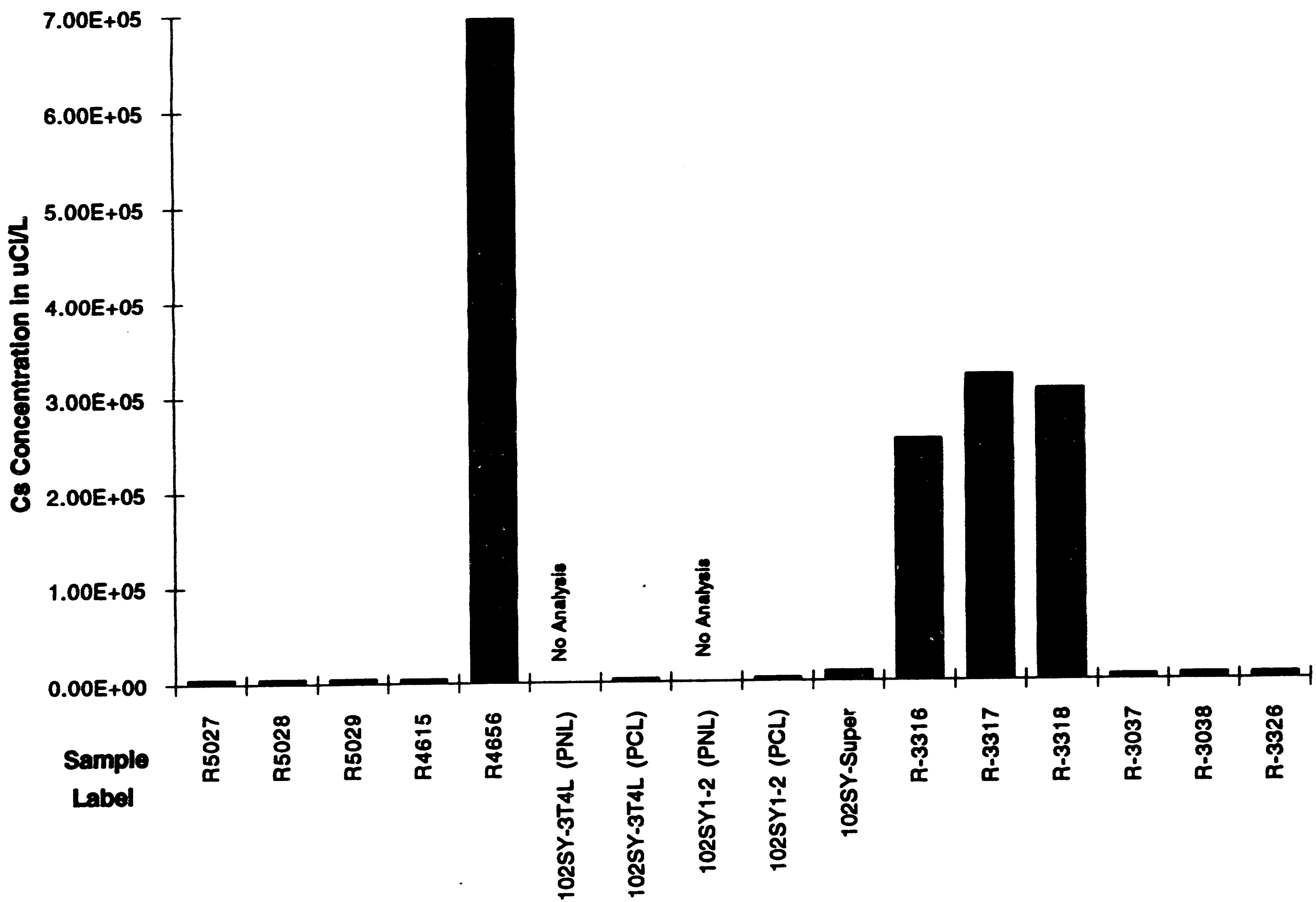

Fig. 10. Variation in Cs-137 analysis of SY-102 supernatant.

which differ significantly. However, no explanation is available as to what is responsible for the different set of analytical values reported.

The variation in the concentration of aluminum, chromium and iron found in these samples is shown in Figure 11. With the exception of the 3T4S samples and the 102SY-Solids sample, all of the remaining samples have the same relative abundance of the three metals, i.e., Al > Cr > Fe. This is consistent with the fact that all of these samples were obtained from near the bottom of the tank, although the location is not available for the R3036 grab sample. In contrast, the 3T4S samples taken from a point higher in the tank have a reduced chromium concentration, compared to the other two metals. The 102SY-Solids sample is a grab sample which also has a reduced chromium concentration, suggesting that this sample, like the 3T4S sample, was obtained from a point higher up in the tank sludge.

If we consider the absolute values of these analytical results, rather than the relative results, we find a large variation in the concentrations of the three elements as a function of the sample. For example, the aluminum concentration varies from a high of ~16% by weight in the R3036 sample, to a low of ~5% in the 4B sample. Similar fluctuations are present in the analyses of all three metals. The source of these fluctuations could be a result of horizontal inhomogeneities in the tank composition, since the 4B sample and grab samples from the bottom of the tank could have been taken from different locations in the tank. Alternatively, the differences in the analytical results could be due to matrix interferences occurring in the analytical procedure. The presence of matrix interferences could alter the absolute values determined for the metal concentrations, but would be less likely to alter their relative concentrations. The analytical results from the R3036 sample are more than double the values reported for the other grab samples. Since we do not know the location of this grab sample, these

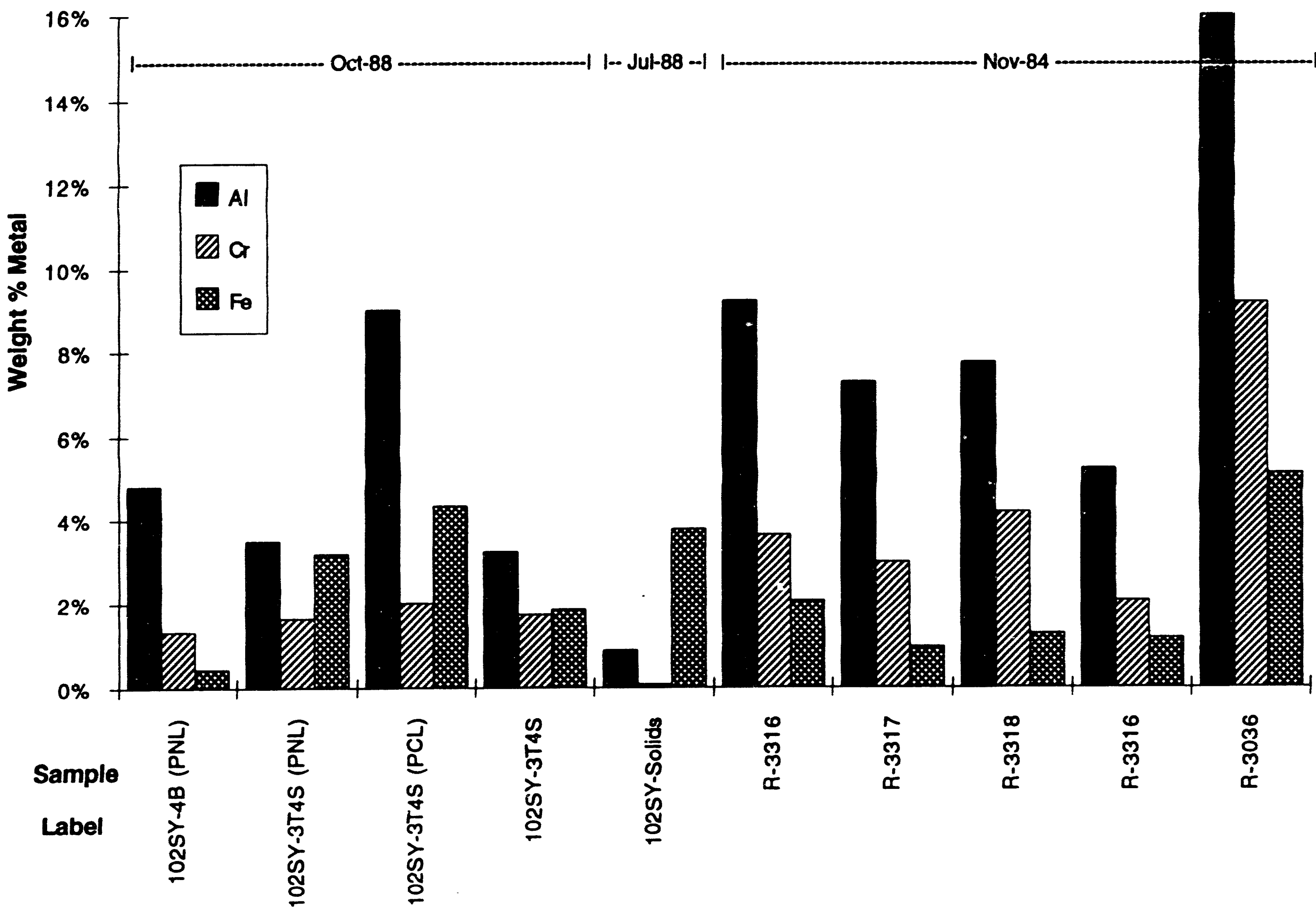

Fig. 11. Variation in elemental analysis for aluminum, chromium and iron in SY-102 sludge.

high concentration values may be typical of sludge higher in the tank. Omitting the R3036 sample data from consideration considerably reduces the spread in the analytical values reported for the other sludge analyses.

The 3T4S sludge sample is the only sample for which we have duplicate and independent analytical data. Figure 12 shows sludge concentration values obtained from Scheele and Peterson (PNL) as well as from Herting (PCL) for aluminum, chromium, iron and sodium. In addition, I have included in this chart Kirkbride's estimate, which is presumably based on the PNL and PCL data, as well as the Weiss results on the July 1988 grab sample (102SY-Solids). Values reported by Scheele and Peterson agree reasonably well with those of Herting for chromium, iron and sodium. However, Herting has an aluminum value nearly three times that of Scheele and Peterson. This deviation in the aluminum value can only be assigned to analytical error or to severe matrix interferences, which were accounted for by one analyst but not the other. It is interesting to note that Kirkbride selected the aluminum value from Scheele and Peterson, the chromium and sodium values from Herting, but used an iron estimate which is lower than either analytical value reported.

The iron value from the 102SY-Solids grab sample is similar to those reported for the 3T4S sample, but the aluminum, chromium and sodium values are all much lower. This deviation may reflect the fact that the 3T4S solid sample was obtained by mixing the top of the fourth core segment with the third core segment followed by homogenization and centrifugation. In contrast, the 102SY-Solids grab sample was almost certainly obtained from a much smaller vertical volume of the tank and therefore the metal concentrations reported should reflect much more localized tank conditions. If this is indeed the case, then these results indicate that the concentrations of the various metals vary substantially, depending upon either the horizontal or vertical

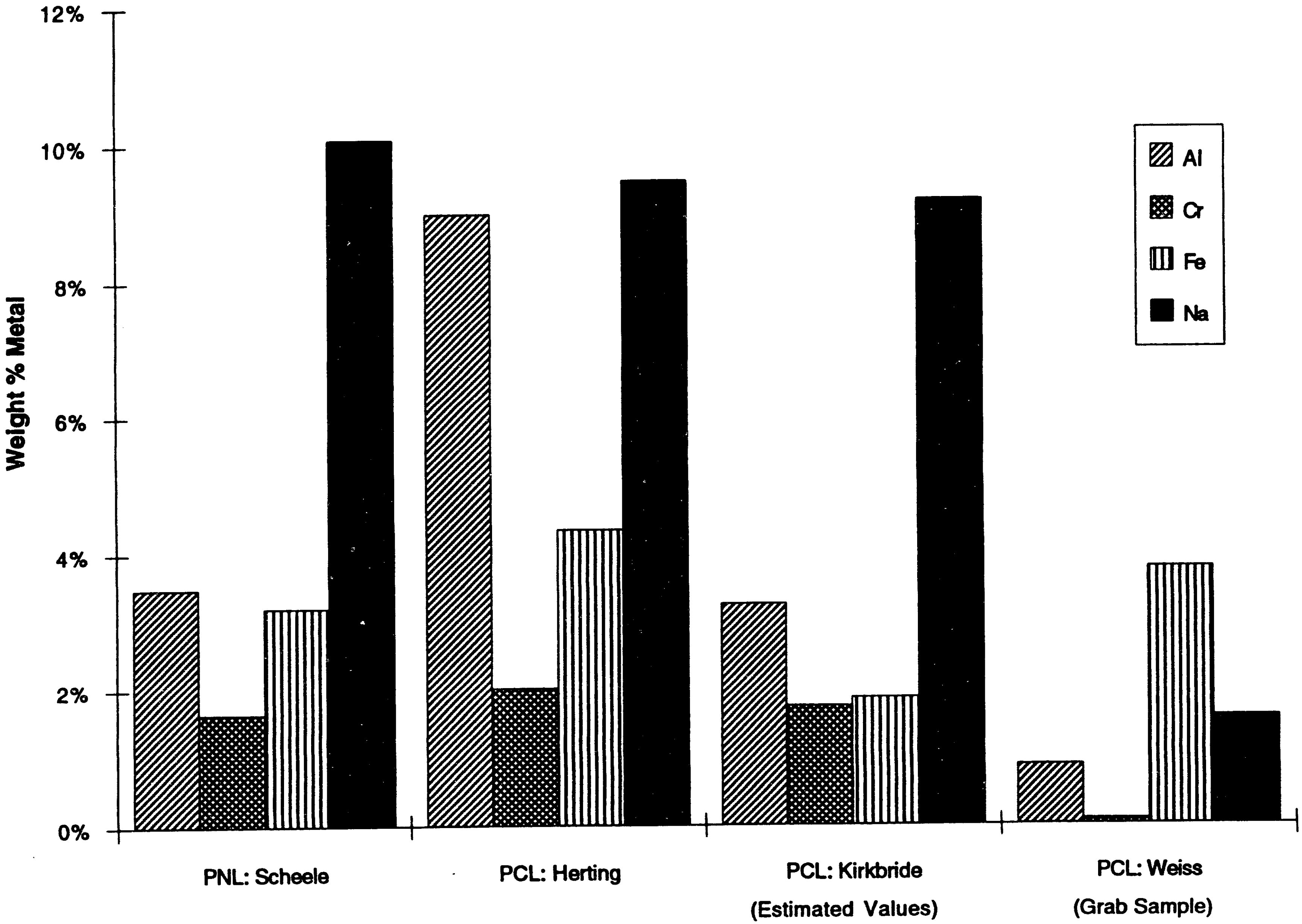

Fig. 12. Variation in elemental analysis for aluminum, chromium, iron and sodium of the 3T4S sample.

sampling location in the sludge. Additional sampling of the tank will be necessary to answer this question.

In Figure 13 we have shown the variation in the concentrations of aluminum, chromium, iron and manganese for the 3T4S sample reported by Scheele and Peterson, and Herting, as well as the values reported for these elements from three of Lumetta and Swanson's sludge washing experiments, i.e., PFP-1, PFP-3 and PFP-8. All of these analytical results are on a sample from the same composite; however, it should be noted that Lumetta and Swanson's results were obtained at a later date and they reported that the composite from which they obtained their samples was dried out. This would increase the effective concentration of the elements due to the loss of water.

The analyses for the four elements all show similar, albeit not identical, patterns. Aluminum and iron are in greatest abundance in all samples, although the absolute concentrations are not the same. Lumetta and Swanson's results do appear on average to be somewhat higher than the results of Scheele and Peterson as expected from the reduced water content of the PFP samples. They are also greater than Herting's results, with the notable exception of aluminum, for which Herting reports a value nearly double that of any of the other analyses. The range of ~1% observed in the analytical results on the three PFP samples from the sludge washing experiments is much larger than the deviation one would expect due to normal analytical error. This may indicate the limits of precision possible for such a complex matrix, but it seems more likely that this range reflects the homogenization process originally used to composite the third and fourth segments and prepare the 3T4S sample. The inhomogeneity of the 3T4S sample, reflected in the large analytical range, may be a consequence of uneven settling during the centrifugation step used on the composite to separate the solid sample (3T4S) from the supernatant sample (3T4L).

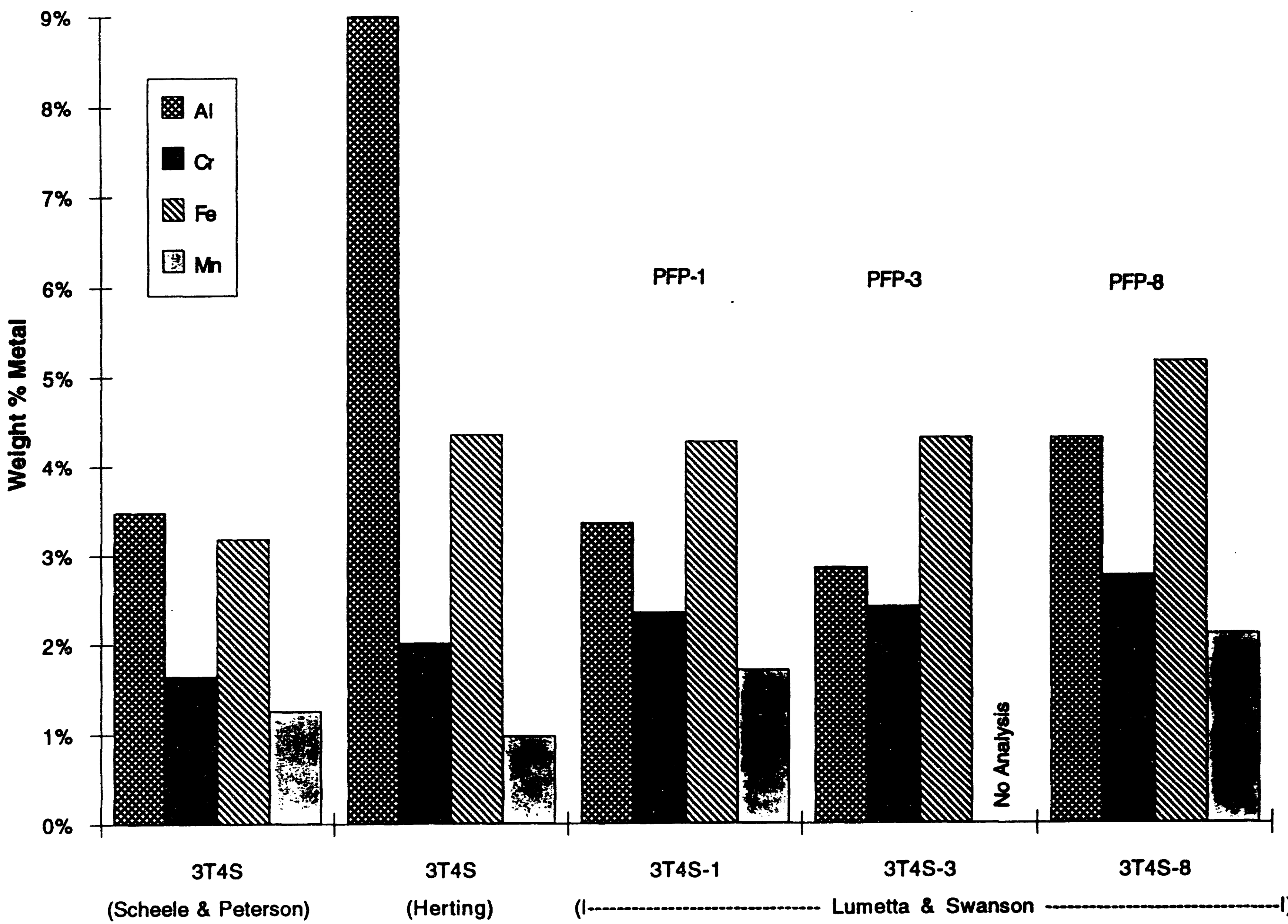

Fig. 13. Variation in elemental analysis for aluminum, chromium, iron and manganese of the 3T4S sample and associated sludge washing experiments.

Figure 14 shows the variation observed for six of the less abundant elements found in the 3T4S sample, including calcium, potassium, phosphorus, lead, thorium and uranium. Unfortunately, not all elements were analyzed in every analysis, but we can get an indication of the limits on the analytical results and the interpretations that can be drawn from them. There appears to be significantly greater variation in the analytical results reported for these less-abundant elements than for the most-abundant elements. For example, the concentrations of potassium and phosphorus reported by Scheele and Peterson are nearly three times greater than the concentrations reported by Herting. A comparison of the analytical results for the three PFP samples show that most of the elements were found to have similar concentrations in all three samples, with the exception of the calcium level in PFP-8, which is smaller by a factor of nearly twenty. As was observed for the more abundant elements, the ranges observed in these analyses exceed normal analytical expectations, which may also be a result of incomplete homogenization of the 3T4S sample.

The variations in concentration of the radioactive elements americium, plutonium, and cesium are shown in Figure 15. Unfortunately, interpretation of the plutonium data is complicated by the fact that different isotopes are reported for different samples (see Comp.SL.final spreadsheet). In addition, the americium and plutonium data listed for Scheele and Peterson's 3T4S sample were actually determined for the 4C sample, i.e., sludge from the top of the fourth core segment prior to forming the composite with sample 3C from the third core segment, rather than sample 3T4S.

If we omit the second 3T4S sample, which is actually the 4C sample, and the 102SY-Solids sample from consideration, we can see that the activity values for Cs-137 are in reasonable agreement for all of the other samples, averaging roughly 130 μCi/g,

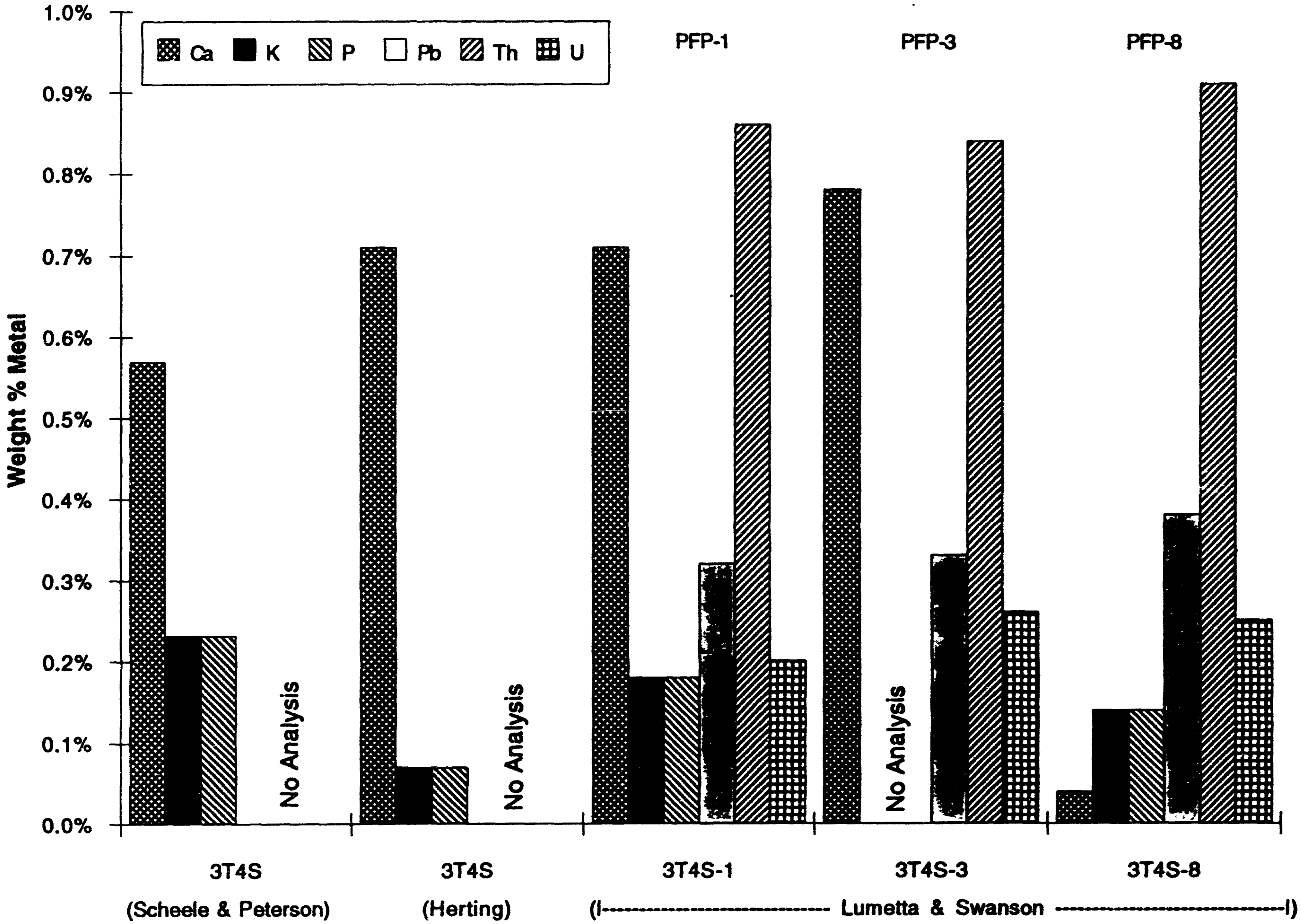

Fig. 14. Variation in elemental analysis for the less abundant calcium, potassium, phosphorus, lead, thorium and uranium of the 3T4S sample.

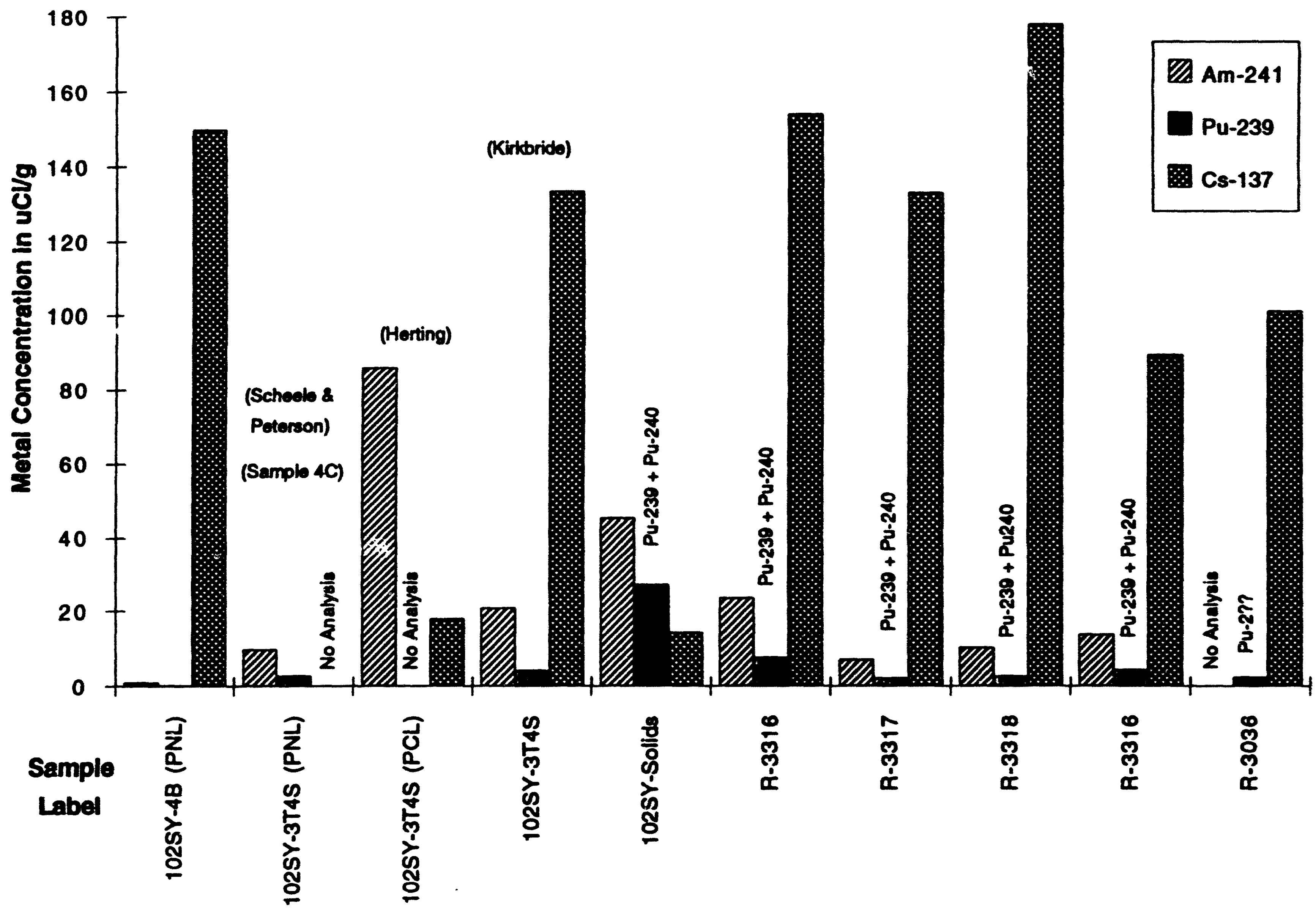

Fig. 15. Variation in the concentrations for radioactive elements americium, plutonium and cesium in SY-102 sludge.

with the largest variation being a factor of two between the R-3318 and R-3316 samples. Since the 4B sample and all the grab samples listed were obtained near the bottom of the tank, this value should reflect the cesium content in the residual salt cake left in the tank. The values for the 4C and 102SY-Solids sample are much lower, consistent with the fact that these samples were obtained at a point significantly higher in the tank, i.e., above the salt cake, where we would expect to find a lower Cs-137 content.

In contrast, the americium activities are generally lower than the Cs-137 activities, but show much greater variation from sample to sample. It is unclear at this time what is responsible for the very large fluctuations observed in the Am-241 activity levels reported in these samples. The values from the bottom of the tank, i.e., the 4B sample and the grab samples, appear to be significantly lower than those reported for samples obtained from a point higher in the tank, such as Herting's analysis of the 3T4S sample and the 102SY-Solids sample. Consistent with this observation is the fact that the Am-241 analysis reported for the 4C sample by Scheele and Peterson also falls in the lower range of activities. We have ignored the value reported by Kirkbride since this value is not an independent analytical result.

Scheele and Peterson's report on the 1988 core samples represents the most complete set of analytical data available for the SY-102 tank sludge. The elemental abundances determined for the 4B and 3T4S core samples are shown in Figure 16. The dominant species in the 4B sample have the order: Na > Al > Cr > P > As ~ Se > Fe. The distribution of the dominant species in the 3T4S sample are quite different, with the exception of sodium and aluminum, and have the following order: Na > Al ~ Fe > Cr > Mn > Ca > P > Si. The difference in the sludge analysis for these two samples presumably reflects the different layers that formed in the tank as the waste stream fed into the tank changed over the years. Due to the compositing and homogenization of

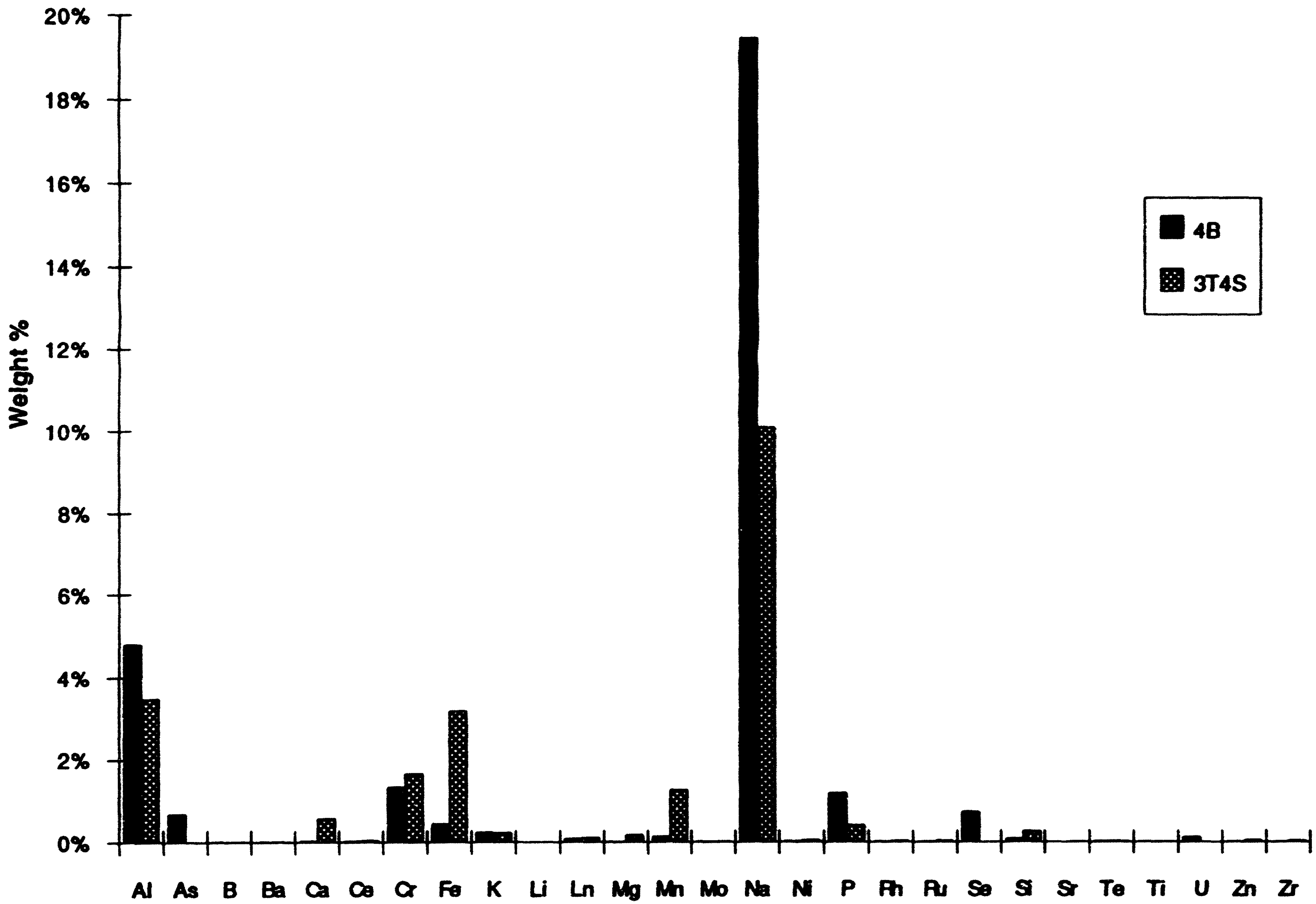

Fig. 16. Elemental abundance in SY-102 solid core samples 4B and 3T4S.

the core segments, we have converted the many layers that may exist in the tank into only two effective layers, i.e., sample 4B, which represents the sludge in the bottom 8 in. of the tank, and sample 3T4S, which represents the remaining 30 in. of sludge.

The elemental abundances of those elements found at lower concentrations in the 4B and 3T4S samples of the sludge are shown in Figure 17. Again it is clear from a comparison of the results for the two samples that they have a different signature, as would be expected if the waste streams forming the sludge were different. Unfortunately, analytical data for bismuth, thorium, and heavy metals such as lead and mercury are not available for these samples. Uranium data for the 3T4S sample are also missing. These additional data would be useful information since the concentrations of these elements in the sludge will probably affect any tank remediation flow sheet proposed.

The analytical data available for the concentrations of anions in the sludge are relatively sparse. Scheele and Peterson reported the concentrations of several anions in the 4B sample but not for the 3T4S sample. As mentioned earlier, these analyses were carried out on aqueous extractions of the sludge and therefore do not detect anions present as insoluble salts. Figure 18 shows a comparison between the anion data available for the 4B sample and the data for the 3T4S sample from Herting's analysis. The much larger nitrate concentration found in the 4B sample is consistent with the salt cake composition proposed for this sample.

Figure 19 shows the variation in the chloride and sulfate concentrations reported for the sludge samples. These are the only two anions for which analytical data are available for the majority of the sludge samples. The chloride data show relatively little variation in concentration compared to the sulfate data. The large deviation in the

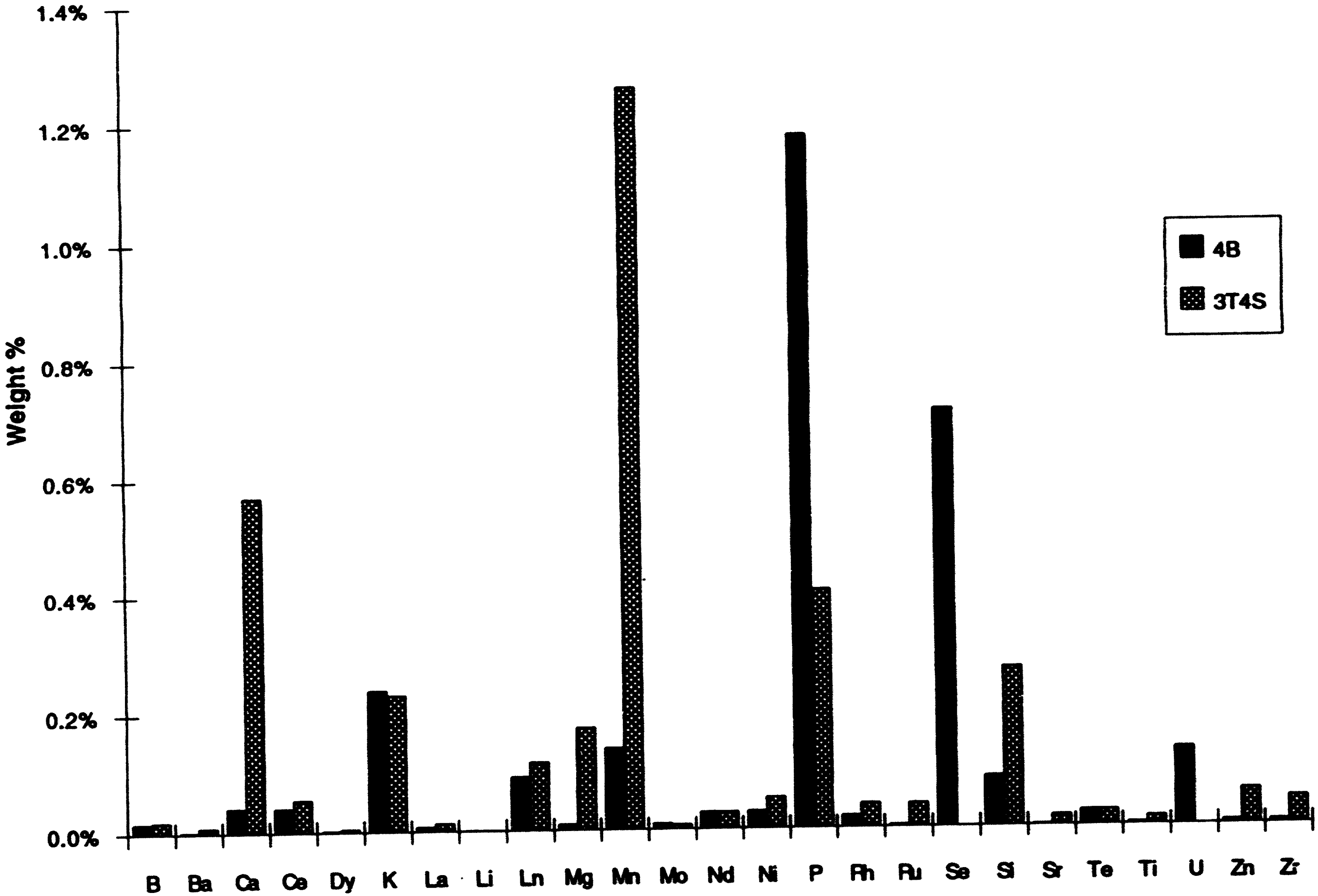

Fig. 17. Elemental abundance of those elements found at lower concentrations in SY-102 solid core samples 4B and 3T4S.

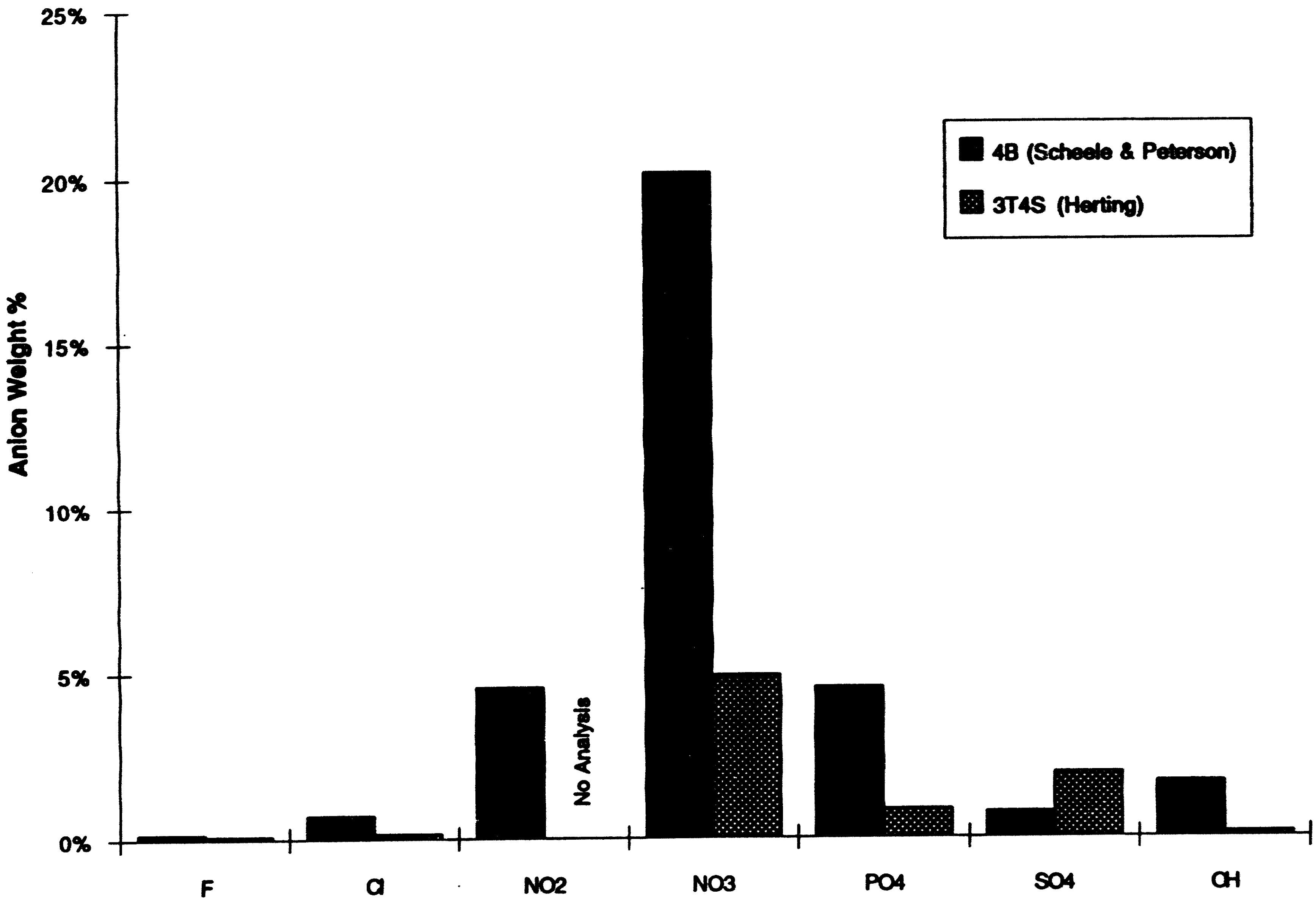

Fig. 18. Anion abundance in SY-102 solid core samples 4B and 3T4S.

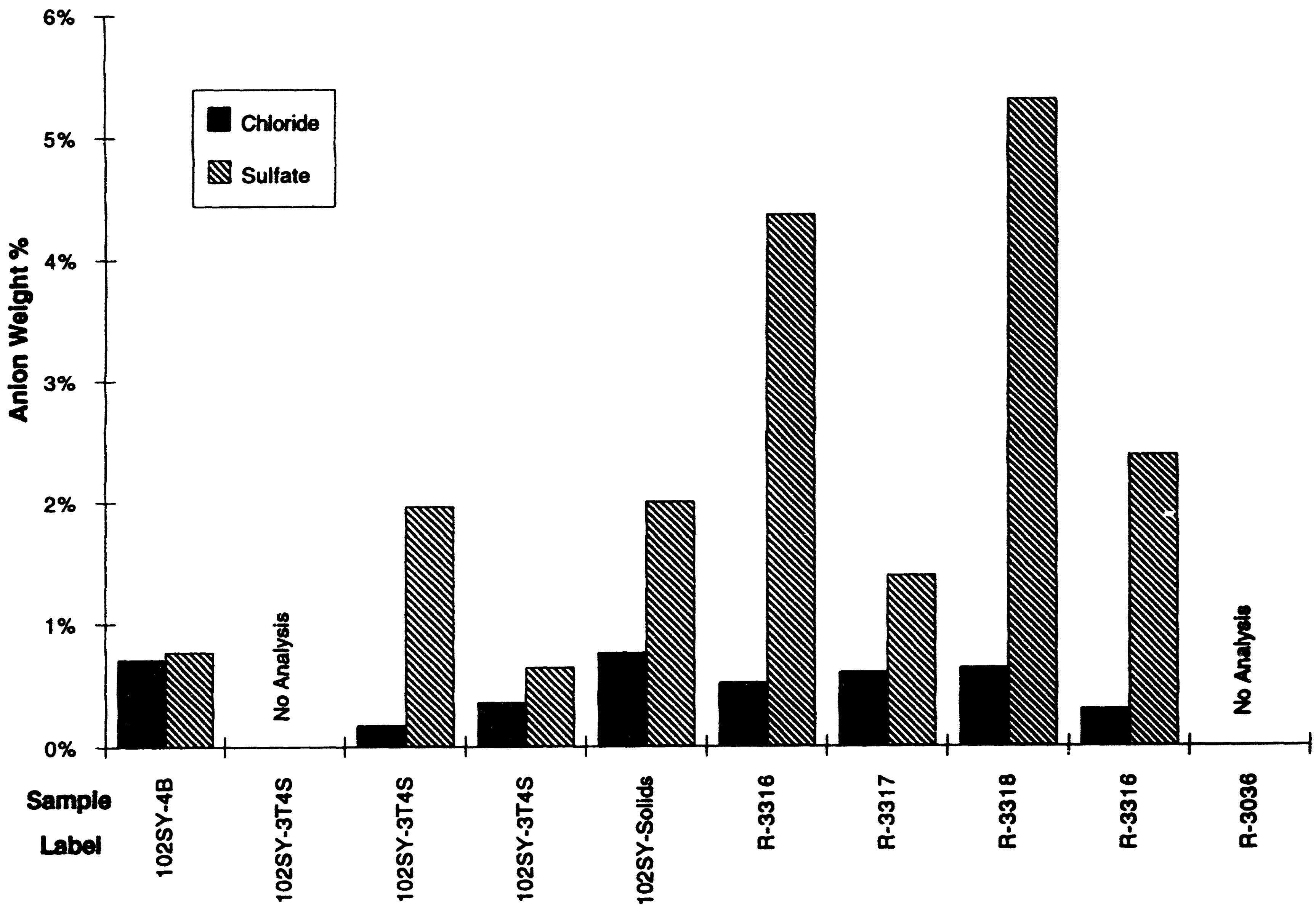

Fig. 19. Variation in anion analysis for chloride and sulfate in SY-102 sludge.

sulfate values reported for the R-3316, R-3317 and R-3318 samples is particularly surprising. The fluctuation may reflect the formation of insoluble, or less soluble salts during the process of extracting the basic solid with water, in preparation for the ion chromatographic method used for the analysis. Mixing of the layers in the sludge may bring together in the liquid phase cations and anions that were separated in the sludge, resulting in the precipitation of new salts. Deviations in the exact method used to carry out the extraction could account for the formation of different amounts of insoluble salts for each sample, and since sulfate salts tend to be less soluble than chloride salts, greater variation in the sulfate results would be expected.

It is of some interest to compare the phosphorus analysis carried out on the 4B sample using ICP with the phosphate analysis carried out on the aqueous extraction of the sample using ion chromatography. Scheele and Peterson report 0.38 mmol/g of sludge by ICP compared to 0.48 mmol/g by ion chromatography. If insoluble phosphate salts were not detected by aqueous extraction, we would expect the ICP number to be larger than the ion chromatography number. Since the reverse appears to be the case, we might expect that all of the phosphate present in the 4B sludge sample should be capable of being extracted by water. In contrast, for the 3T4S sample, Herting reports 0.181 mmol/g by ICP and only 0.0917 mmol/g by ion chromatography, suggesting that nearly half of the phosphate is in the form of water insoluble salts. We can compare this result with Lumetta and Swanson's sludge washing data on the 3T4S sample in which they found that a water wash removed 18.7%, 22.1% and 100% of the phosphorus from the sludge in three separate experiments . They could give no explanation for the large discrepancy between the three experiments, and unfortunately none of them match the 50% extraction rate we would expect from the ICP/ion chromatography comparison. Again, we note here that these fluctuations in the experimental results may simply be a consequence of inhomogeneities in the 3T4S sample that occurred during the sample preparation.

The interpretation of the Lumetta and Swanson's sludge washing study is further clouded by the method used originally to prepare the 3T4S sample. The 3T4S sample was prepared by mixing the slurry from the third core segment with the upper 11 in. of the fourth core segment, homogenizing and centrifuging the mixture, and then separating the solid (3T4S) from the supernatant (3T4L). Since the phosphate levels in supernatant sample 3T4L are much lower than those found in the solid 3T4S sample, it would seem reasonable to expect that any extractable phosphate would have already been extracted into the supernatant during the sample preparation, leaving no phosphate to be extracted in later sludge washing experiments. However, it may be that differences between the hydroxide content of the supernatant during sample preparation and the later sludge washing experiments can account for this behavior. Alternatively, the larger volume of water used in the sludge washing experiments, compared to the supernatant in the sample preparation, may dissolve more of the poorly soluble transition metal phosphate salts.

Comparison of the 1988 and 1990 Cores

Information on the 1990 core is available to us from two sources; Lumetta and Swanson's sludge washing experiments (PFP-6 and PFP-7) and Gray's report from the PCL laboratory at Westinghouse. Both sets of analyses are limited to the 34COMP sample, which appears to be the solid sample analogous to the 1988 core 3T4S sample, resulting from homogenization of the third and fourth segments of the core followed by centrifugation. Although we did not receive a detailed description of the 1990 core and sample preparation, the information we do have suggests that a sample analogous to the 4B sample from the 1988 core was not separated out of the 1990 core, implying that the bottom 8 in. of the 1990 core sample was included in the homogenization of the third and fourth core segments. This should increase the relative concentrations of the salt cake components (e.g., sodium, nitrate, Cs-137) in the 34COMP sample from the 1990 core compared to the 3T4S sample from the 1988 core.

Information from Steve Agnew supports risers 1B and 13A as the locations of the 1988 and 1990 core samples, respectively. Riser 1B is roughly 20 ft 8 in. from the center of the tank, nearly equidistant from the Feed Pump Pit and the Pump Pit. In contrast, riser 13A is less than 11 ft from the center of the tank, adjacent to the Pump Pit. The two risers are approximately 15 ft from each other. Figure 20 presents a schematic of the riser locations on tank SY-102 with the core sites indicated (Rockwell, #SD-RE-TI-093).

The 88/90 CoreComp3 spreadsheet presents the data available for the 34COMP sample from the 1990 core, together with the comparable data for the 4B and 3T4S samples from the 1988 core. The concentrations of aluminum, chromium, iron and manganese in these samples are shown in Figure 21. All three of the 34COMP analyses have similar concentrations for these four elements. The results for the 3T4S samples from the 1988 core are all substantially higher. The higher values could reflect the fact that the 3T4S samples contain less water than the 34COMP sample, as suggested by Lumetta and Swanson. However, the fact that the aluminum content of the 3T4S sample is roughly double that of the 34COMP sample while the iron content of the 3T4S sample is more than triple that of the 34COMP sample implies that explanations other than water content must play a role in accounting for the differences in concentrations observed in these two samples.

The relative abundances of the 3T4S and 34COMP samples are also different. The 3T4S sample has the order Fe > Al > Cr > Mn, whereas the 34COMP sample has the

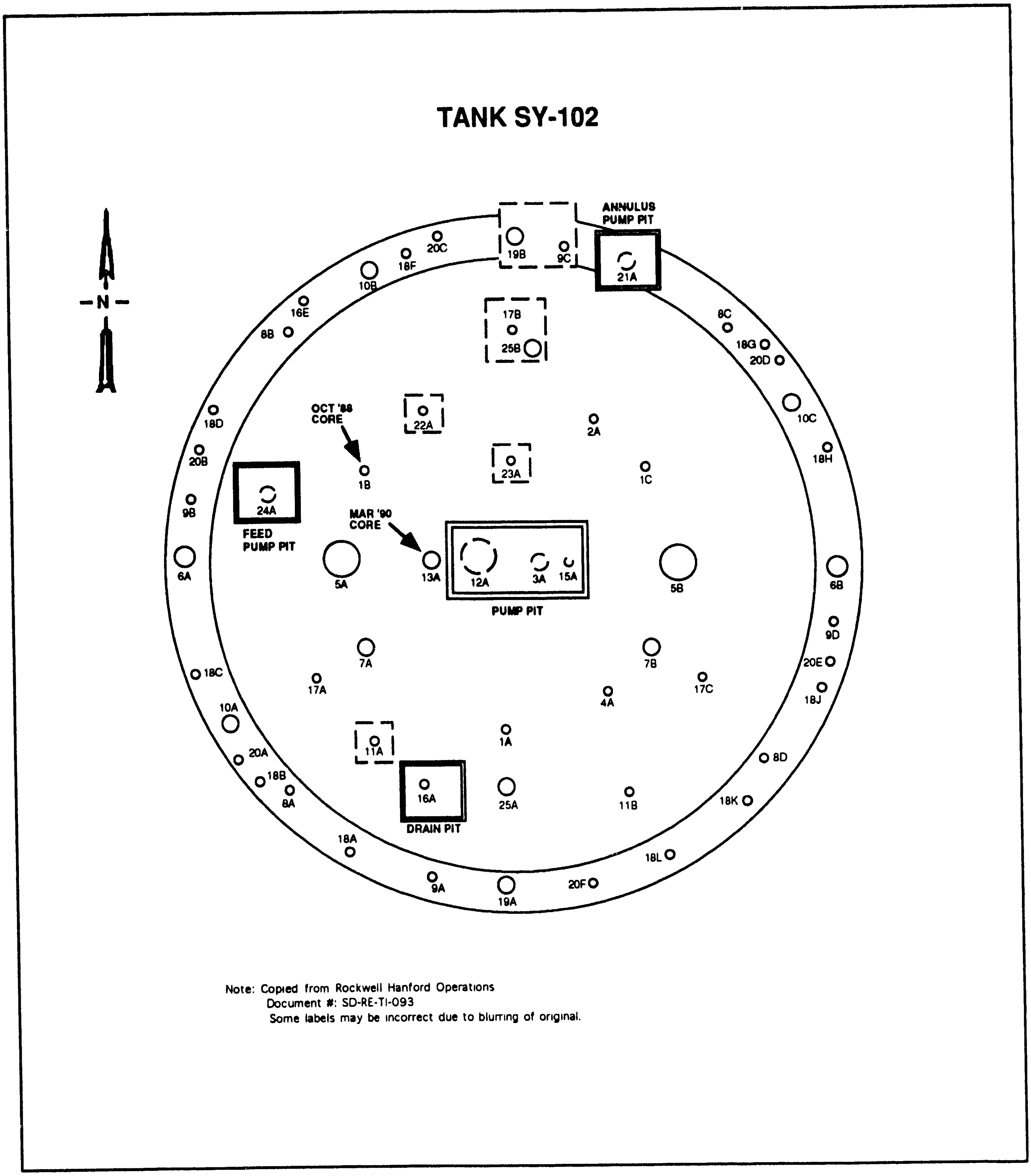

Fig. 20. Schematic of the riser locations on SY-102 with the core sites indicated.

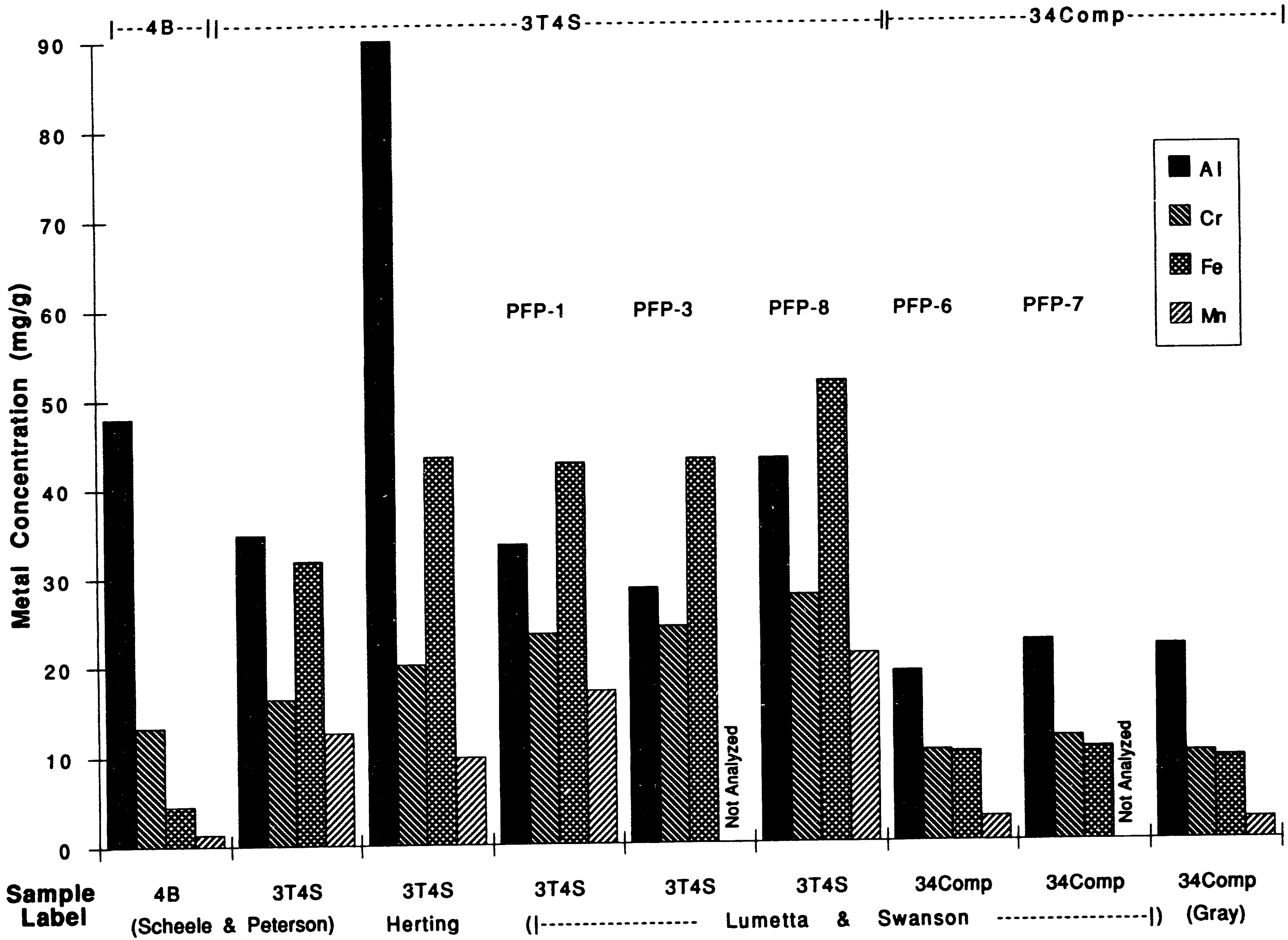

Fig. 21. 1988-1990 core comparison for elements aluminum, chromium, iron and manganese.

order Al > Cr > Fe > Mn. This difference in relative concentrations in samples taken from similar depths in the tank, but at two different locations, suggests that inhomogeneous mixing of the layers in the tank has probably occurred. However, if the 34COMP sample does contain a significantly larger portion of the salt cake from the bottom of the tank, the presence of this material could explain the difference in the relative concentrations since the order for the 4B sample from the 1988 core is the same as that of the 34COMP sample. Thus the combination of greater salt cake and a wetter 34COMP sludge sample may be enough to account for the relative concentration differences observed between the 3T4S and 34COMP samples.

Figure 22 presents the same information for elements present in less abundance in the 34COMP sample, including, calcium, potassium, lead and thorium. There is much greater analytical variation in these results, both for the 3T4S sample and the 34COMP sample. In addition, not all samples were analyzed for all the elements. In particular, the calcium and thorium levels fluctuate by a factors of five and two, respectively. These large fluctuations may represent serious matrix interferences in the analytic method. The combination of missing analyses and poor analytical precision prevents us from making a useful comparison between the 3T4S and 34COMP samples.

Charge Balance

In an attempt to ascertain the reliability and internal consistency of the analytical results, we have carried out a charge balance analysis on the 4B sludge sample from the 1988 core, the sample for which we have the most complete analytical data. These results are presented in the form of two Microsoft Excel spreadsheets (filenames: ChargeBalance and ChargeBalance.complete) in Appendix B. Our initial approach (in ChargeBalance) was to assume that the elements for which the analytical data were obtained by ICP, would be found in the sludge as cations, except for phosphorus,

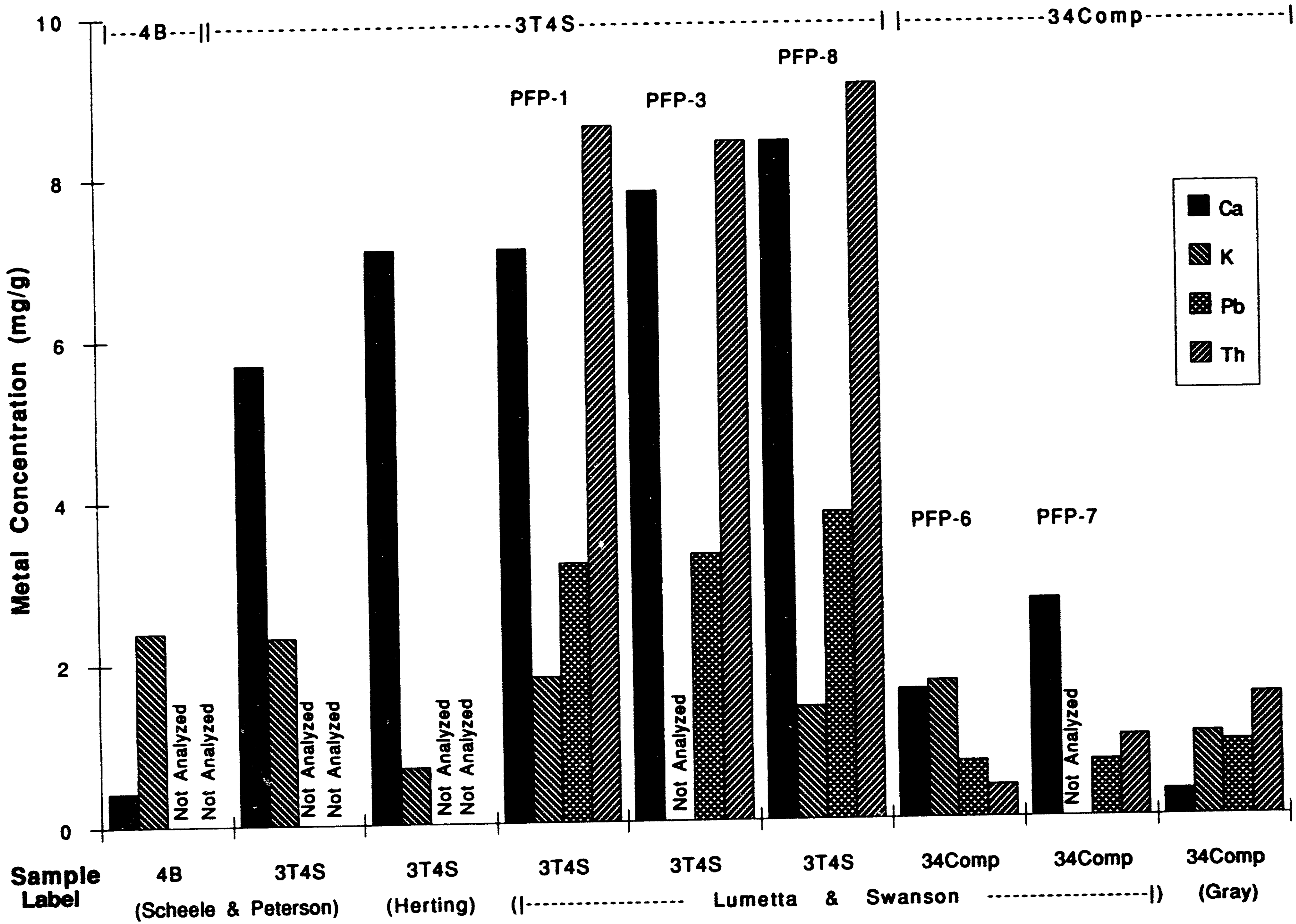

Fig. 22. 1988-1990 core comparisons for less abundant elements calcium, potassium, lead and thorium.

sulfur, boron, arsenic, selenium, and silicon, which were assumed to exist as the oxyanions, phosphate, sulfate, borate, arsenate, selenate, and silicate, respectively. The total charge for these latter anions was then added to the charges obtained from the ion chromatography results for fluoride, chloride, nitrate, nitrite, and hydroxide. The total cationic and anionic charges were obtained by converting the weight % values to molar quantities and multiplying by the appropriate charge. For cations that can exist in multiple oxidation states, a charge consistent with the presence of air and at least 0.1 M NaOH was assumed. For example, iron was assumed to be present as Fe(III) in FeOOH, chromium as a Cr(III) salt, and manganese as Mn(IV) in MnO_2. We refer to this case as the Minimum Negative Anion Case. The charge balance that results from these assumptions is not very good, with a net cationic charge of +150.6 compared to a net anionic charge of -80.5. However, it should be noted that if the counterion for aluminum in the sludge is assumed to be hydroxide instead of nitrate or nitrite, then the hydroxide content needs to be increased, providing an additional 53.4 units of negative charge, resulting in a total anionic content of -133.9.

A second scenario (also in ChargeBalance) assumed that any element capable of existing as an anion under tank conditions, was in fact present in anionic form. This approach was expected to increase the net negative charge and correspondingly decrease the net positive charge. Under this scenario, in addition to the anions already mentioned above, aluminum was assumed to exist as the tetrahydroxyaluminate anion, chromium as chromate, and molybdenum as molybdate. Other potential anions that could exist, but which were not included in this calculation, are tellurium as tellurate, titanium as titanate and zirconium as zirconate. However, since these three elements are present as minor constituents of the sludge, these assumptions do not affect the charge balance calculation significantly. We refer to this scenario as the Maximum Negative Anion Case. The charge balance that results from these assumptions now has an excess of negative charge, with a net cationic content of +89.5 and a net anionic content of -103.4. The Minimum and Maximum cases represent the likely extremes of charge balance possible for the sludge composition.

It is clear from a consideration of these two results, that the assumption made as to the speciation of the aluminum ion in the tank is critical to obtaining a reasonable charge balance. Converting all the aluminum present, based on the ICP analysis from Al(III) to $Al(OH)_4^-$, results in a net swing of 71.2 units of charge from plus to minus. A similar conversion of the chromium from Cr(III) to $CrO_4^=$ results in only a swing of 12.8 units of charge from plus to minus, due to the smaller weight % abundance and larger atomic mass of chromium relative to aluminum. The imbalance in the net cationic and anionic charge in these two examples can be adjusted by altering the Cr(III)/$CrO_4^=$ and/or the $Al(NO_3)_3$/$Al(OH)_3$/$Al(OH)_4^-$ ratios.

Unfortunately, there is no direct evidence as to the form of the aluminum in the 4B sample. However, Scheele and Peterson, based on a water extraction of the sludge samples, estimate that ~10% of the chromium in the 4B and 3T4S samples is in the form of chromate. Lumetta and Swanson's sludge washing results on the 3T4S sample suggest that between 30% and 34% of the chromium is extractable as chromate. We have used Lumetta and Swanson's sludge washing results on the 3T4S sample to make what we believe to be a realistic estimate of the actual charge balance in the sludge. The spreadsheet presenting these results is entitled Realistic Negative Ion Case for SY-102-4B in Appendix B (filename: ChargeBalance.complete).

Using Lumetta and Swanson's sludge-washing results we have incorporated both Cr(III) and chromate into the charge balance spreadsheet using a value of 33% Cr(III) and 67% chromate. The complete charge balance of the tank sludge was then obtained by assuming that 30% of the aluminum is present as $Al(OH)_3$ and 70% as $Al(OH)_4^-$. A cation/anion balance of ±110.7 results from these assumptions. Included in this charge balance are the additional hydroxide ions present in $Al(OH)_3$ which are not accounted for in the hydroxide analysis by ion chromatography. In addition, we have included the oxide and hydroxide content that must be present in $MnO(OH)_2$ and FeOOH, the compounds assumed to most likely account for the manganese and iron content of the tank sludge, respectively.

As mentioned earlier, we were concerned that the technique used to carry out the anion analyses might be in error due to the inability of the water extraction method to extract insoluble salts. In order to estimate the effect of such an error, we carried out one additional charge balance in which we arbitrarily assumed that all the aluminum is in the form of $Al(OH)_3$ and the chromium in the form of Cr(III) (see ChargeBalance.complete). This significantly reduced the anion content of the sludge and we added 8% additional sulfate in order to reestablish the charge balance. This represents a rough upper limit to the amount of missing anions that could be present in the sludge, although several assumptions affect this value. For example, if fluoride is the ion that is not extracted instead of sulfate, the missing fluoride would correspond to roughly 3.2% of the solid. Regardless of the exact assumptions made, it is obvious that the anion concentrations can be significantly higher than were determined experimentally without disrupting the charge balance calculation.

Metal Oxide Balance

An additional piece of information available for the 4B sludge sample from the 1988 core, is the result of calcining the sludge at 1000°C for one hour. A weight % oxide of 38.4% was reported for a sludge sample previously dried at 105°C overnight. The difference in the weight of the sample before and after heating represents conversion of hydroxides to oxides, and decomposition of nitrates and nitrites to oxides. In addition, the reduction in weight after calcination may represent loss of any remaining hydrated water not removed from the lattice by drying overnight. We have used the sludge composition suggested by our charge balance calculation to estimate the loss of weight we should expect upon calcination. Two calculations were carried out; one in which fluoride and chloride salts remain intact but all oxyanion salts convert to oxides; and a second in which phosphate, sulfate, fluoride and chloride salts remain intact. In either case, a value of 40.6% by weight is predicted for the calcination process which is in reasonably good agreement with the experimental value of 38.4%. The production of sodium peroxide in the calcination process, rather than sodium oxide, would reduce the calculated weight % by roughly 1%. Other differences in the form of the oxide produced by the calcination process used could increase or decrease the calculated value. However, the magnitude of the effects resulting from other elements should be much smaller since sodium is by far the most abundant element present in the sludge.

These two calculated values bracket the experimental value; however, we should note that no provision has been made in these calculations to take into account the presence of hydrated water which might remain behind after the drying process at 105°C. The presence of hydrated water in the sample prior to calcination will result in a larger decrease in the experimental weight % obtained, which suggests that the 40.6% calculated value may be the best fit to the lower experimental value.

Using the chromium and aluminum species distribution proposed above from the charge balance calculations, i.e., 30% $Al(OH)_3$ and 33% chromate, results in a calculated total weight % of cations + anions of 74.4% (see ChargeBalance.complete). Scheele and Peterson report that the 4B sample contains 32.7% water, i.e., 67.3% of the original sample was left after drying overnight at 105°C. The calculated value is ~7%

too high, which suggests that our assumption that 30% of the aluminum is in the form of $Al(OH)_3$ is not correct. The inability of Lumetta and Swanson to extract more than 15% of the aluminum content of the 3T4S sludge sample with 0.1 M NaOH suggests that a significant part of the aluminum in the sludge may be present as other compounds, such as aluminum phosphate. The less $Al(OH)_3$ present in the sludge, the lower will be the calculated total weight %, since the mass of the additional hydroxide ions from the $Al(OH)_3$ will not need to be added into the total mass.

Recommendations

Flow sheets proposed for the remediation of waste tanks at the Hanford tank farm can only be evaluated effectively if analytical data for the sludge composition are available, since variation in tank composition can have negative impacts on any process proposed for the cleanup. Attempts at determining tank composition include direct analysis of the sludge currently in the tank via core sampling, as well as the evaluation of the process streams that were fed into, and removed from the tank since 1977 (DREAM project). Since the process stream record for SY-102 is extremely complex, it seems likely that the two sets of SY-102 core samples (1988 and 1990), together with Lumetta and Swanson's sludge washing experiments, constitute the best information available regarding the tank sludge composition.

As discussed in the body of this report, evaluation of the data from these two cores is indicative of significant limitations on our ability to utilize the data to design or evaluate flowsheets proposed to remediate the tank. These limitations include, but are not limited to:

1) the possible presence of severe matrix interferences in the various analyses.
2) uncertainty as to the location of the sampling points in the tank.

3) incomplete recovery of the core sample.

4) uncertainty as to the homogeneity of the sludge sample.

5) uncertainty as to the effectiveness of the aqueous extraction procedure used for anion analyses.

6) the absence of analytical data for important elements that might affect proposed remediation schemes, such as thorium.

7) the absence of analytical data for radioactive isotopes that might affect proposed remediation schemes, such as Sr-90 and Tc-99.

8) uncertainty as to the isotope distribution for radioactive elements such as plutonium.

9) the lack of attention paid to the material balance of the sample.

10) the lack of attention paid to the radioactivity balance, i.e., total alpha, beta and gamma.

Ideally, a third core should be taken from tank SY-102 in order to eliminate the many uncertainties associated with the two previous cores obtained. In order to improve the utility of the core we have considered the following points.

1) The core should be preferentially taken from a point distant from the tank wall, the pump pits and other risers in the tank previously used to transfer slurry into and out of the tank, since the region close to these risers may exhibit atypical layering of the sludge. Risers labeled 4A, 7B and 17C in the southeast region of the tank may be suitable.

2) All analyses should be obtained both with and without control spikes in order to estimate the extent of matrix interferences of critical concern in such a complex mixture.

3) The homogeneity of the core samples prepared should be evaluated prior to carrying out duplicate analyses in order to estimate if the observed range is associated with analytical error or inhomogeneity of the sample.

4) Analyses for anions should be carried out on the acid digested sample in order to ensure detection of anions present in the sludge as insoluble salts.

5) Analyses should be carried out for all species (including complexants and other organics) that might interfere with ion exchange, solvent extraction, or vitrification methods that might be proposed as part of a remediation flow sheet.

6) Analyses should be carried out for all radioactive isotopes that might determine the final classification of the remediated waste as class A or B radioactive waste.

7) Analyses for both the radioactive and cold isotopes should be carried out, e.g., total cesium as well as Cs-137, in order to be able to estimate when column overloading might take place.

8) The plutonium isotope distribution should be determined in order to address potential criticality concerns during the remediation process.

9) Care should be taken to obtain a good material balance for the sample to ensure that elements not analyzed do not makeup a significant fraction of the sludge.

10) Similarly, care should be taken to obtain a good radioactivity balance for the sample to ensure that isotopes not analyzed do not makeup a significant fraction of the total alpha, beta and gamma counts of the sludge.

If a third core is not a practical option, due to cost or due to the long lag time between obtaining a core and the issuance of the analytical report, then priority should be given to reanalyzing the sludge available from the previous two cores, focusing on the issues raised above. Assuming that sufficient material is available from the 1988 and/or 1990 core, new samples should be obtained and analyzed using the guidelines indicated above. In particular, items 2, 4, 7, 9 and 10 applied to any future analyses of the older core material will help determine how much reliance can be placed on the analytical data available from the earlier reports for the 1988 (Scheele and Peterson; Herting; Lumetta and Swanson), and 1990 (Lumetta and Swanson; Gray) cores.

Finally, it would be extremely useful to carry out additional sludge washing experiments in order to resolve some of the questions raised by Lumetta and Swanson's earlier experiments. Of critical concern is whether or not the supernatant from a water or 0.1 M NaOH sludge washing procedure contains sufficient TRUs to render the supernatant a class B or class C waste. In addition, are there any species present in the supernatant that would interfere with the use of standard cesium and technate ion exchange methods that might be used to remove these radioactive isotopes from the supernatant.

In order to provide a firmer basis for evaluating the effectiveness of sludge-washing as a useful pretreatment step for tank remediation, additional sludge washing experiments should be carried out using a) water; b) 0.1 M NaOH; and c) tank supernatant. These experiments should be carried out keeping in mind the same analytical concerns discussed above, e.g., the use of control spikes; analysis for both cold and hot isotopes; material balance and radioactivity balance.

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APPENDIX A

TANK SY-102 COMPOSITION—Liquids and Solids Separate

Filename: Comp.SL.final

TANK SY-102 COMPOSITION --- Liquids and Solids Separate

Sample ID:		102-SY-4B			102-SY-3T4S			102-SY-3T4S			102-SY-3T4S			102-SY-Solids		
Sample Date:		10/25/88			10/25/88			10/25/88			10/25/88			Jul-88		
Analysis Date:		6/30/89, final report 1/90			6/30/89, final report 1/90			7/6/90						3/23/89		
Analyst:		PNL: Scheele & Peterson			PNL: Scheele & Peterson			Process Chem Lab (PCL): Herting						Process Chem Labs: Weiss		
Sample Site:		Oct '88 core			Oct '88 core			Oct '88 core			Oct '88 core			?		
Sample Notes:		Segment #4			Top Seg #4 + Bottom Seg #3			Density =	1.02		Density =	1.5		High value from Tbl 3 used		
								Anal. washed solid and solution			Val. est: core & pretreat results			Weiss (PCL) to Carothers		
Reference:		Peterson to DiLiberto, 6/30/89			Peterson to DiLiberto, 6/30/89			Herting to Sasaki, 7/6/90			Kirkbride to Orme, 12/10/92			Mixing Study-3/23/89		
Phase:		Solid			Solid			Solid			Solid			Solid		
Specie	Mass	wt%	mmol/g	Notes	wt%	mmol/g	Notes	wt%		Notes	wt%	mol/L	Notes	wt%	mg/g	Notes
Ag	107.87										0.0144%	2.00E-03				
Al	26.982	4.8027%	1.78E+00		3.4806%	1.29E+00		9.0000%		18	3.2378%	1.80E+00		0.8800%	8.80E+00	4
As	74.922	0.6818%	9.10E-02	<			NotReq				0.0499%	1.00E-02				
B	10.810	0.0173%	1.60E-02	DetLim	0.0195%	1.80E-02	DetLim				0.0144%	2.00E-02		0.0030%	3.00E-02	4
Ba	137.330	0.0027%	2.00E-04	DetLim	0.0093%	6.80E-04	DetLim									
Bi	208.980													0.0540%	5.40E-01	3
Ca	40.080	0.0421%	1.05E-02		0.5691%	1.42E-01		0.7100%		18	0.4542%	1.70E-01		0.7590%	7.59E+00	4
Cd	112.410										0.0600%	8.00E-03		0.0610%	6.10E-01	3
Ce	140.120	0.0420%	3.00E-03	DetLim	0.0560%	4.00E-03					0.0654%	7.00E-03		0.0240%	2.40E-01	3
Cr(VI)	51.996	0.1279%	2.46E-02		0.1549%	2.98E-02		0.4300%		18	0.1040%	3.00E-02		0.0820%	8.20E-01	4,7
Cr(Tot)	51.996	1.3259%	2.55E-01		1.6431%	3.16E-01		2.0100%		18	1.7332%	5.00E-01		0.0820%	8.20E-01	4
Cu	63.546										0.0847%	2.00E-02		0.0250%	2.50E-01	4
Dy	162.500	0.0033%	2.00E-04	DetLim	0.0052%	3.20E-04	DetLim									
Fe	55.847	0.4468%	8.00E-02		3.1889%	5.71E-01		4.3500%			1.8616%	5.00E-01		3.7710%	3.77E+01	3
K	39.098	0.2385%	6.10E-02		0.2307%	5.90E-02	DetLim	0.0700%		18	0.2085%	8.00E-02		0.0800%	8.00E-01	4
La	138.906	0.0081%	5.80E-04	DetLim	0.0139%	1.00E-03	DetLim									
Li	6.940	0.0014%	2.00E-03	<	0.0014%	2.00E-03	<				0.0014%	3.00E-03				
Ln	157.000	0.0907%	5.78E-03		0.1149%	7.32E-03					0.1047%	1.00E-02		0.1047%	2.40E-01	
Mg	24.305	0.0097%	4.00E-03		0.1726%	7.10E-02		0.1600%			0.1134%	7.00E-02		0.1520%	1.52E+00	3
Mn	54.938	0.1373%	2.50E-02		1.2581%	2.29E-01		0.9800%			0.6593%	1.80E-01		0.6400%	6.40E+00	4
Mo	95.940	0.0096%	1.00E-03	<	0.0077%	8.00E-04					0.0064%	1.00E-03				
Na	22.990	19.4264%	8.45E+00		10.0695%	4.38E+00		9.4600%		18	9.1959%	6.00E+00		1.5800%	1.58E+01	4
Nd	144.240	0.0288%	2.00E-03		0.0288%	2.00E-03					0.0288%	3.00E-03				
Ni	58.710	0.0294%	5.00E-03	DetLim	0.0528%	9.00E-03	DetLim	0.8900%			0.0391%	1.00E-02		0.0560%	5.60E-01	4
P	30.974	1.1770%	3.80E-01	DetLim	0.4027%	1.30E-01	DetLim	0.5800%		18				0.2550%	2.55E+00	3
Pb	207.200										0.2210%	1.60E-02		0.1720%	1.72E+00	3
Rh	102.906	0.0206%	2.00E-03	<	0.0412%	4.00E-03	<				0.0343%	5.00E-03				
Ru	101.070	0.0040%	4.00E-04	<	0.0404%	4.00E-03	<				0.0337%	5.00E-03				
Sb	121.750										0.0244%	3.00E-03				
Se	78.960	0.7106%	9.00E-02	<			NotDet				0.1579%	3.00E-02				
Si	28.086	0.0843%	3.00E-02	DetLim	0.2696%	9.60E-02	DetLim				0.1498%	8.00E-02		0.0880%	8.80E-01	3
Sr	87.620	0.0018%	2.00E-04	DetLim	0.0175%	2.00E-03					0.0058%	1.00E-03		0.0110%	1.10E-01	3
Te	127.600	0.0255%	2.00E-03	<	0.0255%	2.00E-03	<				0.0255%	3.00E-03				
Th	232.038										0.4641%	3.00E-02				
Ti	47.900	0.0038%	8.00E-04	DetLim	0.0144%	3.00E-03					0.0096%	3.00E-03				
Tl	204.370										0.1362%	1.00E-02				
U	238.029	0.1300%	5.46E-03				NotDet				0.4781%	3.00E-02				
V	50.942										0.0034%	1.00E-03				
Zn	65.380	0.0065%	1.00E-03	DetLim	0.0588%	9.00E-03	DetLim				0.0305%	7.00E-03		0.0500%	5.00E-01	3
Zr	91.220	0.0065%	7.10E-04	DetLim	0.0456%	5.00E-03	DetLim				0.0243%	4.00E-03				
Total Metals:		29.4244%	1.13E+01		21.7230%	7.35E+00		28.2300%			19.6251%	9.61E+00		8.7430%	8.74E+01	

Comp.SL.final

TANK SY-102 COMPOSITION --- Liquids and Solids Separate

Sample ID:		102-SY-4B			102-SY-3T4S			102-SY-3T4S			102-SY-3T4S			102-SY-Solids		
Anions		wt%	mmol/g	Notes	wt%	mmol/g		wt%			wt%	mol/L		wt%	mg/g	
F	18.998	0.1653%	8.70E-02					0.1100%			0.3800%	3.00E-01		0.0080%	8.00E-02	8
Cl	35.453	0.7091%	2.00E-01					0.1700%			0.3545%	1.50E-01		0.7600%	7.60E+00	4
NO2	46.006	4.5775%	9.95E-01								2.4536%	8.00E-01				
NO3	62.005	20.1516%	3.25E+00					4.9300%			12.4010%	3.00E+00				
PO4	94.971	4.5586%	4.80E-01					0.8800%			3.7989%	6.00E-01		2.0000%	2.00E+01	4,<
SO4	96.058	0.7685%	8.00E-02					1.9600%			0.6404%	1.00E-01		2.0000%	2.00E+01	4,<
CO3	60.009	0.0000%	0.00E+00								2.4004%	6.00E-01				
OH	17.007	1.7007%	1.00E+00					0.1500%		pH calc	1.7007%	1.50E+00				
Total Anions:		32.6313%	6.09E+00		0.0000%			8.2000%			24.1294%	7.05E+00		4.7680%	4.77E+01	
Total Org C:		0.8700%												0.7550%	7.55E+00	3
Total Comp:		62.9257%	1.74E+01		21.7230%	7.35E+00		36.4300%			43.7545%	1.67E+01		14.2660%	1.43E+02	
TRUs		g/g	uCi/g		g/g	uCi/g		g/g	uCi/g		g/g	Ci/L	g/L (21)	g/g	uCi/g	
Am-241	241.057	2.81E-07	9.73E-01		2.83E-06	9.82E+00	5	2.48E-05	8.60E+01	?	6.00E-06	3.12E-02	9.00E-03	1.31E-05	4.53E+01	
Cm-243	243.000															
Cm-244	244.000										6.67E-10	8.19E-05	1.00E-06			
Cm-24x	243.560	6.84E-10	4.30E-02	2	3.02E-10	1.90E-02	5									
Np-237	237.048	8.28E-07	5.90E-04		1.14E-06	8.10E-04	5				1.33E-06	1.43E-06	2.00E-03			
Pu-238	238.050	2.14E-09	3.70E-02		4.55E-08	7.88E-01	5									
Pu-239	239.052	2.07E-06	1.30E-01		4.49E-05	2.82E+00	5				6.67E-05	6.28E-03	1.00E-01	4.32E-04	2.71E+01	4,9
Pu-240	240.054	1.70E-07	3.90E-02		5.18E-06	1.19E+00	5				6.67E-06	2.30E-03	1.00E-02			
Pu-241	241.057	1.17E-08	1.22E+00		3.44E-07	3.58E+01	5									
Pu-242	242.000															
Pu-244	244.000															
n-TRUs		g/g	uCi/g		g/g	uCi/g		g/g	uCi/g		g/g	Ci/L		g/g	uCi/g	
H-3	3.016	1.33E-13	1.30E-03	<	6.34E-14	6.20E-04	<									
C-14	14.000	3.99E-10	1.80E-03				NotReq				4.44E-10	3.00E-06				
I-129	129.000	1.34E-06	2.40E-04	<	1.34E-06	2.40E-04					1.49E-06	4.00E-07				
Nb-94	94.000	2.13E-08	4.10E-03	<	1.20E-08	2.30E-03	<									
Ni-63	63.000	5.05E-08	2.90E+00	<	9.58E-08	5.50E+00	<				6.97E-08	6.00E-03				
Se-79	79.000	4.52E-09	3.18E-04		2.56E-09	1.80E-04	<									
Sr-90	90.000	4.90E-07	6.76E+01				NotReq	1.52E-06	2.10E+02		4.83E-07	1.00E-01				
Tc-99	99.000	1.18E-05	2.02E-01		1.28E-05	2.20E-01					1.17E-05	3.00E-04		2.33E-06	4.00E-02	4
Ce-144	144.000	3.42E-10	1.10E+00	<			NotReq				4.14E-10	2.00E-03				
Co-60	60.000	9.62E-11	1.10E-01				NotReq				1.17E-10	2.00E-04				
Cs-134	134.000	4.90E-11	6.40E-02				NotReq				5.10E-11	1.00E-04				
Cs-137	137.000	1.71E-06	1.50E+02				NotReq	2.06E-07	1.80E+01		1.52E-06	2.00E-01		1.64E-07	1.44E+01	3
Eu-152	152.000	8.50E-10	1.50E-01				NotReq				7.56E-10	2.00E-04				
Eu-154	154.000	5.49E-09	1.50E+00	4			NotReq				9.76E-09	4.00E-03	1			
Eu-155	155.000															
Ru-106	106.000	4.78E-10	1.60E+00	<			NotReq				3.99E-10	2.00E-03				
Sb-125	125.000	1.53E-09	1.60E+00	<			NotReq				1.27E-09	2.00E-03				
Zr-95	91.220															
Tot TRUs		3.36E-06	2.44E+00		5.45E-05	5.04E+01		2.48E-05	8.60E+01		8.07E-05	3.99E-02		4.45E-04	7.24E+01	
Tot NonTRUs		1.54E-05	2.27E+02		1.43E-05	5.72E+00		1.73E-06	2.28E+02		1.52E-05	3.17E-01		2.50E-06	1.44E+01	
Tot Radionuclides		1.88E-05	2.29E+02		6.88E-05	5.62E+01		2.65E-05	3.14E+02		9.59E-05	3.57E-01		4.47E-04	8.68E+01	

TANK SY-102 COMPOSITION --- Liquids and Solids Separate

Sample #	R-3316-Solid			R-3317-Solid			R-3318-Solid			R-3316-Solid			R-3036-Solid		
Sample [	Nov-84			Nov-84			Nov-84			Nov-84			?		
Analysis	3/29/85			3/29/85			3/29/85			1/10/85			10/5/84		
Analyst	Rockwell AL: Bratzel			Rockwell AL: Bratzel			Rockwell AL: Bratzel			Rockwell AL: Bratzel			Rockwell AL: Bratzel		
Sample {	6" from bottom			6" from bottom			6" from bottom			6" from bottom, Centrif. solids			bottom (?)		
Sample [	Note: Centrifuged solids			Note: Centrifuged solids			Note: Centrifuged solids			Density=	1.54		Density=	2.65	
	Data also reported,1/10/85									Data also reported, 3/29/85			Density too high? 1.65 used		
Referenc	Bratzel to Gale, 3/29/85			Bratzel to Gale, 3/29/85			Bratzel to Gale, 3/29/85			Bratzel to Gale, 1/10/85			Bratzel to Tulberg, 10/5/84		
Phase:	Solid			Solid			Solid			Solid			Solid		
Specie	wt%		Notes	wt%		Notes	wt%		Notes	wt%	g/L	Notes	wt%		Notes
Ag															
Al	9.2100%			7.3000%			7.7500%			5.2013%	8.01E+01	16	16.0000%		
As															
B															
Ba															
Bi															
Ca													0.4500%		
Cd	0.0324%			0.0150%			0.0164%			0.0183%	2.82E-01		0.2200%		
Ce															
Cr(VI)	3.6300%		7	2.9900%		7	4.1900%		7	2.0584%	3.17E+01	7	9.1700%		Cr(III)
Cr(Tot)	3.6300%			2.9900%			4.1900%			2.0584%	3.17E+01		9.1700%		
Cu	0.0063%			0.0036%			0.0053%			0.0035%	5.46E-02				
Dy															
Fe	2.0600%			0.9570%			1.2700%			1.1688%	1.80E+01		5.1000%		
K	0.0830%			0.0227%			0.0466%			0.0470%	7.24E-01				
La															
Li															
Ln	0.0000%	0.00E+00		0.0000%	0.00E+00		0.0000%	0.00E+00		0.0000%	0.00E+00		0.0000%		
Mg	0.1700%			0.0684%			0.0894%			0.0987%	1.52E+00	<	0.2500%		
Mn	0.7000%			0.3500%			0.4400%			0.3935%	6.06E+00		1.9800%		
Mo															
Na															
Nd															
Ni													0.0700%		
P													0.4800%		
Pb															
Rh															
Ru															
Sb															
Se															
Si															
Sr															
Te															
Th															
Ti															
Tl															
U															
V															
Zn															
Zr															
Total Me	15.8917%			11.7067%			13.8077%			8.9896%	1.38E+02		33.7200%		

TANK SY-102 COMPOSITION --- Liquids and Solids Separate

Sample #	R-3316-Solid			R-3317-Solid			R-3318-Solid			R-3316-Solid			R-3036-Solid		
Anions	wt%			wt%			wt%			wt%	g/L		wt%		
F												<			
Cl	0.5200%			0.6000%		<	0.6360%		<	0.2955%	4.55E+00				
NO2															
NO3															
PO4										0.0418%	6.43E-01	17			
SO4	4.3600%		<	1.3900%		<	5.3000%		<	2.3831%	3.67E+01	<			
CO3															
OH															
Total An	4.8800%			1.9900%			5.9360%			2.7203%	4.19E+01		0.0000%		
Total Org													0.0303%	5.00E-01	
Total Co	20.7717%			13.6967%			19.7437%			11.7100%	1.80E+02		33.7503%	5.00E-01	
TRUs	g/g	uCi/g		g/g	uCi/g		g/g	uCi/g		g/g	uCi/L		g/g	uCi/g	
Am-241	6.81E-06	2.36E+01		2.05E-06	7.12E+00		3.00E-06	1.04E+01		3.86E-06	2.06E+04				
Cm-243															
Cm-244															
Cm-24x															
Np-237	3.37E-02	2.40E+01		2.50E-02	1.78E+01		3.62E-02	2.58E+01		1.90E-02	2.09E+04				
Pu-238															15
Pu-239	1.20E-04	7.55E+00	9	3.38E-05	2.12E+00	9	4.16E-05	2.61E+00	9	6.81E-05	6.58E+03	9			15
Pu-240															15
Pu-241													2.31E-08	2.41E+00	15
Pu-242															
Pu-244															
n-TRUs	g/g	uCi/g		g/g	uCi/g		g/g	uCi/g		g/g	uCi/L		g/g	uCi/g	
H-3															
C-14															
I-129															
Nb-94															
Ni-63															
Se-79															
Sr-90	1.83E-06	2.53E+02	13	1.36E-06	1.88E+02	13	1.90E-06	2.62E+02	13	1.04E-06	2.21E+05	13	5.58E-06	7.71E+02	
Tc-99															
Ce-144															
Co-60	6.19E-10	7.08E-01		4.41E-10	5.04E-01					3.50E-10	6.17E+02				
Cs-134															
Cs-137	1.76E-06	1.54E+02		1.52E-06	1.33E+02		2.03E-06	1.78E+02		9.95E-07	1.34E+05		1.15E-06	1.01E+02	
Eu-152	4.81E-08	8.48E+00	14	3.61E-08	6.37E+00	14	5.28E-08	9.32E+00	14	2.72E-08	7.40E+03	14			
Eu-154	2.02E-08	5.51E+00		1.55E-08	4.25E+00		2.08E-08	5.69E+00		1.14E-08	4.80E+03				
Eu-155															
Ru-106															
Sb-125										5.34E-10	8.63E+02				
Zr-95	1.94E-11	4.38E-01		1.46E-11	3.31E-01					1.10E-11	3.82E+02				
Tot TRUs	3.38E-02	5.52E+01		2.50E-02	2.70E+01		3.62E-02	3.88E+01		1.91E-02	4.81E+04		2.31E-08	2.41E+00	
Tot NonT	3.66E-06	4.22E+02		2.93E-06	3.32E+02		4.01E-06	4.55E+02		2.07E-06	3.69E+05		6.74E-06	8.72E+02	
Tot Radi	3.38E-02	4.77E+02		2.50E-02	3.59E+02		3.62E-02	4.94E+02		1.91E-02	4.17E+05		6.76E-06	8.74E+02	

TANK SY-102 COMPOSITION --- Liquids and Solids Separate

Sample ID:		102-SY-3T4L			102-SY-1-2			R5027			R5028			R5029		
Sample Date:		10/25/88			10/25/88			6/2/89			6/2/89			6/2/89		
Analysis Date:		6/30/89, final report 1/90			6/30/89, final report 1/90			8/29/89			8/29/89			8/29/89		
Analyst:		PNL: Scheele & Peterson			PNL: Scheele & Peterson			Process Chem Lab (PCL): Weiss			Process Chem Lab (PCL): Weiss			Process Chem Lab (PCL): Weiss		
Sample Site:		Oct '88 core			Oct '88 core			Supernatant Liquid --- 49' (?)			Supernatant Liquid --- 40' (?)			Supernatant Liquid --- 31' (?)		
Sample Notes:		Top Seg #4 + Bottom Seg #3			Segment #1 & 2 Composite											
								Sp. Gr. =	1.025		Sp. Gr. =	1.016		Sp. Gr. =	1.012	
Reference:		Peterson to DiLiberto, 6/30/89			Peterson to DiLiberto, 6/30/89			Weiss to Saueressig, 8/29/89			Weiss to Saueressig, 8/29/89			Weiss to Saueressig, 8/29/89		
Phase:		Liquid			Liquid			Liquid			Liquid			Liquid		
Specie	Mass	wt%	mmol/g	Notes	wt%	mmol/g	Notes	wt%	M	Notes	wt%	M	Notes	wt%	M	Notes
Ag	107.87															
Al	26.982	0.2590%	9.60E-02		0.1184%	4.39E-02		0.1106%	4.20E-02		0.1089%	4.10E-02		0.1066%	4.00E-02	
As	74.922			NotReq			NotReq									
B	10.810	0.0032%	3.00E-03	DetLim	0.0011%	1.00E-03	DetLim									
Ba	137.330	0.0011%	8.00E-05	<	0.0000%	3.00E-07	DetLim									
Bi	208.980															
Ca	40.080	0.0039%	9.70E-04		0.0003%	7.00E-05		0.0002%	6.00E-05		0.0003%	8.00E-05		0.0002%	5.00E-05	
Cd	112.410															
Ce	140.120	0.0280%	2.00E-03	<	0.0006%	4.00E-05	<									
Cr(VI)	51.996	0.0040%	7.76E-04		0.0012%	2.37E-04										
Cr(Tot)	51.996	0.0312%	6.00E-03		0.0009%	1.80E-04		0.0010%	1.90E-04		0.0010%	1.90E-04		0.0010%	1.90E-04	
Cu	63.546															
Dy	162.500	0.0013%	8.00E-05	<	0.0000%	1.00E-06	<									
Fe	55.847	0.0003%	6.00E-05	DetLim	0.0002%	4.00E-05										
K	39.098	0.1212%	3.10E-02		0.2346%	6.00E-02		0.3395%	8.90E-02		0.3348%	8.70E-02		0.3323%	8.60E-02	
La	138.906	0.0028%	2.00E-04	<	0.0000%	2.00E-06	<									
Li	6.940	0.0021%	3.00E-03	<	0.0000%	1.00E-06	DetLim									
Ln	157.000	0.0452%	2.88E-03		0.0008%	5.20E-05										
Mg	24.305	0.0007%	3.00E-04	<	0.0000%	5.00E-06	DetLim									
Mn	54.938	0.0016%	3.00E-04	<	0.0000%	5.00E-07	DetLim									
Mo	95.940	0.0019%	2.00E-04	DetLim	0.0001%	1.00E-05	DetLim									
Na	22.990	8.2763%	3.60E+00		2.0162%	8.77E-01		2.0186%	9.00E-01		2.0139%	8.90E-01		1.9310%	8.50E-01	
Nd	144.240	0.0087%	6.00E-04	<	0.0001%	9.00E-06	<									
Ni	58.710	0.0041%	7.00E-04	DetLim	0.0000%	5.00E-06	DetLim									
P	30.974			NotDet	0.0093%	3.00E-03		0.0094%	3.10E-03		0.0095%	3.10E-03		0.0089%	2.90E-03	
Pb	207.200															
Rh	102.906	0.0309%	3.00E-03	<	0.0031%	3.00E-04	<									
Ru	101.070	0.0505%	5.00E-03	<	0.0020%	2.00E-04	<									
Sb	121.750															
Se	78.960			NotDet			NotDet									
Si	28.086	0.0022%	8.00E-04	DetLim	0.0129%	4.60E-03	DetLim									
Sr	87.620	0.0018%	2.00E-04	<	0.0000%	6.00E-07	DetLim									
Te	127.600	0.0255%	2.00E-03	<	0.0003%	2.00E-05	<									
Th	232.038															
Ti	47.900	0.0014%	3.00E-04	<	0.0000%	2.00E-06	DetLim									
Tl	204.370															
U	238.029			NotDet			NotDet									
V	50.942															
Zn	65.380	0.0131%	2.00E-03	<	0.0002%	3.00E-05										
Zr	91.220	0.0064%	7.00E-04	<	0.0000%	1.00E-06	DetLim									
Total Metals:		8.8794%	3.76E+00		2.4004%	9.90E-01		2.4782%	1.03E+00		2.4683%	1.02E+00		2.3799%	9.79E-01	

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TANK SY-102 COMPOSITION --- Liquids and Solids Separate

Sample ID:		102-SY-3T4L			102-SY-1-2			R5027			R5028			R5029		
Anions		wt%	mmol/g		wt%	mmol/g		wt%	M		wt%	M		wt%	M	
F	18.998							0.0741%	4.00E-02		0.0729%	3.90E-02		0.0732%	3.90E-02	
Cl	35.453							0.0152%	4.40E-03		0.0157%	4.50E-03		0.0158%	4.50E-03	
NO2	46.006							0.2289%	5.10E-02		0.2219%	4.90E-02		0.2318%	5.10E-02	
NO3	62.005							2.1172%	3.50E-01		2.0750%	3.40E-01		2.0832%	3.40E-01	
PO4	94.971							0.0222%	2.40E-03		0.0234%	2.50E-03		0.0235%	2.50E-03	
SO4	96.058							0.0122%	1.30E-03	<	0.0123%	1.30E-03	<	0.0123%	1.30E-03	<
CO3	60.009															
OH	17.007															
Total Anions:		0.0000%			0.0000%			2.4699%	2.48E+00		2.4211%	2.44E+00		2.4398%	2.36E+00	
Total Org C:																
Total Comp:		8.8794%	7.38E+00		2.4004%	1.87E+00		4.9492%	4.86E+00		4.8894%	4.79E+00		4.8197%	4.62E+00	
TRUs		g/g	uCi/g		g/g	uCi/g		g/g	uCi/L		g/g	uCi/L		g/g	uCi/L	
Am-241	241.057	1.46E-05	5.06E+01	6				9.01E-12	3.20E-02	<	4.26E-11	1.50E-01	<	1.17E-11	4.10E-02	<
Cm-243	243.000															
Cm-244	244.000															
Cm-24x	243.560	3.82E-09	2.40E-01	6												
Np-237	237.048	1.82E-06	1.30E-03	6												
Pu-238	238.050	7.79E-08	1.35E+00	6												
Pu-239	239.052	1.55E-04	9.73E+00	6				1.55E-09	1.00E-01	9	1.57E-09	1.00E-01	9	1.73E-09	1.10E-01	9
Pu-240	240.054	1.48E-05	3.40E+00	6												
Pu-241	241.057	1.12E-06	1.17E+02	6												
Pu-242	242.000															
Pu-244	244.000															
n-TRUs		g/g	uCi/g		g/g	uCi/g		g/g	uCi/L		g/g	uCi/L		g/g	uCi/L	
H-3	3.016	8.14E-15	7.96E-05	<	2.56E-15	2.50E-05	<									
C-14	14.000			NotReq			NotReq									
I-129	129.000	1.57E-07	2.80E-05		1.01E-07	1.80E-05										
Nb-94	94.000	1.61E-1[illegible]	3.10E-06	<	3.17E-12	6.10E-07	<									
Ni-63	63.000	3.31E-12	1.90E-04	<	6.97E-12	4.00E-04	<									
Se-79	79.000	8.62E-09	6.07E-04		2.13E-10	1.50E-05										
Sr-90	90.000			NotReq			NotReq	3.67E-12	5.20E-01	13	3.85E-12	5.40E-01	13	3.72E-12	5.20E-01	13
Tc-99	99.000	3.14E-06	5.38E-02		1.17E-07	2.01E-03		1.7E-07	2.99E+00		1.72E-07	2.99E+00		1.69E-07	2.93E+00	
Ce-144	144.000			NotReq			NotReq									
Co-60	60.000			NotReq			NotReq									
Cs-134	134.000			NotReq			NotReq									
Cs-137	137.000			NotReq			NotReq	5.91E-08	5.30E+03	20	5.74E-08	5.10E+03	20	5.76E-08	5.10E+03	20
Eu-152	152.000			NotReq			NotReq									
Eu-154	154.000			NotReq			NotReq									
Eu-155	155.000															
Ru-106	106.000			NotReq			NotReq									
Sb-125	125.000			NotReq			NotReq									
Zr-95	91.220			NotReq												
Tot TRUs		1.87E-04	1.82E+02		0.00E+00	0.00E+00		1.56E-09	1.32E-01		1.61E-09	2.50E-01		1.74E-09	1.51E-01	
Tot NonTRUs		3.30E-06	5.47E-02		2.18E-07	2.47E-03		2.29E-07	5.30E+03		2.29E-07	5.10E+03		2.26E-07	5.10E+03	
Tot Radionuclides		1.91E-04	1.82E+02		2.18E-07	2.47E-03		2.31E-07	5.30E+03		2.31E-07	5.10E+03		2.28E-07	5.10E+03	

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TANK SY-102 COMPOSITION — Liquids and Solids Separate

Sample #	R4656			R4615			102-SY-3T4L			102-SY-1-2			102-SY-Supernate		
Sample I				3/20/89			10/25/88			10/25/88			Jun-88		
Analysis	8/29/89			3/24/89			11/19/90			11/19/90			3/23/89		
Analyst	Process Chem Lab (PCL): Weiss			Process Chem Lab (PCL): Weiss			Process Chem Lab (PCL): ?			Process Chem Lab (PCL): ?			Process Chem Labs: Weiss		
Sample !	Supernatant Liquid — (?)			Supernatant Liquid — (?)			Oct '88 core			Oct '88 core			?		
Sample !				(Assumed R-4656 Value)			Top Seg #4 + Bottom Seg #3			Segment #1 & #2 Composite			Note: High value from Tbl 2 used		
	Density =	1.57		Density =	1.57		Sp. Gr. =	1.18		Sp. Gr. =	1.02		Density=	1.00	(Assume
Referenc	Weiss to Boyles, 5/2/89			Weiss to Campbell, 4/27/89			Weiss to Kirch, 11/19/90			Weiss to Kirch, 11/19/90			Weiss (PCL) to Carothers		
Phase:	Liquid			Liquid			Liquid	(rev. DILib 3/7/90		Liquid			Liquid	Mix Study-3/23/89	
Specie	wt%	M	Notes	wt%	M	Notes	wt%	M	Notes	wt%	M	Notes	wt%	M	Notes
Ag															
Al	2.6122%	1.52E+00		0.0670%	3.90E-02		0.2812%	1.23E-01		0.1323%	5.00E-02		0.2293%	8.50E-02	12
As							0.0002%	3.00E-05		0.0002%	3.00E-05				
B	0.0020%	2.90E-03											0.0010%	9.60E-04	11
Ba															
Bi															
Ca	0.0019%	7.40E-04		0.0001%	5.00E-05		0.0031%	9.20E-04		0.0004%	1.10E-04		0.0007%	1.80E-04	12
Cd															
Ce				0.0004%	5.00E-05								0.0024%	1.70E-04	12
Cr(VI)													0.0049%	9.40E-04	7,12
Cr(Tot)	0.0027%	8.20E-04		0.0006%	1.70E-04		0.0353%	8.00E-03		0.0010%	1.90E-04		0.0049%	9.40E-04	12
Cu													0.0004%	7.00E-05	11
Dy															
Fe	0.0004%	1.20E-04					0.0007%	1.50E-04		0.0002%	3.00E-05		0.0004%	8.00E-05	12
K	0.3636%	1.46E-01		0.1669%	6.70E-02		0.1209%	3.65E-02		0.2423%	6.32E-02		0.1020%	2.61E-02	12
La				0.0001%	6.00E-06										
Li															
Ln										0.0000%	0.00E+00		0.0027%	1.70E-04	
Mg															
Mn															
Mo	0.0061%	1.00E-03		0.0061%	1.00E-03										
Na	12.7688%	8.72E+00		1.1275%	7.70E-01		8.3387%	4.28E+00		1.9631%	8.71E-01		3.6554%	1.59E+00	11
Nd															
Ni	0.0020%	5.40E-04		0.0020%	5.40E-04										
P	0.0065%	3.30E-03		0.0051%	2.60E-03		0.2339%	8.91E-02		0.0091%	3.00E-03		0.0235%	7.60E-03	12
Pb															
Rh															
Ru															
Sb															
Se							0.0000%	2.00E-06		0.0000%	3.00E-06	<			
Si				0.0047%	2.60E-03		0.0014%	6.00E-04		0.0033%	1.20E-03		0.0070%	2.50E-03	11
Sr															
Te															
Th															
Ti															
Tl															
U	0.0188%	1.24E-03		0.0188%	1.24E-03		0.0008%	4.00E-05		0.0007%	3.00E-05				
V															
Zn							0.0043%	7.80E-04		0.0001%	2.00E-05				
Zr															
Total Mo	15.7851%	1.04E+01		1.3993%	8.84E-01		9.0206%	4.54E+00		2.3527%	9.89E-01		4.0272%	1.71E+00	

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TANK SY-102 COMPOSITION — Liquids and Solids Separate

Sample #R4656				R4615			102-SY-3T4L			102-SY-1-2			102-SY-Supernate		
Anions	wt%	M		wt%	M		wt%	M		wt%	M		wt%	M	
F	0.0823%	6.80E-02	<	0.0411%	3.40E-02		0.0435%	2.70E-02	<	0.0503%	2.70E-02	<	0.0285%	1.50E-02	12
Cl	0.0124%	5.50E-03		0.0140%	6.20E-03		0.1502%	5.00E-02		0.1564%	4.50E-02		0.0280%	7.90E-03	12
NO2	0.1260%	4.30E-02		10.8421%	3.70E+00		2.0040%	5.14E-01		0.1976%	4.38E-02				
NO3	8.2147%	2.08E+00		1.3823%	3.50E-01		8.9329%	1.70E+00		2.2978%	3.78E-01		3.4971%	5.64E-01	12
PO4	0.3327%	5.50E-02	<	0.0085%	1.40E-03	<	0.6407%	7.96E-02		0.0745%	8.00E-03	<	0.1425%	1.50E-02	12,<
SO4	6.1795%	1.01E+00		0.0496%	8.10E-03		0.5536%	6.80E-02		0.0753%	8.00E-03	<	0.1441%	1.50E-02	10,<
CO3							2.1868%	4.30E-01		0.3706%	6.30E-02		0.2760%	4.60E-02	10
OH	1.1049%	1.02E+00					1.0954%	7.60E-01		0.6686%	4.01E-01		0.9915%	5.83E-01	11
Total An	16.0525%	2.35E+01		12.3375%	5.83E+00		15.6069%	1.26E+01		3.8912%	2.90E+00		5.1077%	4.59E+00	
Total Org	0.7962%	1.25E+01					0.1864%	2.20E+00		0.0206%	2.12E-01		0.0462%	4.62E-01	12
Total Co	32.6338%	5.95E+01		13.7368%	1.16E+01		24.8140%	2.72E+01		6.2647%	5.95E+00		9.1811%	9.60E+00	
TRUs	g/g	uCi/L		g/g	uCi/L		g/g	uCi/L		g/g	uCi/L		g/g	uCi/L	
Am-241	1.60E-10	8.70E-01		6.06E-12	3.30E-02	<							3.69E-10	1.28E+00	12
Cm-243															
Cm-244															
Cm-24x															
Np-237															
Pu-238															
Pu-239	4.60E-08	4.53E+00	9	4.47E-10	4.40E-02	9	2.16E-09	1.60E-01	9, 22	2.50E-09	1.60E-01	9, 22	1.59E-08	1.00E+00	9,12
Pu-240															
Pu-241															
Pu-242															
Pu-244															
n-TRUs	g/g	uCi/L		g/g	uCi/L		g/g	uCi/L		g/g	uCi/L		g/g	uCi/L	
H-3															
C-14							4.32E-12	2.30E-02		5.00E-12	2.30E-02				
I-129															
Nb-94															
Ni-63															
Se-79															
Sr-90	7.29E-09	1.58E+03	13	2.72E-12	5.90E-01	13	1.07E-11	1.75E+00	13, 22	1.24E-11	1.75E+00	13, 22			
Tc-99	1.37E-05	3.69E+02		9.29E-08	2.50E+00								5.83E-07	1.00E+01	12
Ce-144															
Co-60															
Cs-134															
Cs-137	5.07E-06	6.96E+05	20	3.4E-08	4.67E+03	20	3.78E-08	3.90E+03	22	4.37E-08	3.90E+03	22	1.17E-07	1.02E+04	12
Eu-152															
Eu-154															
Eu-155															
Ru-106															
Sb-125															
Zr-95															
Tot TRUs	4.61E-08	5.40E+00		4.53E-10	7.70E-02		2.16E-09	1.60E-01	22	2.50E-09	1.60E-01	22	1.63E-08	2.28E+00	
Tot NonT	1.88E-05	6.98E+05		1.27E-07	4.67E+03		3.78E-08	3.90E+03	22	4.37E-08	3.90E+03	22	7.00E-07	1.02E+04	
Tot Radi	1.88E-05	6.98E+05		1.27E-07	4.67E+03		4.00E-08	3.90E+03	22	4.62E-08	3.90E+03	22	7.16E-07	1.02E+04	

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TANK SY-102 COMPOSITION --- Liquids and Solids Separate

Sample #	R-3316-Supernate				R-3317-Supernate				R-3318-Supernate				R-3037-Supernate				R-3038-Supernate				R-3326-Supernate			
Sample D	Nov-84				Nov-84				Nov-84				Nov-84				Nov-84				?			
Analysis	3/29/85				3/29/85				3/29/85				10/5/84				10/5/84				12/31/84			
Analyst	Rockwell AL: Bratzel				Rockwell AL: Bratzel				Rockwell AL: Bratzel				Rockwell AL: Bratzel				Rockwell AL: Bratzel				Rockwell AL: Bratzel			
Sample S	6" from bottom				6" from bottom				6" from bottom				top				middle				?			
Sample I	Density=	1.41			Density=	1.44			Density=	1.42			Sp. Gr.=	1.03			Sp. Gr.=	1.06			Sp. Gr.=	1.06		
	(I)																				(Assumed R-3038 Value)			
Referenc	Bratzel to Gale, 3/29/85				Bratzel to Gale, 3/29/85				Bratzel to Gale, 3/29/85				Bratzel to Tulberg, 10/5/84				Bratzel to Tulberg, 10/5/84				Bratzel to Tulberg, 12/31/84			
Phase:	Liquid				Liquid				Liquid				Liquid				Liquid				Liquid			
Specie	wt%	M	Notes		wt%	M	Notes		wt%	M	Notes		wt%	M	Notes		wt%	M	Notes		wt%	M	Notes	
Ag																								
Al	0.4669%	2.44E-01			0.6727%	3.59E-01			0.7125%	3.75E-01			0.1360%	5.19E-02			0.1604%	6.30E-02			0.1655%	6.50E-02		
As																								
B																								
Ba																								
Bi																								
Ca													0.0001%	2.25E-05										
Cd	0.0042%	5.26E-04			0.0024%	3.13E-04			0.0018%	2.28E-04			0.0006%	5.87E-05			0.0008%	7.30E-05			0.0010%	9.24E-05		
Ce																								
Cr(VI)	0.0819%	2.22E-02	7		0.0812%	2.25E-02	7		0.0842%	2.30E-02	7		0.0034%	6.73E-04	Cr(III)		0.0041%	8.46E-04	Cr(III)					
Cr(Tot)	0.0819%	2.22E-02			0.0812%	2.25E-02			0.0842%	2.30E-02			0.0034%	6.73E-04			0.0041%	8.46E-04			0.0048%	9.79E-04		
Cu	0.0003%	5.73E-05	<		0.0002%	5.15E-05			0.0002%	3.62E-05														
Dy																								
Fe	0.0003%	6.52E-05	<		0.0004%	1.07E-04			0.0004%	1.12E-04			0.0002%	3.04E-05			0.0003%	5.01E-05			0.0006%	1.06E-04		
K	0.1101%	3.97E-02			0.1412%	5.20E-02			0.1385%	5.03E-02			0.0073%	1.92E-03			0.0085%	2.30E-03						
La																								
Li																								
Ln	0.0000%	0.00E+00			0.0000%	0.00E+00			0.0000%	0.00E+00			0.0000%	0.00E+00			0.0000%	0.00E+00						
Mg	0.0003%	1.50E-04	<		0.0002%	1.23E-04	<		0.0002%	9.49E-05	<		0.0000%	4.11E-06	<		0.0000%	4.52E-06						
Mn	0.0003%	6.62E-05	<		0.0002%	6.45E-05			0.0002%	5.72E-05			0.0000%	1.92E-06	<		0.0000%	1.82E-06	<		0.0001%	1.84E-05	<	
Mo																								
Na																								
Nd																								
Ni													0.0000%	5.11E-06	<		0.0000%	5.11E-06	<		0.3700%	6.68E-02		
P													0.0116%	3.87E-03			0.0141%	4.84E-03						
Pb																								
Rh																								
Ru																								
Sb																								
Se																								
Si																								
Sr																								
Te																								
Th																								
Ti																								
Tl																								
U																								
V																								
Zn																								
Zr																								
Total Me	0.6641%	3.07E-01			0.8986%	4.34E-01			0.9380%	4.49E-01			0.1592%	5.85E-02			0.1882%	7.11E-02			0.5419%	1.33E-01		

TANK SY-102 COMPOSITION --- Liquids and Solids Separate

Sample	R-3316-Supernate			R-3317-Supernate			R-3318-Supernate			R-3037-Supernate			R-3039-Supernate			R-3326-Supernate		
Anions	wt%	M		wt%	M		wt%	M		wt%	M		wt%	M		wt%	M	
F	0.1779%	1.32E-01	<	0.1438%	1.09E-01		0.1118%	8.36E-02		0.0071%	3.86E-03		0.1498%	8.36E-02		0.0049%	2.72E-03	<
Cl	0.3369%	1.34E-01		0.3816%	1.55E-01		0.4194%	1.68E-01					0.5619%	1.68E-01				
NO2	5.2205%	1.60E+00		5.3034%	1.66E+00		5.3457%	1.65E+00		0.1746%	3.91E-02		7.1612%	1.65E+00		0.2079%	4.79E-02	
NO3	12.0932%	2.75E+00		14.8984%	3.46E+00		15.1082%	3.46E+00		2.7752%	4.61E-01		20.2393%	3.46E+00		3.3342%	5.70E-01	
PO4	0.4796%	7.12E-02		0.3430%	5.20E-02		0.3110%	4.65E-02		0.0356%	3.86E-03		0.4166%	4.65E-02		0.0404%	4.51E-03	
SO4	3.2700%	4.80E-01	<	1.4342%	2.15E-01	<	1.1162%	1.65E-01		0.0374%	4.01E-03		1.4952%	1.65E-01		0.0306%	3.38E-03	
CO3	2.3961%	5.63E-01		2.5879%	6.21E-01		3.0258%	7.16E-01					4.0535%	7.16E-01		0.2100%	3.71E-02	
OH	1.1423%	[illegible].47E-01		1.7244%	1.46E+00		1.6408%	1.37E+00		0.6704%	4.06E-01		2.1981%	1.37E+00		0.7573%	4.72E-01	
Total An	25.1164%	7.02E+00		26.8166%	8.22E+00		27.0791%	8.16E+00		3.7003%	9.82E-01		36.2757%	7.74E+00		4.5854%	1.34E+00	
Total Org													0.0239%	2.53E-01		0.0228%	2.42E-01	
Total Co	25.7805%	1.40E+01		27.7153%	1.64E+01		28.0171%	1.63E+01		3.8595%	1.96E+00		36.4878%	1.57E+01		5.1501%	2.92E+00	
TRUs	g/g	uCi/L		g/g	uCi/L		g/g	uCi/L		g/g	uCi/L		g/g	uCi/L		g/g	uCi/L	
Am-241	2.09E-09	1.02E+01					3.86E-09	1.90E+01		3.02E-10	1.08E+00		7.51E-09	2.76E+01				
Cm-243																		
Cm-244																		
Cm-24x																		
Np-237																		
Pu-238												15			15			
Pu-239	2.17E-08	1.92E+00	9	7.81E-08	7.06E+00	9	1.04E-07	9.27E+00	9			15			15			
Pu-240												15			15			
Pu-241										2.80E-10	3.00E+01	15	6.11E-10	6.75E+01	15	1.91E-10	2.11E+01	
Pu-242																		
Pu-244																		
n-TRUs	g/g	uCi/L		g/g	uCi/L		g/g	uCi/L		g/g	uCi/L		g/g	uCi/L		g/g	uCi/L	
H-3																		
C-14																		
I-129																		
Nb-94																		
Ni-63																		
Se-79																		
Sr-90	4.54E-09	8.84E+02	13	8.4E-09	1.67E+03	13	9.13E-09	1.79E+03	13							8.81E-12	1.29E+00	13
Tc-99																		
Ce-144																		
Co-60																		
Cs-134																		
Cs-137	2.06E-06	2.54E+05		2.55E-06	3.21E+05		2.46E-06	3.06E+05		5.94E-08	5.35E+03		7.06E-08	6.55E+03		7.13E-08	6.61E+03	
Eu-152																		
Eu-154																		
Eu-155																		
Ru-106																		
Sb-125																		
Zr-95																		
Tot TRUs	2.38E-08	1.21E+01		7.81E-08	7.06E+00		1.08E-07	2.83E+01		5.82E-10	3.11E+01		8.12E-09	9.51E+01		1.91E-10	2.11E+01	
Tot NonT	2.06E-06	2.55E+05		2.56E-06	3.23E+05		2.47E-06	3.06E+05		5.94E-08	5.35E+03		7.06E-08	6.55E+03		7.13E-08	6.61E+03	
Tot Radi	2.09E-06	2.55E+05		2.63E-06	3.23E+05		2.58E-06	3.06E+05		6.00E-08	5.38E+03		7.86E-08	6.65E+03		7.15E-08	6.63E+03	

TANK SY-102 COMPOSITION --- Liquids and Solids Separate

Notes
<: Actual value must be less than reported value.
1: Sum of Eu-154 and Eu-155. Half-Life of Eu-154 used in calculation.
2: Cm-243 + Cm 244 --- average half-life used (32 + 17.6)/2 = 24.8y
3: Data taken from column 3 (total) of Table 3
4: Data taken from column 4 (acid dissolution) of table 3
5: These data for sample 102-SY-T4C, i.e., top portion of segment #4
6: These data for sample 102-SY-T3C, i.e., segment #3
7: Total Cr assumed to be Cr(VI)
8: Fluoride value only from water leach.
9: Sum of Pu-239 and Pu-240. Half-Life of Pu-239 used in calculation.
10: Data taken from column 1 (supernate only) of table 2
11: Data taken from column 2 (decanted supernate) of table 2
12: Data taken from column 3 (centrifuged supernate) of table 2
13: Sum of Sr-89 and Sr-90. Half-Life of Sr-90 used in calculation.
14: Value for Eu-155 which decays to Eu-154 with 1.81 year half-life
15: Isotopic Pu values not given. Two analalysis methods used. Filtered and unfiltered values given.
16: Value reduced from 8.01E+03
17: Value of 4.22 wt% from Tbl 1 appears to have been calc using E+01 not E-01
18: wt% sum of water soluble and insoluble components
19: Value from APDU Pu analysis reported
20: No other detectable gamma
21: Raw data in g/L
22: Radioactivity values of the 3T4L and 1-2 samples are identical. At least one set of values must be incorrect.

	Half-Life (yrs) *	Ci/g **
Am-241	4.33E+02	3.47E+00
Cm-243	2.91E+01	5.11E+01
Cm-244	1.81E+01	8.19E+01
Cm-24x	2.36E+01	6.29E+01
Np-237	2.14E+06	7.13E-04
Pu-238	8.77E+01	1.73E+01
Pu-239	2.41E+04	6.28E-02
Pu-240	6.56E+03	2.30E-01
Pu-241	1.44E+01	1.04E+02
Pu-242	3.75E+05	3.98E-03
Pu-244	8.00E+07	1.85E-05
H-3	1.23E+01	9.78E+03
C-14	5.73E+03	4.51E+00
I-129	1.57E+07	1.79E-04
Nb-94	2.00E+04	1.92E-01
Ni-63	1.00E+02	5.74E+01
Se-79	6.50E+04	7.04E-02
Sr-90	2.91E+01	1.38E+02
Tc-99	2.13E+05	1.71E-02
Ce-144	7.80E-01	3.22E+03
Co-60	5.27E+00	1.14E+03
Cs-134	2.07E+00	1.31E+03
Cs-137	3.02E+01	8.75E+01
Eu-152	1.35E+01	1.76E+02
Eu-154	8.59E+00	2.73E+02
Eu-155	4.71E+00	4.95E+02
Ru-106	1.02E+00	3.34E+03
Sb-125	2.76E+00	1.05E+03
Zr-95	1.75E-01	2.26E+04

References

* F. W. Walker, J. R. Parrington and F. Feiner, Nuclides and Isotopes, 14th Ed., GE [1989]

** E. Browne and R. B. Firestone, Table of Radioactive Isotopes, Ed. V. Shirley, Wiley-Interscience, NY [1986]

SY-102 LIQUID COMPOSITIONS

Filename: Liquid.Values

SY-102 LIQUID COMPOSITIONS

Sample ID:		**102SY3T4L**	**102SY1-2**	**R5027**	**R5028**	**R5029**	**R4656**	**R4615**	**102SY3T4L**
Sample Date:		10/25/88	10/25/88	6/2/89	6/2/89	6/2/89	3/14/89	3/20/89	10/25/88
Analysis Date:		6/30/89, final	6/30/89, fina	8/29/89	8/29/89	8/29/89	8/29/89	3/24/89	11/19/90
Analyst:		PNL:Scheele	PNL:Scheele	PCL	PCL	PCL	PCL	PCL	PCL
		&Peterson	&Peterson	Weiss	Weiss	Weiss	Weiss	Weiss	?
Sample Site:		Oct'88core	Oct'88core	49' (?)	40' (?)	31' (?)	Super (?)	Super-(?)	Oct'88core
Sample Notes:		Comp 3/4	Comp 1/2						Comp 3/4
Sp.Gr./Den.:				sg=1.025	sg=1.016	sg=1.012	d=1.57	d=1.57	sg=1.18
Reference:		Peterson to	Peterson to	Weiss to	Weiss to	Weiss to	Weiss to	Weiss to	Weiss to
		DiLiberto	DiLiberto	Saueressig	Saueressig	Saueressig	Boyles	Campbell	Kirch*
		6/30/89	6/30/89	8/29/89	8/29/89	8/29/89	5/2/89	4/27/89	11/19/90
Phase:		**Liquid**	**Liquid**	**Liquid**	**Liquid**	**Liquid**	**Liquid**	**Liquid**	**Liquid**
Specie	**Mass**	**wt%**	**wt%**	**wt%**	**wt%**	**wt%**	**wt%**	**wt%**	**wt%**
Ag	107.87								
Al	26.98	0.2590%	0.1184%	0.1106%	0.1089%	0.1066%	2.6122%	0.0670%	0.2812%
As	74.92								0.0002%
B	10.81	0.0032%	0.0011%				0.0020%		
Ba	137.33	0.0011%	0.0000%						
Bi	208.98								
Ca	40.08	0.0039%	0.0003%	0.0002%	0.0003%	0.0002%	0.0019%	0.0001%	0.0031%
Cd	112.41								
Ce	140.12	0.0280%	0.0006%					0.0004%	
Cr(VI)	52.00	0.0040%	0.0012%						
Cr(Tot)	52.00	0.0312%	0.0009%	0.0010%	0.0010%	0.0010%	0.0027%	0.0006%	0.0353%
Cu	63.55								
Dy	162.50	0.0013%	0.0000%						
Fe	55.85	0.0003%	0.0002%				0.0004%		0.0007%
K	39.10	0.1212%	0.2346%	0.3395%	0.3348%	0.3323%	0.3636%	0.1669%	0.1209%
La	138.91	0.0028%	0.0000%					0.0001%	
Li	6.94	0.0021%	0.0000%						
Ln	157.00	0.0452%	0.0008%						
Mg	24.31	0.0007%	0.0000%						
Mn	54.94	0.0016%	0.0000%						
Mo	95.94	0.0019%	0.0001%				0.0061%	0.0061%	
Na	22.99	8.2763%	2.0162%	2.0186%	2.0139%	1.9310%	12.7688%	1.1275%	8.3387%
Nd	144.24	0.0087%	0.0001%						
Ni	58.71	0.0041%	0.0000%				0.0020%	0.0020%	
P	30.97		0.0093%	0.0094%	0.0095%	0.0089%	0.0065%	0.0051%	0.2339%
Pb	207.20								
Rh	102.91	0.0309%	0.0031%						
Ru	101.07	0.0505%	0.0020%						
Sb	121.75								
Se	78.96								0.0000%
Si	28.09	0.0022%	0.0129%					0.0047%	0.0014%
Sr	87.62	0.0018%	0.0000%						
Te	127.60	0.0255%	0.0003%						
Th	232.04								
Ti	47.90	0.0014%	0.0000%						
Tl	204.37								
U	238.03						0.0188%	0.0188%	0.0008%
V	50.94								
Zn	65.38	0.0131%	0.0002%						0.0043%
Zr	91.22	0.0064%	0.0000%						
Tot Metals:		8.8794%	2.4004%	2.4792%	2.4683%	2.3799%	15.7851%	1.3993%	9.0206%

SY-102 LIQUID COMPOSITIONS

Sample ID:		102SY3T4L	102SY1-2	R5027	R5028	R5029	R4656	R4615	102SY3T4L
Anions		wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%
F	19.00			0.0741%	0.0729%	0.0732%	0.0823%	0.0411%	0.0435%
Cl	35.45			0.0152%	0.0157%	0.0158%	0.0124%	0.0140%	0.1502%
NO2	46.01			0.2289%	0.2219%	0.2318%	0.1260%	10.8421%	2.0040%
NO3	62.00			2.1172%	2.0750%	2.0832%	8.2147%	1.3823%	8.9329%
PO4	94.97			0.0222%	0.0234%	0.0235%	0.3327%	0.0085%	0.6407%
SO4	96.06			0.0122%	0.0123%	0.0123%	6.1795%	0.0496%	0.5536%
CO3	60.01								2.1868%
OH	17.01						1.1049%		1.0954%
Tot Anions:		0.0000%	0.0000%	2.4699%	2.4211%	2.4398%	16.0525%	12.3375%	15.6069%
Tot Org C:							0.7962%		0.1864%
Tot Comp:		8.8794%	2.4004%	4.9492%	4.8894%	4.8197%	32.6338%	13.7368%	24.8140%
TRUs		g/g	g/g	g/g	g/g	g/g	g/g	g/g	g/g
Am-241	241.06	1.46E-05		9.01E-12	4.26E-11	1.17E-11	1.60E-10	6.06E-12	
Cm-243	243.00								
Cm-244	244.00								
Cm-24x	243.56	3.82E-09							
Np-237	237.05	1.82E-06							
Pu-238	238.05	7.79E-08							
Pu-239	239.05	1.55E-04		1.55E-09	1.57E-09	1.73E-09	4.60E-08	4.47E-10	2.16E-09
Pu-240	240.05	1.48E-05							
Pu-241	241.06	1.12E-06							
Pu-242	242.00								
Pu-244	244.00								
n-TRUs		g/g	g/g	g/g	g/g	g/g	g/g	g/g	g/g
H-3	3.02	8.14E-15	2.56E-15						
C-14	14.00								4.32E-12
I-129	129.00	1.57E-07	1.01E-07						
Nb-94	94.00	1.61E-11	3.17E-12						
Ni-63	63.00	3.31E-12	6.97E-12						
Se-79	79.00	8.62E-09	2.13E-10						
Sr-90	90.00			3.67E-12	3.85E-12	3.72E-12	7.29E-09	2.72E-12	1.07E-11
Tc-99	99.00	3.14E-06	1.17E-07	1.70E-07	1.72E-07	1.69E-07	1.37E-05	9.29E-08	
Ce-144	144.00								
Co-60	60.00								
Cs-134	134.00								
Cs-137	137.00			5.91E-08	5.74E-08	5.76E-08	5.07E-06	3.40E-08	3.78E-08
Eu-152	152.00								
Eu-154	154.00								
Eu-155	155.00								
Ru-106	106.00								
Sb-125	125.00								
Zr-95	91.22								
Tot TRUs		1.87E-04	0.00E+00	1.56E-09	1.61E-09	1.74E-09	4.61E-08	4.53E-10	2.16E-09
Tot n-TRUs		3.30E-06	2.18E-07	2.29E-07	2.29E-07	2.26E-07	1.88E-05	1.27E-07	3.78E-08
Tot Radionuclide		1.91E-04	2.18E-07	2.31E-07	2.31E-07	2.28E-07	1.88E-05	1.27E-07	4.00E-08

Liquid.Values

SY-102 LIQUID COMPOSITIONS

Sample I	102SY1-2	102SYSuper	R-3316	R-3317	R-3318	R-3037	R-3038	R-3326
Sample [	10/25/88	6/1/88	11/1/84	11/1/84	11/1/84	11/1/84	11/1/84	?
Analysis	11/19/90	3/23/89	3/29/85	3/29/85	3/29/85	10/5/84	10/5/84	12/31/84
Analyst:	PCL	PCL	Rockwell	Rockwell	Rockwell	Rockwell	Rockwell	Rockwell
	?	Weiss	Bratzel	Bratzel	Bratzel	Bratzel	Bratzel	Bratzel
Sample $	Oct'88core	?	6",bottom	6",bottom	6",bottom	top	middle	?
Sample !	Comp 1/2	High value						
Sp.Gr./D	1.02	d=1(?)	d=1.41	d=1.44	d=1.42	sg=1.03	sg=1.06	sg=1.06
Referenc	Weiss to	Weiss(PCL) to	Bratzel to	Bratzel to	Bratzel to	Bratzel to	Bratzel to	Bratzel to
	Kirch*	Carothers	Gale	Gale	Gale	Tulberg	Tulberg	Tulberg
	11/19/90	3/23/89	3/29/85	3/29/85	3/29/85	10/5/84	10/5/84	12/31/84
Phase:	**Liquid**	**Liquid**	**Liquid**	**Liquid**	**Liquid**	**Liquid**	**Liquid**	**Liquid**
Specie	**wt%**	**wt%**	**wt%**	**wt%**	**wt%**	**wt%**	**wt%**	**wt%**
Ag								
Al	0.1323%	0.2293%	0.4669%	0.6727%	0.7125%	0.1360%	0.1604%	0.1655%
As	0.0002%							
B		0.0010%						
Ba								
Bi								
Ca	0.0004%	0.0007%				0.0001%		
Cd			0.0042%	0.0024%	0.0018%	0.0006%	0.0008%	0.0010%
Ce		0.0024%						
Cr(VI)		0.0049%	0.0819%	0.0812%	0.0842%	0.0034%	0.0041%	
Cr(Tot)	0.0010%	0.0049%	0.0819%	0.0812%	0.0842%	0.0034%	0.0041%	0.0048%
Cu		0.0004%	0.0003%	0.0002%	0.0002%			
Dy								
Fe	0.0002%	0.0004%	0.0003%	0.0004%	0.0004%	0.0002%	0.0003%	0.0006%
K	0.2423%	0.1020%	0.1101%	0.1412%	0.1385%	0.0073%	0.0085%	
La								
Li								
Ln	0.0000%	0.0027%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	
Mg			0.0003%	0.0002%	0.0002%	0.0000%	0.0000%	
Mn			0.0003%	0.0002%	0.0002%	0.0000%	0.0000%	0.0001%
Mo								
Na	1.9631%	3.6554%						
Nd								
Ni						0.0000%	0.0000%	0.3700%
P	0.0091%	0.0235%				0.0116%	0.0141%	
Pb								
Rh								
Ru								
Sb								
Se	0.0000%							
Si	0.0033%	0.0070%						
Sr								
Te								
Th								
Ti								
Tl								
U	0.0007%							
V								
Zn	0.0001%							
Zr								
Tot Meta	2.3527%	4.0272%	0.6641%	0.8986%	0.9380%	0.1592%	0.1882%	0.5419%

Liquid.Values

SY-102 LIQUID COMPOSITIONS

Sample II	102SY1-2	102SYSuper	R-3316	R-3317	R-3318	R-3037	R-30[illegible]3	R-3326
Anions	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%
F	0.0503%	0.0285%	0.1779%	0.1438%	0.1118%	0.0071%	0.1498%	0.0049%
Cl	0.1564%	0.0280%	0.3369%	0.3816%	0.4194%		0.5619%	
NO2	0.1976%		5.2205%	5.3034%	5.3457%	0.1746%	7.1612%	0.2079%
NO3	2.2978%	3.4971%	12.0932%	14.8984%	15.1082%	2.7752%	20.2393%	3.3342%
PO4	0.0745%	0.1425%	0.4796%	0.3430%	0.3110%	0.0356%	0.4166%	0.0404%
SO4	0.0753%	0.1441%	3.2700%	1.4342%	1.1162%	0.0374%	1.4952%	0.0306%
CO3	0.3706%	0.2760%	2.3961%	2.5879%	3.0258%		4.0535%	0.2100%
OH	0.6686%	0.9915%	1.1423%	1.7244%	1.6408%	0.6704%	2.1981%	0.7573%
Tot Anio	3.8912%	5.1077%	25.1164%	26.8166%	27.0791%	3.7003%	36.2757%	4.5854%
Tot Org (	0.0208%	0.0462%					0.0239%	0.0228%
Tot Com	6.2647%	9.1811%	25.7805%	27.7153%	28.0171%	3.8595%	36.4878%	5.1501%
TRUs	g/g	g/g	g/g	g/g	g/g	g/g	g/g	g/g
Am-241		3.69E-10	2.09E-09		3.86E-09	3.02E-10	7.51E-09	
Cm-243								
Cm-244								
Cm-24x								
Np-237								
Pu-238								
Pu-239	2.50E-09	1.59E-08	2.17E-08	7.81E-08	1.04E-07			
Pu-240								
Pu-241						2.80E-10	6.11E-10	1.91E-10
Pu-242								
Pu-244								
n-TRUs	g/g	g/g	g/g	g/g	g/g	g/g	g/g	g/g
H-3								
C-14	5.00E-12							
I-129								
Nb-94								
Ni-63								
Se-79								
Sr-90	1.24E-11		4.54E-09	8.40E-09	9.13E-09			8.81E-12
Tc-99		5.83E-07						
Ce-144								
Co-60								
Cs-134								
Cs-137	4.37E-08	1.17E-07	2.06E-06	2.55E-06	2.46E-06	5.94E-08	7.06E-08	7.13E-08
Eu-152								
Eu-154								
Eu-155								
Ru-106								
Sb-125								
Zr-95								
Tot TRUs	2.50E-09	1.63E-08	2.38E-08	7.81E-08	1.08E-07	5.82E-10	8.12E-09	1.91E-10
Tot n-TRI	4.37E-08	7.00E-07	2.06E-06	2.56E-06	2.47E-06	5.94E-08	7.06E-08	7.13E-08
Tot Radi	4.62E-08	7.16E-07	2.09E-06	2.63E-06	2.58E-06	6.00E-08	7.88E-08	7.15E-08

Liquid.Values

SY-102 LIQUID COMPOSITIONS

Sample ID:		102SY3T4L	102SY1-2	R5027	R5028	R5029	R4656	R4615	102SY3T4L
Sample Date:		10/25/88	10/25/88	6/2/89	6/2/89	6/2/89	3/14/89	3/20/89	10/25/88
Analysis Date:		6/30/89, final	6/30/89, fina	8/29/89	8/29/89	8/29/89	8/29/89	3/24/89	11/19/90
Analyst:		PNL:Scheele	PNL:Scheele	PCL	PCL	PCL	PCL	PCL	PCL
		&Peterson	&Peterson	Weiss	Weiss	Weiss	Weiss	Weiss	?
Sample Site:		Oct'88core	Oct'88core	49' (?)	40' (?)	31' (?)	Super (?)	Super-(?)	Oct'88core
Sample Notes:		Comp 3/4	Comp 1/2						Comp 3/4
Sp.Gr./Den.:				sg=1.025	sg=1.016	sg=1.012	d=1.57	d=1.57	sg=1.18
Reference:		Peterson to	Peterson to	Weiss to	Weiss to	Weiss to	Weiss to	Weiss to	Weiss to
		DiLiberto	DiLiberto	Saueressig	Saueressig	Saueressig	Boyles	Campbell	Kirch*
		6/30/89	6/30/89	8/29/89	8/29/89	8/29/89	5/2/89	4/27/89	11/19/90
Phase:		Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid
Specie	Mass	g/L	g/L	g/L	g/L	g/L	g/L	g/L	g/L
Ag	107.87			1.21E+00					
Al	26.98	3.11E+00	1.21E+00	1.13E+00	1.11E+00	1.08E+00	4.10E+01	1.05E+00	3.32E+00
As	74.92								2.25E-03
B	10.81	3.89E-02	1.11E-02				3.13E-02		
Ba	137.33	1.32E-02	4.22E-05						
Bi	208.98								
Ca	40.08	4.67E-02	2.88E-03	2.40E-03	3.21E-03	2.00E-03	2.97E-02	2.00E-03	3.69E-02
Cd	112.41								
Ce	140.12	3.36E-01	5.74E-03					7.01E-03	
Cr(VI)	52.00	4.84E-02	1.26E-02						
Cr(Tot)	52.00	3.74E-01	9.59E-03	9.88E-03	9.88E-03	9.88E-03	4.26E-02	8.84E-03	4.16E-01
Cu	63.55								
Dy	162.50	1.56E-02	1.67E-04						
Fe	55.85	4.02E-03	2.29E-03				6.70E-03		8.38E-03
K	39.10	1.45E+00	2.40E+00	3.48E+00	3.40E+00	3.36E+00	5.71E+00	2.62E+00	1.43E+00
La	138.91	3.33E-02	2.85E-04					8.33E-04	
Li	6.94	2.50E-02	7.11E-06						
Ln	157.00	5.43E-01	8.37E-03						
Mg	24.31	8.75E-03	1.25E-04						
Mn	54.94	1.98E-02	2.82E-05						
Mo	95.94	2.30E-02	9.83E-04				9.59E-02	9.59E-02	
Na	22.99	9.93E+01	2.07E+01	2.07E+01	2.05E+01	1.95E+01	2.00E+02	1.77E+01	9.84E+01
Nd	144.24	1.04E-01	1.33E-03						
Ni	58.71	4.93E-02	3.01E-04				3.17E-02	3.17E-02	
P	30.97		9.52E-02	9.60E-02	9.60E-02	8.98E-02	1.02E-01	8.05E-02	2.76E+00
Pb	207.20								
Rh	102.91	3.70E-01	3.16E-02						
Ru	101.07	6.06E-01	2.07E-02						
Sb	121.75								
Se	78.96								1.58E-04
Si	28.09	2.70E-02	1.32E-01					7.30E-02	1.69E-02
Sr	87.62	2.10E-02	5.39E-05						
Te	127.60	3.06E-01	2.62E-03						
Th	232.04								
Ti	47.90	1.72E-02	9.82E-05						
Tl	204.37								
U	238.03						2.95E-01	2.95E-01	9.52E-03
V	50.94								
Zn	65.38	1.57E-01	2.01E-03						5.10E-02
Zr	91.22	7.66E-02	9.35E-05						
Tot Metals:		1.07E+02	2.46E+01	2.54E+01	2.51E+01	2.41E+01	2.48E+02	2.20E+01	1.06E+02

Liquid.Values

SY-102 LIQUID COMPOSITIONS

Sample ID:		102SY3T4L	102SY1-2	R5027	R5028	R5029	R4656	R4615	102SY3T4L
Anions		g/L	g/L	g/L	g/L	g/L	g/L	g/L	g/L
F	19.00			7.60E-01	7.41E-01	7.41E-01	1.29E+00	6.46E-01	5.13E-01
Cl	35.45			1.56E-01	1.60E-01	1.60E-01	1.95E-01	2.20E-01	1.77E+00
NO2	46.01			2.35E+00	2.25E+00	2.35E+00	1.98E+00	1.70E+02	2.36E+01
NO3	62.00			2.17E+01	2.11E+01	2.11E+01	1.29E+02	2.17E+01	1.05E+02
PO4	94.97			2.28E-01	2.37E-01	2.37E-01	5.22E+00	1.33E-01	7.56E+00
SO4	96.06			1.25E-01	1.25E-01	1.25E-01	9.70E+01	7.78E-01	6.53E+00
CO3	60.01								2.58E+01
OH	17.01						1.73E+01		1.29E+01
Tot Anions:		0.00E+00	0.00E+00	2.53E+01	2.46E+01	2.47E+01	2.52E+02	1.94E+02	1.84E+02
Tot Org C:							7.96E-03		1.86E-03
Tot Comp:		1.07E+02	7.24E-01	5.07E+01	4.97E+01	4.88E+01	5.00E+02	2.16E+02	2.91E+02
TRUs		uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L
Am-241	241.06	6.07E+04		3.20E-02	1.50E-01	4.10E-02	8.70E-01	3.30E-02	
Cm-243	243.00								
Cm-244	244.00								
Cm-24x	243.56	2.88E+02							
Np-237	237.05	1.56E+00							
Pu-238	238.05	1.62E+03							
Pu-239	239.05	1.17E+04		1.00E-01	1.00E-01	1.10E-01	4.53E+00	4.40E-02	1.60E-01
Pu-240	240.05	4.08E+03							
Pu-241	241.06	1.40E+05							
Pu-242	242.00								
Pu-244	244.00								
n-TRUs		uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L
H-3	3.02	9.55E-02	3.00E-02						
C-14	14.00								2.30E-02
I-129	129.00	3.36E-02	2.16E-02						
Nb-94	94.00	3.72E-03	7.32E-04						
Ni-63	63.00	2.28E-01	4.80E-01						
Se-79	79.00	7.28E-01	1.80E-02						
Sr-90	90.00			5.20E-01	5.40E-01	5.20E-01	1.58E+03	5.90E-01	1.75E+00
Tc-99	99.00	6.46E+01	2.41E+00	2.99E+00	2.99E+00	2.93E+00	3.69E+02	2.50E+00	
Ce-144	144.00								
Co-60	60.00								
Cs-134	134.00								
Cs-137	137.00			5.30E+03	5.10E+03	5.10E+03	6.96E+05	4.67E+03	3.90E+03
Eu-152	152.00								
Eu-154	154.00								
Eu-155	155.00								
Ru-106	106.00								
Sb-125	125.00								
Zr-95	91.22								
Tot TRUs		2.19E+05	0.00E+00	1.32E-01	2.50E-01	1.51E-01	5.40E+00	7.70E-02	1.60E-01
Tot n-TRUs		6.56E+01	2.96E+00	5.30E+03	5.10E+03	5.10E+03	6.98E+05	4.67E+03	3.90E+03
Tot Radionuclide		2.19E+05	3.11E+02	5.30E+03	5.10E+03	5.10E+03	6.98E+05	4.67E+03	3.90E+03

Liquid.Values

SY-102 LIQUID COMPOSITIONS

Sample I	102SY1-2	102SYSuper	R-3316	R-3317	R-3318	R-3037	R-3038	R-3326
Sample I	10/25/88	6/1/88	11/1/84	11/1/84	11/1/84	11/1/84	11/1/84	?
Analysis	11/19/90	3/23/89	3/29/85	3/29/85	3/29/85	10/5/84	10/5/84	12/31/84
Analyst:	PCL	PCL	Rockwell	Rockwell	Rockwell	Rockwell	Rockwell	Rockwell
	?	Weiss	Bratzel	Bratzel	Bratzel	Bratzel	Bratzel	Bratzel
Sample S	Oct'88core	?	6",bottom	6",bottom	6",bottom	top	middle	?
Sample I	Comp 1/2	High value						
Sp.Gr./D	1.02	d=1(?)	d=1.41	d=1.44	d=1.42	sg=1.03	sg=1.06	sg=1.06
Referenc	Weiss to	Weiss(PCL) to	Bratzel to	Bratzel to	Bratzel to	Bratzel to	Bratzel to	Bratzel to
	Kirch*	Carothers	Gale	Gale	Gale	Tulberg	Tulberg	Tulberg
	11/19/90	3/23/89	3/29/85	3/29/85	3/29/85	10/5/84	10/5/84	12/31/84
Phase:	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid
Specie	g/L	g/L	g/L	g/L	g/L	g/L	g/L	g/L
Ag								
Al	1.35E+00	2.29E+00	6.58E+00	9.69E+00	1.01E+01	1.40E+00	1.70E+00	1.75E+00
As	2.25E-03							
B		1.04E-02						
Ba								
Bi								
Ca	4.41E-03	7.21E-03				9.02E-04		
Cd			5.91E-02	3.52E-02	2.56E-02	6.60E-03	8.21E-03	1.04E-02
Ce		2.38E-02						
Cr(VI)		4.89E-02	1.15E+00	1.17E+00	1.20E+00	3.50E-02	4.40E-02	
Cr(Tot)	9.88E-03	4.89E-02	1.15E+00	1.17E+00	1.20E+00	3.50E-02	4.40E-02	5.09E-02
Cu		4.45E-03	3.64E-03	3.27E-03	2.30E-03			
Dy								
Fe	1.68E-03	4.47E-03	3.64E-03	5.98E-03	6.25E-03	1.70E-03	2.80E-03	5.92E-03
K	2.47E+00	1.02E+00	1.55E+00	2.03E+00	1.97E+00	7.51E-02	8.99E-02	
La								
Li								
Ln	0.00E+00	2.67E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Mg			3.65E-03	2.99E-03	2.31E-03	9.99E-05	1.10E-04	
Mn			3.64E-03	3.54E-03	3.14E-03	1.05E-04	1.00E-04	1.01E-03
Mo								
Na	2.00E+01	3.66E+01						
Nd								
Ni						3.00E-04	3.00E-04	3.92E+00
P	9.29E-02	2.35E-01				1.20E-01	1.50E-01	
Pb								
Rh								
Ru								
Sb								
Se	2.37E-06							
Si	3.37E-02	7.02E-02						
Sr								
Te								
Th								
Ti								
Tl								
U	7.14E-03							
V								
Zn	1.31E-03							
Zr								
Tot Meta	2.40E+01	4.03E+01	1.05E+01	1.41E+01	1.45E+01	1.67E+00	2.04E+00	5.74E+00

Liquid.Values

SY-102 LIQUID COMPOSITIONS

Sample I	102SY1-2	102SYSuper	R-3316	R-3317	R-3318	R-3037	R-3038	R-3326
Anions	g/L	g/L	g/L	g/L	g/L	g/L	g/L	g/L
F	5.13E-01	2.85E-01	2.51E+00	2.07E+00	1.59E+00	7.33E-02	1.59E+00	5.17E-02
Cl	1.60E+00	2.80E-01	4.75E+00	5.50E+00	5.96E+00		5.96E+00	
NO2	2.02E+00		7.36E+01	7.64E+01	7.59E+01	1.80E+00	7.59E+01	2.20E+00
NO3	2.34E+01	3.50E+01	1.71E+02	2.15E+02	2.15E+02	2.86E+01	2.15E+02	3.53E+01
PO4	7.60E-01	1.42E+00	6.76E+00	4.94E+00	4.42E+00	3.67E-01	4.42E+00	4.28E-01
SO4	7.68E-01	1.44E+00	4.61E+01	2.07E+01	1.58E+01	3.85E-01	1.58E+01	3.25E-01
CO3	3.78E+00	2.76E+00	3.38E+01	3.73E+01	4.30E+01		4.30E+01	2.23E+00
OH	6.82E+00	9.92E+00	1.61E+01	2.48E+01	2.33E+01	6.90E+00	2.33E+01	8.03E+00
Tot Anio	3.97E+01	1.29E+02	3.54E+02	3.86E+02	3.85E+02	3.81E+01	3.85E+02	4.86E+01
Tot Org (	2.08E-04	5.55E+00					2.39E-04	2.28E-04
Tot Com	6.37E+01	2.63E+02	3.65E+02	4.00E+02	3.99E+02	3.98E+01	3.87E+02	5.43E+01
TRUs	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L
Am-241		1.28E+00	1.02E+01		1.90E+01	1.08E+00	2.76E+01	
Cm-243								
Cm-244								
Cm-24x								
Np-237								
Pu-238								
Pu-239	1.60E-01	1.00E+00	1.92E+00	7.06E+00	9.27E+00			
Pu-240								
Pu-241						3.00E+01	6.75E+01	2.11E+01
Pu-242								
Pu-244								
n-TRUs	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L
H-3								
C-14	2.30E-02							
I-129								
Nb-94								
Ni-63								
Se-79								
Sr-90	1.75E+00		8.84E+02	1.67E+03	1.79E+03			1.29E+00
Tc-99		1.00E+01						
Ce-144								
Co-60								
Cs-134								
Cs-137	3.90E+03	1.02E+04	2.54E+05	3.21E+05	3.06E+05	5.35E+03	6.55E+03	6.61E+03
Eu-152								
Eu-154								
Eu-155								
Ru-106								
Sb-125								
Zr-95								
Tot TRUs	1.60E-01	2.28E+00	1.21E+01	7.06E+00	2.83E+01	3.11E+01	9.51E+01	2.11E+01
Tot n-TRI	3.90E+03	1.02E+04	2.55E+05	3.23E+05	3.08E+05	5.35E+03	6.55E+03	6.61E+03
Tot Radi	3.90E+03	1.02E+04	2.55E+05	3.23E+05	3.08E+05	5.38E+03	6.65E+03	6.63E+03

Liquid.Values

SY-102 LIQUID COMPOSITIONS

Sample ID:		102SY3T4L	102SY1-2	R5027	R5028	R5029	R4656	R4615	102SY3T4L
Sample Date:		10/25/88	10/25/88	6/2/89	6/2/89	6/2/89	3/14/89	3/20/89	10/25/88
Analysis Date:		6/30/89, final	6/30/89, fina	8/29/89	8/29/89	8/29/89	8/29/89	3/24/89	11/19/90
Analyst:		PNL:Scheele	PNL:Scheele	PCL	PCL	PCL	PCL	PCL	PCL
		&Peterson	&Peterson	Weiss	Weiss	Weiss	Weiss	Weiss	?
Sample Site:		Oct'88core	Oct'88core	49' (?)	40' (?)	31' (?)	Super (?)	Super-(?)	Oct'88core
Sample Notes:		Comp 3/4	Comp 1/2						Comp 3/4
Sp.Gr./Den.:				sg=1.025	sg=1.016	sg=1.012	d=1.57	d=1.57	sg=1.18
Reference:		Peterson to	Peterson to	Weiss to	Weiss to	Weiss to	Weiss to	Weiss to	Weiss to
		DiLiberto	DiLiberto	Saueressig	Saueressig	Saueressig	Boyles	Campbell	Kirch*
		6/30/89	6/30/89	8/29/89	8/29/89	8/29/89	5/2/89	4/27/89	11/19/90
Phase:		Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid
Specie		M	M	M	M	M	M	M	M
Ag	107.87								
Al	26.98	1.15E-01	5.27E-02	4.20E-02	4.10E-02	4.00E-02	1.52E+00	3.90E-02	1.23E-01
As	74.92								3.00E-05
B	10.81	3.60E-03	1.20E-03				2.90E-03		
Ba	137.33	9.60E-05	3.60E-07						
Bi	208.98								
Ca	40.08	1.16E-03	8.40E-05	6.00E-05	8.00E-05	5.00E-05	7.40E-04	5.00E-05	9.20E-04
Cd	112.41								
Ce	140.12	2.40E-03	4.80E-05					5.00E-05	
Cr(VI)	52.00	9.31E-04	2.84E-04						
Cr(Tot)	52.00	7.20E-03	2.16E-04	1.90E-04	1.90E-04	1.90E-04	8.20E-04	1.70E-04	8.00E-03
Cu	63.55								
Dy	162.50	9.60E-05	1.20E-06						
Fe	55.85	7.20E-05	4.80E-05				1.20E-04		1.50E-04
K	39.10	3.72E-02	7.20E-02	8.90E-02	8.70E-02	8.60E-02	1.46E-01	6.70E-02	3.65E-02
La	138.91	2.40E-04	2.40E-06					6.00E-06	
Li	6.94	3.60E-03	1.20E-06						
Ln	157.00	3.46E-03	6.24E-05						
Mg	24.31	3.60E-04	6.00E-06						
Mn	54.94	3.60E-04	6.00E-07						
Mo	95.94	2.40E-04	1.20E-05				1.00E-03	1.00E-03	
Na	22.99	4.32E+00	1.05E+00	9.00E-01	8.90E-01	8.50E-01	8.72E+00	7.70E-01	4.28E+00
Nd	144.24	7.20E-04	1.08E-05						
Ni	58.71	8.40E-04	6.00E-06				5.40E-04	5.40E-04	
P	30.97		3.60E-03	3.10E-03	3.10E-03	2.90E-03	3.30E-03	2.60E-03	8.91E-02
Pb	207.20								
Rh	102.91	3.60E-03	3.60E-04						
Ru	101.07	6.00E-03	2.40E-04						
Sb	121.75								
Se	78.96								2.00E-06
Si	28.09	9.60E-04	5.52E-03					2.60E-03	6.00E-04
Sr	87.62	2.40E-04	7.20E-07						
Te	127.60	2.40E-03	2.40E-05						
Th	232.04								
Ti	47.90	3.60E-04	2.40E-06						
Tl	204.37								
U	238.03						1.24E-03	1.24E-03	4.00E-05
V	50.94								
Zn	65.38	2.40E-03	3.60E-05						7.80E-04
Zr	91.22	8.40E-04	1.20E-06						
Tot Metals:		4.51E+00	1.19E+00	1.03E+00	1.02E+00	9.79E-01	1.04E+01	8.84E-01	4.54E+00

Liquid.Values

SY-102 LIQUID COMPOSITIONS

Sample ID:		102SY3T4L	102SY1-2	R5027	R5028	R5029	R4656	R4615	102SY3T4L
Anions		M	M	M	M	M	M	M	M
F	19.00			4.00E-02	3.90E-02	3.90E-02	6.80E-02	3.40E-02	2.70E-02
Cl	35.45			4.40E-03	4.50E-03	4.50E-03	5.50E-03	6.20E-03	5.00E-02
NO2	46.01			5.10E-02	4.90E-02	5.10E-02	4.30E-02	3.70E+00	5.14E-01
NO3	62.00			3.50E-01	3.40E-01	3.40E-01	2.08E+00	3.50E-01	1.70E+00
PO4	94.97			2.40E-03	2.50E-03	2.50E-03	5.50E-02	1.40E-03	7.96E-02
SO4	96.06			1.30E-03	1.30E-03	1.30E-03	1.01E+00	8.10E-03	6.80E-02
CO3	60.01								4.30E-01
OH	17.01						1.02E+00		7.60E-01
Tot Anions:		0.00E+00	0.00E+00	2.48E+00	2.44E+00	2.36E+00	2.35E+01	5.83E+00	1.26E+01
Tot Org C:							1.25E+01		2.20E+00
Tot Comp:		4.51E+00	1.19E+00	4.86E+00	4.79E+00	4.62E+00	5.95E+01	1.16E+01	2.72E+01
TRUs		uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L
Am-241	241.06	6.07E+04		3.20E-02	1.50E-01	4.10E-02	8.70E-01	3.30E-02	
Cm-243	243.00								
Cm-244	244.00								
Cm-24x	243.56	2.88E+02	2.88E+02						
Np-237	237.05	1.56E+00	1.56E+00						
Pu-238	238.05	1.62E+03	1.62E+03						
Pu-239	239.05	1.17E+04	1.17E+04	1.00E-01	1.00E-01	1.10E-01	4.53E+00	4.40E-02	1.60E-01
Pu-240	240.05	4.08E+03	4.08E+03						
Pu-241	241.06	1.40E+05	1.40E+05						
Pu-242	242.00								
Pu-244	244.00								
n-TRUs		uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L
H-3	3.02	9.55E-02	9.55E-02						
C-14	14.00								2.30E-02
I-129	129.00	3.36E-02	3.36E-02						
Nb-94	94.00	3.72E-03	3.72E-03						
Ni-63	63.00	2.28E-01	2.28E-01						
Se-79	79.00	7.28E-01	7.28E-01						
Sr-90	90.00			5.20E-01	5.40E-01	5.20E-01	1.58E+03	5.90E-01	1.75E+00
Tc-99	99.00	6.46E+01	6.46E+01	2.99E+00	2.99E+00	2.93E+00	3.69E+02	2.50E+00	
Ce-144	144.00								
Co-60	60.00								
Cs-134	134.00								
Cs-137	137.00			5.30E+03	5.10E+03	5.10E+03	6.96E+05	4.67E+03	3.90E+03
Eu-152	152.00								
Eu-154	154.00								
Eu-155	155.00								
Ru-106	106.00								
Sb-125	125.00								
Zr-95	91.22								
Tot TRUs		2.19E+05	1.58E+05	1.32E-01	2.50E-01	1.51E-01	5.40E+00	7.70E-02	1.60E-01
Tot n-TRUs		6.56E+01	6.56E+01	5.30E+03	5.10E+03	5.10E+03	6.98E+05	4.67E+03	3.90E+03
Tot Radionuclide		2.19E+05	1.58E+05	5.30E+03	5.10E+03	5.10E+03	6.98E+05	4.67E+03	3.90E+03

Liquid.Values

SY-102 LIQUID COMPOSITIONS

Sample I	102SY1-2	102SYSuper	R-3316	R-3317	R-3318	R-3037	R-3038	R-3326
Sample I	10/25/88	6/1/88	11/1/84	11/1/84	11/1/84	11/1/84	11/1/84	?
Analysis	11/19/90	3/23/89	3/29/85	3/29/85	3/29/85	10/5/84	10/5/84	12/31/84
Analyst	PCL	PCL	Rockwell	Rockwell	Rockwell	Rockwell	Rockwell	Rockwell
	?	Weiss	Bratzel	Bratzel	Bratzel	Bratzel	Bratzel	Bratzel
Sample I	Oct'88core	?	6",bottom	6",bottom	6",bottom	top	middle	?
Sample I	Comp 1/2	High value						
Sp.Gr./D	1.02	d=1(?)	d=1.41	d=1.44	d=1.42	sg=1.03	sg=1.06	sg=1.06
Referenc	Weiss to	Weiss(PCL) to	Bratzel to	Bratzel to	Bratzel to	Bratzel to	Bratzel to	Bratzel to
	Kirch*	Carothers	Gale	Gale	Gale	Tulberg	Tulberg	Tulberg
	11/19/90	3/23/89	3/29/85	3/29/85	3/29/85	10/5/84	10/5/84	12/31/84
Phase:	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid
Specie	M	M	M	M	M	M	M	M
Ag								
Al	5.00E-02	8.50E-02	2.44E-01	3.59E-01	3.75E-01	5.19E-02	6.30E-02	6.50E-02
As	3.00E-05							
B		9.60E-04						
Ba								
Bi								
Ca	1.10E-04	1.80E-04				2.25E-05		
Cd			5.26E-04	3.13E-04	2.28E-04	5.87E-05	7.30E-05	9.24E-05
Ce		1.70E-04						
Cr(VI)		9.40E-04	2.22E-02	2.25E-02	2.30E-02	6.73E-04	8.46E-04	
Cr(Tot)	1.90E-04	9.40E-04	2.22E-02	2.25E-02	2.30E-02	6.73E-04	8.46E-04	9.79E-04
Cu		7.00E-05	5.73E-05	5.15E-05	3.62E-05			
Dy								
Fe	3.00E-05	8.00E-05	6.52E-05	1.07E-04	1.12E-04	3.04E-05	5.01E-05	1.06E-04
K	6.32E-02	2.61E-02	3.97E-02	5.20E-02	5.03E-02	1.92E-03	2.30E-03	
La								
Li								
Ln	0.00E+00	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Mg			1.50E-04	1.23E-04	9.49E-05	4.11E-06	4.52E-06	
Mn			6.62E-05	6.45E-05	5.72E-05	1.92E-06	1.82E-06	1.84E-05
Mo								
Na	8.71E-01	1.59E+00						
Nd								
Ni						5.11E-06	5.11E-06	6.68E-02
P	3.00E-03	7.60E-03				3.87E-03	4.84E-03	
Pb								
Rh								
Ru								
Sb								
Se	3.00E-08							
Si	1.20E-03	2.50E-03						
Sr								
Te								
Th								
Ti								
Tl								
U	3.00E-05							
V								
Zn	2.00E-05							
Zr								
Tot Meta	9.89E-01	1.71E+00	3.07E-01	4.34E-01	4.49E-01	5.85E-02	7.11E-02	1.33E-01

Liquid.Values

SY-102 LIQUID COMPOSITIONS

Sample I	102SY1-2	102SYSuper	R-3316	R-3317	R-3318	R-3037	R-3038	R-3326
Anions	M	M	M	M	M	M	M	M
F	2.70E-02	1.50E-02	1.32E-01	1.09E-01	8.36E-02	3.86E-03	8.36E-02	2.72E-03
Cl	4.50E-02	7.90E-03	1.34E-01	1.55E-01	1.68E-01		1.68E-01	
NO2	4.38E-02		1.60E+00	1.66E+00	1.65E+00	3.91E-02	1.65E+00	4.79E-02
NO3	3.78E-01	5.64E-01	2.75E+00	3.46E+00	3.46E+00	4.61E-01	3.46E+00	5.70E-01
PO4	8.00E-03	1.50E-02	7.12E-02	5.20E-02	4.65E-02	3.86E-03	4.65E-02	4.51E-03
SO4	8.00E-03	1.50E-02	4.80E-01	2.15E-01	1.65E-01	4.01E-03	1.65E-01	3.38E-03
CO3	6.30E-02	4.60E-02	5.63E-01	6.21E-01	7.16E-01		7.16E-01	3.71E-02
OH	4.01E-01	5.83E-01	9.47E-01	1.46E+00	1.37E+00	4.06E-01	1.37E+00	4.72E-01
Tot Anio	2.90E+00	4.59E+00	7.02E+00	8.22E+00	8.16E+00	9.82E-01	7.74E+00	1.34E+00
Tot Org (	2.12E-01	4.62E-01					2.53E-01	2.42E-01
Tot Com	5.95E+00	9.60E+00	1.40E+01	1.64E+01	1.63E+01	1.96E+00	1.57E+01	2.92E+00
TRUs	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L
Am-241		1.28E+00	1.02E+01		1.90E+01	1.08E+00	2.76E+01	
Cm-243								
Cm-244								
Cm-24x								
Np-237								
Pu-238								
Pu-239	1.60E-01	1.00E+00	1.92E+00	7.06E+00	9.27E+00			
Pu-240								
Pu-241						3.00E+01	6.75E+01	2.11E+01
Pu-242								
Pu-244								
n-TRUs	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L
H-3								
C-14	2.30E-02							
I-129								
Nb-94								
Ni-63								
Se-79								
Sr-90	1.75E+00		8.84E+02	1.67E+03	1.79E+03			1.29E+00
Tc-99		1.00E+01						
Ce-144								
Co-60								
Cs-134								
Cs-137	3.90E+03	1.02E+04	2.54E+05	3.21E+05	3.06E+05	5.35E+03	6.55E+03	6.61E+03
Eu-152								
Eu-154								
Eu-155								
Ru-106								
Sb-125								
Zr-95								
Tot TRUs	1.60E-01	2.28E+00	1.21E+01	7.06E+00	2.83E+01	3.11E+01	9.51E+01	2.11E+01
Tot n-TRI	3.90E+03	1.02E+04	2.55E+05	3.23E+05	3.08E+05	5.35E+03	6.55E+03	6.61E+03
Tot Radi	3.90E+03	1.02E+04	2.55E+05	3.23E+05	3.08E+05	5.3[illegible]E+03	6.65E+03	6.63E+03

SY-102 SOLID COMPOSITIONS

Filename: Solid.Values

SY-102 SOLID COMPOSITIONS

Sample ID:		102-SY-4B	102SY3T4S	102SY3T4S	102SY3T4S	102SYSolids	R-3316	R-3317	R-3318	R-3316	R-3036
Sample Date:		10/25/88	10/25/88	10/25/88	10/25/88	7/1/88	11/1/84	11/1/84	11/1/84	11/1/84	?
Analysis Date:		6/30/89	6/30/89	7/6/90		3/23/89	3/29/85	3/29/85	3/29/85	1/10/85	10/5/84
Analyst		PNL: Scheele	PNL: Scheele	PCL: Herting		PCL: Weiss	Rockwell AL:	Rockwell AL:	Rockwell AL:	Rockwell AL:	Rockwell AL:
		& Peterson	& Peterson				Bratzel	Bratzel	Bratzel	Bratzel	Bratzel
Sample Site:		Oct'88core	Oct'88core	Oct '88 core	Oct '88 core	?	6", bottom	6", bottom	6", bottom	6", bottom	bottom (?)
Sample Notes:		Segment #4	Comp 3/4		d=1.5 (est)	High values	Cent. solids	Cent. solids	Cent. solids	d=1.54	d=1.65(?)
Reference:		Peterson to	Peterson to	Herting to	Kirkbride to	Weiss (PCL)	Bratzel to	Bratzel to	Bratzel to	Bratzel to	Bratzel to
		DiLiberto	DiLiberto	Sasaki	Orme	to Carothers	Gale	Gale	Gale	Gale	Tulberg
		6/30/89	6/30/89	7/6/90	12/10/92	3/23/89	3/29/85	3/29/85	3/29/85	1/10/85	10/5/84
Phase:		Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Specie	Mass	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%
Ag	107.87				0.0144%						
Al	26.98	4.8027%	3.4806%	9.0000%	3.2378%	0.8800%	9.2100%	7.3000%	7.7500%	5.2013%	16.0000%
As	74.92	0.6818%			0.0499%						
B	10.81	0.0173%	0.0195%		0.0144%	0.0030%					
Ba	137.33	0.0027%	0.0093%								
Bi	208.98					0.0540%					
Ca	40.08	0.0421%	0.5691%	0.7100%	0.4542%	0.7590%					0.4500%
Cd	112.41				0.0600%	0.0610%	0.0324%	0.0150%	0.0164%	0.0183%	0.2200%
Ce	140.12	0.0420%	0.0560%		0.0654%	0.0240%					
Cr(VI)	52.00	0.1279%	0.1549%	0.4300%	0.1040%	0.0820%	3.6300%	2.9900%	4.1900%	2.0584%	9.1700%
Cr(Tot)	52.00	1.3259%	1.6431%	2.0100%	1.7332%	0.0820%	3.6300%	2.9900%	4.1900%	2.0584%	9.1700%
Cu	63.55				0.0847%	0.0250%	0.0063%	0.0036%	0.0053%	0.0035%	
Dy	162.50	0.0033%	0.0052%								
Fe	55.85	0.4468%	3.1889%	4.3500%	1.8616%	3.7710%	2.0600%	0.9570%	1.2700%	1.1688%	5.1000%
K	39.10	0.2385%	0.2307%	0.0700%	0.2085%	0.0800%	0.0830%	0.0227%	0.0466%	0.0470%	
La	138.91	0.0081%	0.0139%								
Li	6.94	0.0014%	0.0014%		0.0014%						
Ln	157.00	0.0907%	0.1149%		0.1047%	0.1047%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
Mg	24.31	0.0097%	0.1726%	0.1600%	0.1134%	0.1520%	0.1700%	0.0684%	0.0894%	0.0987%	0.2500%
Mn	54.94	0.1373%	1.2581%	0.9800%	0.6593%	0.6400%	0.7000%	0.3500%	0.4400%	0.3935%	1.9800%
Mo	95.94	0.0096%	0.0077%		0.0064%						
Na	22.99	19.4264%	10.0695%	9.4800%	9.1959%	1.5800%					
Nd	144.24	0.0288%	0.0288%		0.0288%						
Ni	58.71	0.0294%	0.0528%	0.8900%	0.0391%	0.0560%					0.0700%
P	30.97	1.1770%	0.4027%	0.5800%		0.2550%					0.4800%
Pb	207.20				0.2210%	0.1720%					
Rh	102.91	0.0206%	0.0412%		0.0343%						
Ru	101.07	0.0040%	0.0404%		0.0337%						
Sb	121.75				0.0244%						
Se	78.96	0.7106%			0.1579%						

SY-102 SOLID COMPOSITIONS

Sample ID:		102-SY-4B	102SY3T4S	102SY3T4S	102SY3T4S	102SYSolids	R-3316	R-3317	R-3318	R-3316	R-3036
Si	28.09	0.0843%	0.2696%		0.1498%	0.0880%					
Sr	87.62	0.0018%	0.0175%		0.0058%	0.0110%					
Te	127.60	0.0255%	0.0255%		0.0255%						
Th	232.04				0.4641%						
Ti	47.90	0.0038%	0.0144%		0.0096%						
Tl	204.37				0.1362%						
U	238.03	0.1300%			0.4761%						
V	50.94				0.0034%						
Zn	65.38	0.0065%	0.0588%		0.0305%	0.0500%					
Zr	91.22	0.0065%	0.0456%		0.0243%						
Tot Metals:		29.4244%	21.7230%	28.2300%	19.6251%	8.7430%	15.8917%	11.7067%	13.8077%	8.9896%	33.7200%
Anions		wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%
F	19.00	0.1653%		0.1100%	0.3800%	0.0080%					
Cl	35.45	0.7091%		0.1700%	0.3545%	0.7600%	0.5200%	0.6000%	0.6360%	0.2955%	
NO2	46.01	4.5775%			2.4536%						
NO3	62.00	20.1516%		4.9300%	12.4010%						
PO4	94.97	4.5586%		0.8800%	3.7989%	2.0000%				0.0418%	
SO4	96.06	0.7685%		1.9600%	0.6404%	2.0000%	4.3600%	1.3900%	5.3000%	2.3831%	
CO3	60.01	0.0000%			2.4004%						
OH	17.01	1.7007%		0.1500%	1.7007%						
Tot Anions:		32.6313%	0.0000%	8.2000%	24.1294%	4.7680%	4.8800%	1.9900%	5.9360%	2.7203%	0.0000%
Tot Org C:		0.8700%				0.7550%					0.0303%
Tot Comp:		62.9257%	21.7230%	36.4300%	43.7545%	14.2660%	20.7717%	13.6967%	19.7437%	11.7100%	33.7503%
TRUs		(g/g)	(g/g)	(g/g)	(g/g)	(g/g)	(g/g)	(g/g)	(g/g)	(g/g)	(g/g)
Am-241	241.06	2.81E-07	2.83E-06	2.48E-05	6.00E-06	1.31E-05	6.81E-06	2.05E-06	3.00E-06	3.86E-06	
Cm-243	243.00										
Cm-244	244.00				6.67E-10						
Cm-24x	243.56	6.84E-10	3.02E-10								
Np-237	237.05	8.28E-07	1.14E-06		1.33E-06		3.37E-02	2.50E-02	3.62E-02	1.90E-02	
Pu-238	238.05	2.14E-09	4.55E-08								
Pu-239	239.05	2.07E-06	4.49E-05		6.67E-05	4.32E-04	1.20E-04	3.38E-05	4.16E-05	6.81E-05	
Pu-240	240.05	1.70E-07	5.18E-06		6.67E-06						
Pu-241	241.06	1.17E-08	3.44E-07								2.31E-08
Pu-242	242.00										
Pu-244	244.00										

SY-102 SOLID COMPOSITIONS

Sample ID:		102-SY-4B	102SY3T4S	102SY3T4S	102SY3T4S	102SYSolids	R-3316	R-3317	R-3318	R-3316	R-3036
n-TRUs		(g/g)	(g/g)	(g/g)	(g/g)	(g/g)	(g/g)	(g/g)	(g/g)	(g/g)	(g/g)
H-3	3.02	1.33E-13	6.34E-14								
C-14	14.00	3.99E-10			4.44E-10						
I-129	129.00	1.34E-06	1.34E-06		1.49E-06						
Nb-94	94.00	2.13E-08	1.20E-08								
Ni-63	63.00	5.05E-08	9.58E-08		6.97E-08						
Se-79	79.00	4.52E-09	2.56E-09								
Sr-90	90.00	4.90E-07		1.52E-06	4.83E-07		1.83E-06	1.36E-06	1.90E-06	1.04E-06	5.58E-06
Tc-99	99.00	1.18E-05	1.28E-05		1.17E-05	2.33E-06					
Ce-144	144.00	3.42E-10			4.14E-10						
Co-60	60.00	9.62E-11			1.17E-10		6.19E-10	4.41E-10		3.50E-10	
Cs-134	134.00	4.90E-11			5.10E-11						
Cs-137	137.00	1.71E-06		2.06E-07	1.52E-06	1.64E-07	1.76E-06	1.52E-06	2.03E-06	9.95E-07	1.15E-06
Eu-152	152.00	8.50E-10			7.56E-10		4.81E-08	3.61E-08	5.28E-08	2.72E-08	
Eu-154	154.00	5.49E-09			9.76E-09		2.02E-08	1.55E-08	2.08E-08	1.14E-08	
Eu-155	155.00										
Ru-106	106.00	4.78E-10			3.99E-10						
Sb-125	125.00	1.53E-09			1.27E-09					5.34E-10	
Zr-95	91.22						1.94E-11	1.46E-11		1.10E-11	
Tot TRUs		3.36E-06	5.45E-05	2.48E-05	8.07E-05	4.45E-04	3.38E-02	2.50E-02	3.62E-02	1.91E-02	2.31E-08
Tot n-TRUs		1.54E-05	1.43E-05	1.73E-06	1.52E-05	2.50E-06	3.66E-06	2.93E-06	4.01E-06	2.07E-06	6.74E-06
Tot Radionuclid		1.88E-05	6.88E-05	2.65E-05	9.59E-05	4.47E-04	3.38E-02	2.50E-02	3.62E-02	1.91E-02	6.76E-06

SY-102 SOLID COMPOSITIONS

Sample ID:		102-SY-4B	102SY3T4S	102SY3T4S	102SY3T4S	102SYSolids	R-3316	R-3317	R-3318	R-3316	R-3036
Sample Date:		10/25/88	10/25/88	10/25/88	10/25/88	7/1/88	11/1/84	11/1/84	11/1/84	11/1/84	?
Analysis Date:		6/30/89	6/30/89	7/6/90		3/23/89	3/29/85	3/29/85	3/29/85	1/10/85	10/5/84
Analyst		PNL: Scheele	PNL: Scheele	PCL: Herting		PCL: Weiss	Rockwell AL:	Rockwell AL:	Rockwell AL:	Rockwell AL:	Rockwell AL:
		& Peterson	& Peterson				Bratzel	Bratzel	Bratzel	Bratzel	Bratzel
Sample Site:		Oct'88core	Oct'88core	Oct '88 core	Oct '88 core	?	6", bottom	6", bottom	6", bottom	6", bottom	bottom (?)
Sample Notes:		Segment #4	Comp 3/4	d=1.02	d=1.5 (est)	High values	Cent. solids	Cent. solids	Cent. solids	d=1.54	d=1.65(?)
Reference:		Peterson to	Peterson to	Herting to	Kirkbride to	Weiss (PCL)	Bratzel to	Bratzel to	Bratzel to	Bratzel to	Bratzel to
		DiLiberto	DiLiberto	Sasaki	Orme	to Carothers	Gale	Gale	Gale	Gale	Tulberg
		6/30/89	6/30/89	7/6/90	12/10/92	3/23/89	3/29/85	3/29/85	3/29/85	1/10/85	10/5/84
Phase:		Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Specie	Mass	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g
Ag	107.87				1.44E-01						
Al	26.98	4.80E+01	3.48E+01	9.00E+01	3.24E+01	8.80E+00	9.21E+01	7.30E+01	7.75E+01	5.20E+01	1.60E+02
As	74.92	6.82E+00			4.99E-01						
B	10.81	1.73E-01	1.95E-01		1.44E-01	3.00E-02					
Ba	137.33	2.75E-02	9.34E-02								
Bi	208.98					5.40E-01					
Ca	40.08	4.21E-01	5.69E+00	7.10E+00	4.54E+00	7.59E+00					4.50E+00
Cd	112.41				6.00E-01	6.10E-01	3.24E-01	1.50E-01	1.64E-01	1.83E-01	2.20E+00
Ce	140.12	4.20E-01	5.60E-01		6.54E-01	2.40E-01					
Cr(VI)	52.00	1.28E+00	1.55E+00	4.30E+00	1.04E+00	8.20E-01	3.63E+01	2.99E+01	4.19E+01	2.06E+01	9.17E+01
Cr(Tot)	52.00	1.33E+01	1.64E+01	2.01E+01	1.73E+01	8.20E-01	3.63E+01	2.99E+01	4.19E+01	2.06E+01	9.17E+01
Cu	63.55				8.47E-01	2.50E-01	6.27E-02	3.59E-02	5.34E-02	3.55E-02	
Dy	162.50	3.25E-02	5.20E-02								
Fe	55.85	4.47E+00	3.19E+01	4.35E+01	1.86E+01	3.77E+01	2.06E+01	9.57E+00	1.27E+01	1.17E+01	5.10E+01
K	39.10	2.38E+00	2.31E+00	7.00E-01	2.09E+00	8.00E-01	8.30E-01	2.27E-01	4.66E-01	4.70E-01	
La	138.91	8.06E-02	1.39E-01								
Li	6.94	1.39E-02	1.39E-02		1.39E-02						
Ln	157.00	9.07E-01	1.15E+00		1.05E+00	2.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mg	24.31	9.72E-02	1.73E+00	1.60E+00	1.13E+00	1.52E+00	1.70E+00	6.84E-01	8.94E-01	9.87E-01	2.50E+00
Mn	54.94	1.37E+00	1.26E+01	9.80E+00	6.59E+00	6.40E+00	7.00E+00	3.50E+00	4.40E+00	3.94E+00	1.98E+01
Mo	95.94	9.59E-02	7.68E-02		6.40E-02						
Na	22.99	1.94E+02	1.01E+02	9.48E+01	9.20E+01	1.58E+01					
Nd	144.24	2.88E-01	2.88E-01		2.88E-01						
Ni	58.71	2.94E-01	5.28E-01	8.90E+00	3.91E-01	5.60E-01					7.00E-01
P	30.97	1.18E+01	4.03E+00	5.80E+00		2.55E+00					4.80E+00
Pb	207.20				2.21E+00	1.72E+00					
Rh	102.91	2.06E-01	4.12E-01		3.43E-01						
Ru	101.07	4.04E-02	4.04E-01		3.37E-01						
Sb	121.75				2.44E-01						
Se	78.96	7.11E+00			1.58E+00						

Solid.Values

SY-102 SOLID COMPOSITIONS

Sample ID:		102-SY-4B	102SY3T4S	102SY3T4S	102SY3T4S	102SYSolids	R-3316	R-3317	R-3318	R-3316	R-3036
Si	28.09	8.43E-01	2.70E+00		1.50E+00	8.80E-01					
Sr	87.62	1.75E-02	1.75E-01		5.84E-02	1.10E-01					
Te	127.60	2.55E-01	2.55E-01		2.55E-01						
Th	232.04				4.64E+00						
Ti	47.90	3.83E-02	1.44E-01		9.58E-02						
Tl	204.37				1.36E+00						
U	238.03	1.30E+00			4.76E+00						
V	50.94				3.40E-02						
Zn	65.38	6.54E-02	5.88E-01		3.05E-01	5.00E-01					
Zr	91.22	6.48E-02	4.56E-01		2.43E-01						
Tot Metals:		2.96E+02	2.20E+02	2.82E+02	1.98E+02	8.85E+01	1.59E+02	1.17E+02	1.38E+02	8.99E+01	3.37E+02
Anions		mg/g	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g
F	19.00	1.65E+00		1.10E+00	3.80E+00	8.00E-02					
Cl	35.45	7.09E+00		1.70E+00	3.55E+00	7.60E+00	5.20E+00	6.00E+00	6.36E+00	2.95E+00	
NO2	46.01	4.58E+01			2.45E+01						
NO3	62.00	2.02E+02		4.93E+01	1.24E+02						
PO4	94.97	4.56E+01		8.80E+00	3.80E+01	2.00E+01				4.18E-01	
SO4	96.06	7.68E+00		1.96E+01	6.40E+00	2.00E+01	4.36E+01	1.39E+01	5.30E+01	2.38E+01	
CO3	60.01	0.00E+00			2.40E+01						
OH	17.01	1.70E+01		1.50E+00	1.70E+01						
Tot Anions:		3.26E+02	0.00E+00	8.20E+01	2.41E+02	4.77E+01	4.88E+01	1.99E+01	5.94E+01	2.72E+01	0.00E+00
Tot Org C:						7.55E+00					5.00E-01
Tot Comp:		6.23E+02	2.20E+02	3.64E+02	4.40E+02	1.44E+02	2.08E+02	1.37E+02	1.97E+02	1.17E+02	3.38E+02
TRUs		uCi/g	uCi/g	uCi/g	uCi/g	uCi/g	uCi/g	uCi/g	uCi/g	uCi/g	uCi/g
Am-241	241.06	9.73E-01	9.82E+00	8.60E+01	2.08E+01	4.53E+01	2.36E+01	7.12E+00	1.04E+01	1.37E+01	
Cm-243	243.00										
Cm-244	244.00				5.46E-02						
Cm-24x	243.56	4.30E-02	1.90E-02								
Np-237	237.05	5.90E-04	8.10E-04		9.50E-04		2.40E+01	1.78E+01	2.58E+01	1.39E+01	
Pu-238	238.05	3.70E-02	7.88E-01								
Pu-239	239.05	1.30E-01	2.82E+00		4.18E+00	2.71E+01	7.55E+00	2.12E+00	2.61E+00	4.39E+00	
Pu-240	240.05	3.90E-02	1.19E+00		1.53E+00						
Pu-241	241.06	1.22E+00	3.58E+01								2.41E+00
Pu-242	242.00										
Pu-244	244.00										

SY-102 SOLID COMPOSITIONS

Sample ID:		102-SY-4B	102SY3T4S	102SY3T4S	102SY3T4S	102SYSolids	R-3316	R-3317	R-3318	R-3316	R-3036
n-TRUs		uCi/g	uCi/g	uCi/g	uCi/g	uCi/g	uCi/g	uCi/g	uCi/g	uCi/g	uCi/g
H-3	3.02	1.30E-03	6.20E-04								
C-14	14.00	1.80E-03			2.00E-03						
I-129	129.00	2.40E-04	2.40E-04		2.67E-04						
Nb-94	94.00	4.10E-03	2.30E-03								
Ni-63	63.00	2.90E+00	5.50E+00		4.00E+00						
Se-79	79.00	3.18E-04	1.80E-04								
Sr-90	90.00	6.76E+01		2.10E+02	6.67E+01		2.53E+02	1.88E+02	2.62E+02	1.47E+02	7.71E+02
Tc-99	99.00	2.02E-01	2.20E-01		2.00E-01	4.00E-02					
Ce-144	144.00	1.10E+00			1.33E+00						
Co-60	60.00	1.10E-01			1.33E-01		7.08E-01	5.04E-01		4.11E-01	
Cs-134	134.00	6.40E-02			6.67E-02						
Cs-137	137.00	1.50E+02		1.80E+01	1.33E+02	1.44E+01	1.54E+02	1.33E+02	1.78E+02	8.93E+01	1.01E+02
Eu-152	152.00	1.50E-01			1.33E-01		8.48E+00	6.37E+00	9.32E+00	4.93E+00	
Eu-154	154.00	1.50E+00			2.67E+00		5.51E+00	4.25E+00	5.69E+00	3.20E+00	
Eu-155	155.00										
Ru-106	106.00	1.60E+00			1.33E+00						
Sb-125	125.00	1.60E+00			1.33E+00					5.75E-01	
Zr-95	91.22						4.38E-01	3.31E-01		2.55E-01	
Tot TRU		2.44E+00	5.04E+01	8.60E+01	2.66E+01	7.24E+01	5.52E+01	2.70E+01	3.88E+01	3.21E+01	2.41E+00
Tot NonTRU		2.27E+02	5.72E+00	2.28E+02	2.11E+02	1.44E+01	4.22E+02	3.32E+02	4.55E+02	2.46E+02	8.72E+02
Tot Radionuclid		2.29E+02	5.62E+01	3.14E+02	2.38E+02	8.68E+01	4.77E+02	3.59E+02	4.94E+02	2.78E+02	8.74E+02

SY-102 SOLID COMPOSITIONS

Sample ID:		102-SY-4B	102SY3T4S	102SY3T4S	102SY3T4S	102SYSolids	R-3316	R-3317	R-3318	R-3316	R-3036
Sample Date:		10/25/88	10/25/88	10/25/88	10/25/88	7/1/88	11/1/84	11/1/84	11/1/84	11/1/84	?
Analysis Date:		6/30/89	6/30/89	7/6/90		3/23/89	3/29/85	3/29/85	3/29/85	1/10/85	10/5/84
Analyst		PNL: Scheele	PNL: Scheele	PCL: Herting		PCL: Weiss	Rockwell AL:	Rockwell AL:	Rockwell AL:	Rockwell AL:	Rockwell AL:
		& Peterson	& Peterson				Bratzel	Bratzel	Bratzel	Bratzel	Bratzel
Sample Site:		Oct'88core	Oct'88core	Oct '88 core	Oct '88 core	?	6", bottom	6", bottom	6", bottom	6", bottom	bottom (?)
Sample Notes:		Segment #4	Comp 3/4	d=1.02	d=1.5 (est)	High values	Cent. solids	Cent. solids	Cent. solids	d=1.54	d=1.65(?)
Reference:		Peterson to	Peterson to	Herting to	Kirkbride to	Weiss (PCL)	Bratzel to	Bratzel to	Bratzel to	Bratzel to	Bratzel to
		DiLiberto	DiLiberto	Sasaki	Orme	to Carothers	Gale	Gale	Gale	Gale	Tulberg
		6/30/89	6/30/89	7/6/90	12/10/92	3/23/89	3/29/85	3/29/85	3/29/85	1/10/85	10/5/84
Phase:		Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Note:		Assumed a density of 1.5 g/mL to convert from mg/g									
Specie	Mass	g/L	g/L	g/L	g/L	g/L	g/L	g/L	g/L	g/L	g/L
Ag	107.87				2.16E-01						
Al	26.98	7.20E+01	5.22E+01	1.35E+02	4.86E+01	1.32E+01	1.38E+02	1.10E+02	1.16E+02	7.80E+01	2.40E+02
As	74.92	1.02E+01			7.49E-01						
B	10.81	2.59E-01	2.92E-01		2.16E-01	4.50E-02					
Ba	137.33	4.12E-02	1.40E-01								
Bi	208.98					8.10E-01					
Ca	40.08	6.31E-01	8.54E+00	1.07E+01	6.81E+00	1.14E+01					6.75E+00
Cd	112.41				8.99E-01	9.15E-01	4.86E-01	2.25E-01	2.46E-01	2.75E-01	3.30E+00
Ce	140.12	6.31E-01	8.41E-01		9.81E-01	3.60E-01					
Cr(VI)	52.00	1.92E+00	2.32E+00	6.45E+00	1.56E+00	1.23E+00	5.45E+01	4.49E+01	6.29E+01	3.09E+01	1.38E+02
Cr(Tot)	52.00	1.99E+01	2.46E+01	3.02E+01	2.60E+01	1.23E+00	5.45E+01	4.49E+01	6.29E+01	3.09E+01	1.38E+02
Cu	63.55				1.27E+00	3.75E-01	9.41E-02	5.39E-02	8.01E-02	5.32E-02	
Dy	162.50	4.88E-02	7.80E-02								
Fe	55.85	6.70E+00	4.78E+01	6.53E+01	2.79E+01	5.66E+01	3.09E+01	1.44E+01	1.91E+01	1.75E+01	7.65E+01
K	39.10	3.58E+00	3.46E+00	1.05E+00	3.13E+00	1.20E+00	1.25E+00	3.41E-01	6.99E-01	7.05E-01	
La	138.91	1.21E-01	2.08E-01								
Li	6.94	2.08E-02	2.08E-02		2.08E-02						
Ln	157.00	1.36E+00	1.72E+00		1.57E+00	3.60E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mg	24.31	1.46E-01	2.59E+00	2.40E+00	1.70E+00	2.28E+00	2.55E+00	1.03E+00	1.34E+00	1.48E+00	3.75E+00
Mn	54.94	2.06E+00	1.89E+01	1.47E+01	9.89E+00	9.60E+00	1.05E+01	5.25E+00	6.60E+00	5.90E+00	2.97E+01
Mo	95.94	1.44E-01	1.15E-01		9.59E-02						
Na	22.99	2.91E+02	1.51E+02	1.42E+02	1.38E+02	2.37E+01					
Nd	144.24	4.33E-01	4.33E-01		4.33E-01						
Ni	58.71	4.40E-01	7.93E-01	1.34E+01	5.87E-01	8.40E-01					1.05E+00
P	30.97	1.77E+01	6.04E+00	8.70E+00		3.83E+00					7.20E+00
Pb	207.20				3.32E+00	2.58E+00					
Rh	102.91	3.09E-01	6.17E-01		5.15E-01						
Ru	101.07	6.06E-02	6.06E-01		5.05E-01						
Sb	121.75				3.65E-01						

Solid.Values

SY-102 SOLID COMPOSITIONS

Sample ID:		102-SY-4B	102SY3T4S	102SY3T4S	102SY3T4S	102SYSolids	R-3316	R-3317	R-3318	R-3316	R-3036
Se	78.96	1.07E+01			2.37E+00						
Si	28.09	1.26E+00	4.04E+00		2.25E+00	1.32E+00					
Sr	87.62	2.63E-02	2.63E-01		8.76E-02	1.65E-01					
Te	127.60	3.83E-01	3.83E-01		3.83E-01						
Th	232.04				6.96E+00						
Ti	47.90	5.75E-02	2.16E-01		1.44E-01						
Tl	204.37				2.04E+00						
U	238.03	1.95E+00			7.14E+00						
V	50.94				5.09E-02						
Zn	65.38	9.81E-02	8.83E-01		4.58E-01	7.50E-01					
Zr	91.22	9.71E-02	6.84E-01		3.65E-01						
Tot Metals:		4.45E+02	3.30E+02	4.23E+02	2.98E+02	1.33E+02	2.38E+02	1.76E+02	2.07E+02	1.35E+02	5.06E+02
Anions		g/L	g/L	g/L	g/L	g/L	g/L	g/L	g/L	g/L	g/L
F	19.00	2.48E+00		1.65E+00	5.70E+00	1.20E-01					
Cl	35.45	1.06E+01		2.55E+00	5.32E+00	1.14E+01	7.80E+00	9.00E+00	9.54E+00	4.43E+00	
NO2	46.01	6.87E+01			3.68E+01						
NO3	62.00	3.02E+02		7.40E+01	1.86E+02						
PO4	94.97	6.84E+01		1.32E+01	5.70E+01	3.00E+01				6.26E-01	
SO4	96.06	1.15E+01		2.94E+01	9.61E+00	3.00E+01	6.54E+01	2.09E+01	7.95E+01	3.57E+01	
CO3	60.01	0.00E+00			3.60E+01						
OH	17.01	2.55E+01		2.25E+00	2.55E+01						
Tot Anions:		4.89E+02	0.00E+00	1.23E+02	3.62E+02	7.15E+01	7.32E+01	2.99E+01	8.90E+01	4.08E+01	0.00E+00
Tot Org C:						1.13E+01					7.50E-01
Tot Comp:		9.34E+02	3.30E+02	5.46E+02	6.59E+02	2.16E+02	3.12E+02	2.05E+02	2.96E+02	1.76E+02	5.07E+02
TRUs		uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L
Am-241	241.06	1.46E+03	1.47E+04	1.29E+05	3.12E+04	6.79E+04	3.54E+04	1.07E+04	1.56E+04	2.06E+04	
Cm-243	243.00										
Cm-244	244.00				8.19E+01						
Cm-24x	243.56	6.45E+01	2.85E+01								
Np-237	237.05	8.85E-01	1.22E+00		1.43E+00		3.60E+04	2.67E+04	3.87E+04	2.09E+04	
Pu-238	238.05	5.55E+01	1.18E+03								
Pu-239	239.05	1.95E+02	4.23E+03		6.28E+03	4.07E+04	1.13E+04	3.18E+03	3.92E+03	6.58E+03	
Pu-240	240.05	5.85E+01	1.79E+03		2.30E+03						
Pu-241	241.06	1.83E+03	5.37E+04								3.62E+03
Pu-242	242.00										
Pu-244	244.00										

Solid.Values

SY-102 SOLID COMPOSITIONS

Sample ID:		102-SY-4B	102SY3T4S	102SY3T4S	102SY3T4S	102SYSolids	R-3316	R-3317	R-3318	R-3316	R-3036
n-TRUs		uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L	uCi/L
H-3	3.02	1.95E+00	9.30E-01								
C-14	14.00	2.70E+00			3.00E+00						
I-129	129.00	3.60E-01	3.60E-01		4.00E-01						
Nb-94	94.00	6.15E+00	3.45E+00								
Ni-63	63.00	4.35E+03	8.25E+03		6.00E+03						
Se-79	79.00	4.77E-01	2.70E-01								
Sr-90	90.00	1.01E+05		3.15E+05	1.00E+05		3.80E+05	2.82E+05	3.93E+05	2.21E+05	1.16E+06
Tc-99	99.00	3.03E+02	3.30E+02		3.00E+02	6.00E+01					
Ce-144	144.00	1.65E+03			2.00E+03						
Co-60	60.00	1.65E+02			2.00E+02		1.06E+03	7.56E+02		6.17E+02	
Cs-134	134.00	9.60E+01			1.00E+02						
Cs-137	137.00	2.25E+05		2.70E+04	2.00E+05	2.15E+04	2.31E+05	2.00E+05	2.67E+05	1.34E+05	1.52E+05
Eu-152	152.00	2.25E+02			2.00E+02		1.27E+04	9.56E+03	1.40E+04	7.40E+03	
Eu-154	154.00	2.25E+03			4.00E+03		8.27E+03	6.38E+03	8.54E+03	4.80E+03	
Eu-155	155.00										
Ru-106	106.00	2.40E+03			2.00E+03						
Sb-125	125.00	2.40E+03			2.00E+03					8.63E+02	
Zr-95	91.22						6.57E+02	4.97E+02		3.82E+02	
Tot TRUs		3.66E+03	7.57E+04	1.29E+05	3.99E+04	1.09E+05	8.27E+04	4.06E+04	5.82E+04	4.81E+04	3.62E+03
Tot n-TRUs		3.40E+05	8.59E+03	3.42E+05	3.17E+05	2.16E+04	6.33E+05	4.99E+05	6.83E+05	3.69E+05	1.31E+06
Tot Radionuclide		3.44E+05	8.42E+04	4.71E+05	3.57E+05	1.30E+05	7.16E+05	5.39E+05	7.41E+05	4.17E+05	1.31E+06

1988 AND 1990 CORE ANALYSIS COMPARISON

Filename: 3T4S.Data.Solid

3T4S.Data.Solid

1988 AND 1990 CORE ANALYSIS COMPARISON

Sample ID:		4B	3T4S	3T4S	3T4S-1	3T4S-3	3T4S-8	34COMP-6	34COMP-7	3T4S Ave	34COMP Ave
Sample Date:		10/25/88	10/25/88	10/25/88	10/25/88	10/25/88	10/25/88	2/27/90	2/27/90		
Analysis Date:		6/30/89	6/30/89	7/6/90	?	?	?	?	?		
Analyst		PNL: Scheele & Peterson	PNL: Scheele & Peterson	PCL: Herting	PNL: Lumetta & Swanson	PNL: Lumetta & Swanson	PNL: Lumetta & Swanson	PNL: Lumetta & Swanson	PNL: Lumetta & Swanson		
Sample Site:		Oct'88 core	Oct'88 core	Oct'88 core	Oct'88 core	Oct'88 core	Oct'88 core	Feb'90 core	Feb'90 core		
Sample Notes:		Segment #4	Comp 3&4	Comp 3/4	Comp 3/4	Comp 3/4	Comp 3/4	Comp 3/4	Comp 3/4		
Reference:		Peterson to DiLiberto 6/30/89	Peterson to DiLiberto 6/30/89	Herting to Sasaki 7/6/90	Draft Report 3/1/93	Draft Report 3/1/93	Draft Report 3/1/93	Draft Report 3/1/93	Draft Report 3/1/93		
Phase:		Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Specie	Mass	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%
Al	26.98	5%	3%	9.0000%	3.3600%	2.8600%	4.3100%	1.9000%	2.2400%	4.6021%	2.0700%
Ca	40.08	0%	1%	0.7100%	0.7100%	0.7800%	0.0400%	0.1600%	0.2700%	0.5618%	0.2150%
Cr(Tot)	52.00	1%	2%	2.0100%	2.3500%	2.4200%	2.7700%	1.0200%	1.1600%	2.2386%	1.0900%
Fe	55.85	0%	3%	4.3500%	4.2700%	4.3100%	5.1700%	1.0000%	1.0400%	4.2578%	1.0200%
K	39.10	0%	0%	0.0700%	0.1800%		0.1400%	0.1700%		0.1552%	0.1700%
Mn	54.94	0%	1%	0.9800%	1.7100%		2.1100%	0.2700%		1.5145%	0.2700%
P	30.97	1%	0%	0.5800%	0.4900%	0.5000%	0.1200%	0.9500%	0.7800%	0.4185%	0.8650%
Pb	207.20				0.3200%	0.3300%	0.3800%	0.0700%	0.0700%	0.3433%	0.0700%
Th	232.04				0.8600%	0.8400%	0.9100%	0.0400%	0.1000%	0.8700%	0.0700%
U	238.03	0%			0.2000%	0.2600%	0.2500%			0.2367%	
Total Metals:		8.3003%	10.7731%	17.7000%	14.4500%	12.3000%	16.2000%	5.5800%	5.6600%		

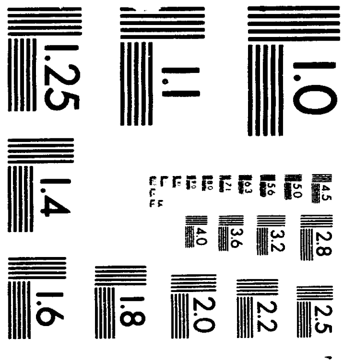
APPENDIX B

CHARGE BALANCE - METAL OXIDE CALCULATIONS

			MINIMUM NEGATIVE ION CASE						
Cation	(+/-)	Mass	Wt%	Net (+)	Anion	(+/-)	Mass	Wt%	Net (-)
Ag	1	107.87			F	-1	19.00	0.17%	-0.8701
Al	3	26.98	4.80%	53.3698	Cl	-1	35.45	0.71%	-2.0001
As	5	74.92			Br	-1	79.91		
B	3	10.81			I	-1	126.90		
Ba	2	137.33	0.00%	0.0039	NO2	-1	46.01	4.58%	-9.9499
Bi	3	208.98			NO3	-1	62.00	20.15%	-32.5000
Ca	2	40.08	0.04%	0.2101	PO4	-3	94.97	4.56%	-14.3999
Cd	2	112.41			SO4	-2	96.06	0.77%	-1.6000
Cr	3	52.00	1.33%	7.6500	CO3	-2	60.01		
Cu	2	63.55			OH	-1	17.01	1.70%	-9.9998
Fe	3	55.85	0.45%	2.4001	O*	-2	16.00	0.17%	-2.0999
K	1	39.10	0.24%	0.6100	OH*	-1	17.01	0.22%	-1.2999
Li	1	6.94	0.00%	0.0202	O**	0	16.00	1.39%	0.0000
Ln	3	157.00	0.09%	0.1733	N	-3	14.01		
Mg	2	24.31	0.01%	0.0798	P	-3	30.97		
Mn	4	54.94	0.14%	0.9997	S	-2	32.06		
Mo	3	95.94	0.01%	0.0300	Se	-2	78.96	0.71%	-1.7999
Na	1	22.99	19.43%	84.5002	C	-4	12.01		
Ni	2	58.71	0.03%	0.1002	Si	-4	28.09	0.08%	-1.2006
Pb	2	207.20			H	1	1.01		
Rh	3	102.91	0.02%	0.0601	As	-3	74.92	0.68%	-2.7228
Ru	3	101.07	0.00%	0.0119	B	-0.5	10.81	0.02%	-0.0800
Sb	3	121.75							
Se	-2	78.96							
Si	-4	28.09							
Sr	2	87.62	0.00%	0.0041					
Te	2	127.60	0.03%	0.0400					
Th	4	232.04							
Ti	4	47.90	0.00%	0.0317					
Tl	3	204.37							
U	4	238.03	0.13%	0.2185					
V	3	50.94							
Zn	2	65.38	0.01%	0.0199					
Zr	4	91.22	0.01%	0.0285					
Cation Totals (wt%/+)			26.76%	150.5619	Anion Totals (wt%/-)			35.91%	-80.5230
Wt% Cation + Anion			62.67%						
Wt% Cation + Oxide			40.56%	(calc)	OH***	-1	17.01	9.08%	-53.3698
			38.40%	(exp)	Total Anion Charge ***				-133.8928

Notes

1) Assumes that only N, P, S, B, As, Se and Si exist as oxyanions.
2) Data from Scheele and Peterson's analysis of 102-SY-4B solid
3) * includes values of mass and charge for O and OH tied up in FeOOH and MnO(OH)2.
4) ** includes mass of O tied up in borate, arsenate, selenate and silicate.
5) *** If hydroxide instead of nitrate is the counterion for aluminum in the sludge, then the total anion charge becomes -133.9, much closer to the total cation charge calculated!



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CHARGE BALANCE - METAL OXIDE CALCULATIONS

			MAXIMUM NEGATIVE ION CASE							
Cation	(+/-)	Mass	Wt%	Net (+)		Anion	(+/-)	Mass	Wt%	Net (-)
Ag	1	107.87				F	-1	19.00	0.17%	-0.8701
Al	3	26.98				Cl	-1	35.45	0.71%	-2.0001
As	5	74.92				Br	-1	79.91		
B	3	10.81				I	-1	126.90		
Ba	2	137.33	0.00%	0.0039		NO2	-1	46.01	4.58%	-9.9499
Bi	3	208.98				NO3	-1	62.00	20.15%	-32.5000
Ca	2	40.08	0.04%	0.2101		PO4	-3	94.97	4.56%	-14.3999
Cd	2	112.41				SO4	-2	96.06	0.77%	-1.6000
Cr	3	52.00				CO3	-2	60.01		
Cu	2	63.55				OH	-1	17.01	1.70%	-9.9998
Fe	3	55.85	0.45%	2.4001		Al	-1	26.98	4.80%	-17.7899
K	1	39.10	0.24%	0.6100		As	-3	74.92	0.68%	-2.7228
Li	1	6.94	0.00%	0.0202		B	-0.5	10.81	0.02%	-0.0800
Ln	3	157.00	0.10%	0.1911		Cr	-2	52.00	1.33%	-5.1000
Mg	2	24.31	0.01%	0.0798		Mo	-2	95.94	0.01%	-0.0200
Mn	4	54.94	0.14%	0.9997		V	-3	50.94		
Mo	3	95.94				Se	-2	78.96	0.71%	-1.7999
Na	1	22.99	19.43%	84.5002		Si	-4	28.09	0.08%	-1.2006
Ni	2	58.71	0.03%	0.1002		O*	-2	16.00	0.17%	-2.0999
Pb	2	207.20				OH*	-1	17.01	0.22%	-1.2999
Rh	3	102.91	0.02%	0.0601		O**	0	16.00	3.03%	0.0000
Ru	3	101.07	0.00%	0.0119		OH**	0	17.01	12.10%	0.0000
Sb	3	121.75				N	-3	14.01		
Se	-2	78.96				P	-3	30.97		
Si	-4	28.09				S	-2	32.06		
Sr	2	87.62	0.00%	0.0041		C	-4	12.01		
Te	2	127.60	0.03%	0.0400		H	1	1.01		
Th	4	232.04								
Ti	4	47.90	0.00%	0.0317						
Tl	3	204.37								
U	4	238.03	0.13%	0.2185						
V	3	50.94								
Zn	2	65.38	0.01%	0.0199						
Zr	4	91.22	0.01%	0.0285						
Cation Totals (wt%/+)			20.63%	89.5298		Anion Totals (wt%/-)			55.78%	-103.4329
Wt% Cation + Anion			76.42%							
Wt% Cation + Oxide			40.56%	(calc)						
			38.40%	(exp)						

Notes

1) Assumes that in addition to N, P, S, B, As, Se and Si existing as oxyanions, Cr, and Mo also exist as oxyanions and Al as the hydroxyanion.

2) Data from Scheele and Peterson's analysis of 102-SY-4B solid

3) * includes values of mass and charge for O and OH tied up in FeOOH and MnO(OH)2.

4) ** includes mass of O tied up in borate, arsenate, selenate, silicate, chromate and molybdate, as well as OH tied up in the Al(OH)4 anion.

CHARGE BALANCE - METAL OXIDE CALCULATIONS

			%OXIDE CASE 1		%OXIDE CASE 2	
Cation	**Charge**	**Mass**	**Wt%**	**%Oxide**	**Wt%**	**%Oxide**
Ag	1	107.87				
Al	3	26.98	4.80%	9.07%	4.80%	9.07%
As	5	74.92				
B	3	10.81				
Ba	2	137.33	0.00%	0.00%	0.00%	0.00%
Bi	3	208.98				
Ca	2	40.08	0.04%	0.06%	0.04%	0.06%
Cd	2	112.41				
Cr	3	52.00	1.33%	1.94%	1.33%	1.94%
Cu	2	63.55				
Fe	3	55.85	0.45%	0.64%	0.45%	0.64%
K	1	39.10	0.24%	0.29%	0.24%	0.29%
Li	1	6.94	0.00%	0.00%	0.00%	0.00%
Ln	3	157.00	0.09%	0.10%	0.09%	0.10%
Mg	2	24.31	0.01%	0.02%	0.01%	0.02%
Mn	4	54.94	0.14%	0.22%	0.14%	0.22%
Mo	3	95.94	0.01%	0.01%	0.01%	0.01%
Na	1	22.99	18.55%	25.00%	3.33%	4.49%
Ni	2	58.71	0.03%	0.04%	0.03%	0.04%
Pb	2	207.20				
Rh	3	102.91	0.02%	0.03%	0.02%	0.03%
Ru	3	101.07	0.00%	0.00%	0.00%	0.00%
Sb	3	121.75				
Se	4	78.96	0.71%	1.00%	0.71%	1.00%
Si	4	28.09	0.08%	0.18%	0.08%	0.18%
Sr	2	87.62	0.00%	0.00%	0.00%	0.00%
Te	2	127.60	0.03%	0.03%	0.03%	0.03%
Th	4	232.04				
Ti	4	47.90	0.00%	0.01%	0.00%	0.01%
Tl	3	204.37				
U	4	238.03	0.13%	0.15%	0.13%	0.15%
V	3	50.94				
Zn	2	65.38	0.01%	0.01%	0.01%	0.01%
Zr	4	91.22	0.01%	0.01%	0.01%	0.01%
Total % Metal Oxides				33.80%		18.29%
			Anion	**%Anion**	**Anion**	**%Anion**
			F	0.17%	F	0.17%
			Cl	0.71%	Cl	0.71%
Total Na	19.43%		Na	0.88%	PO4	4.56%
					SO4	0.77%
					Na	16.10%
Total %Anions + %Na in Salts				1.75%		22.30%
Total %Metal Oxides + %Anions				40.56%		40.59%

Notes

Calculation of %oxide in 'Maximum Negative Ion Case' resulting from calcination at 1000°C.

Case 1: Assumes all metals go to simple oxide except for NaF and NaCl. Sodium content reduced by amount tied up as fluoride and chloride salts.

Case 2: Assumes all metals go to simple oxide except for NaF, NaCl, Na3PO4 and Na2SO4. Sodium content reduced by amount of sodium tied up in these salts and added back in the anion column.

ChargeBalance.complete REASONABLE CHARGE BALANCE

		REALISTIC NEGATIVE ION CASE FOR SY-102-4B							
Cation	**Charge**	**Mass**	**Wt%**	**Net (+)**	**Anion**	**Charge**	**Mass**	**Wt%**	**Net (-)**
Ag	1	107.87			F	-1	19.00	0.17%	-0.8701
Al	3	26.98	1.44%	16.0109	Cl	-1	35.45	0.71%	-2.0001
As	5	74.92			Br	-1	79.91		
B	3	10.81			I	-1	126.90		
Ba	2	137.33	0.00%	0.0039	NO2	-1	46.01	4.58%	-9.9499
Bi	3	208.98			NO3	-1	62.00	20.15%	-32.5000
Ca	2	40.08	0.04%	0.2101	PO4	-3	94.97	4.56%	-14.3999
Cd	2	112.41			SO4	-2	96.06	0.77%	-1.6000
Cr	3	52.00	0.89%	5.1255	CO3	-2	60.01		
Cu	2	63.55			OH(anal)	-1	17.01	1.70%	-9.9998
Fe	3	55.85	0.45%	2.4001	Al(OH)4	-1	26.98	3.36%	-12.4530
K	1	39.10	0.24%	0.6100	AsO4	-3	74.92	0.68%	-2.7228
Li	1	6.94	0.00%	0.0202	B4O7	-0.5	10.81	0.02%	-0.0800
Ln	3	157.00	0.10%	0.1911	CrO4	-2	52.00	0.44%	-1.6830
Mg	2	24.31	0.01%	0.0798	MoO4	-2	95.94	0.01%	-0.0200
Mn	4	54.94	0.14%	0.9997	VO4	-3	50.94		
Mo	3	95.94			SeO4	-2	78.96	0.71%	-1.7999
Na	1	22.99	19.43%	84.5002	SiO4	-4	28.09	0.08%	-1.2006
Ni	2	58.71	0.03%	0.1002	O	-2	16.00		
Pb	2	207.20			N	-3	14.01		
Rh	3	102.91	0.02%	0.0601	P	-3	30.97		
Ru	3	101.07	0.00%	0.0119	S	-2	32.06		
Sb	3	121.75			C	-4	12.01		
Se	-2	78.96			H	1	1.01		
Si	-4	28.09			OH (MnO(OH)2)	-1	17.01	0.09%	-0.4998
Sr	2	87.62	0.00%	0.0041	O (MnO(OH)2)	-2	16.00	0.04%	-0.4998
Te	2	127.60	0.03%	0.0400	OH (Al(OH)3)	-1	17.01	2.72%	-16.0109
Th	4	232.04			OH (Al(OH)4)	0	17.01	8.47%	0.0000
Ti	4	47.90	0.00%	0.0317	OH (FeOOH)	-1	17.01	0.14%	-0.8000
Tl	3	204.37			O (FeOOH)	-2	16.00	0.13%	-1.6001
U	4	238.03	0.13%	0.2185	O (CrO4)	0	16.00	0.54%	0.0000
V	3	50.94			O (other anions)	0	16.00	1.40%	0.0000
Zn	2	65.38	0.01%	0.0199					
Zr	4	91.22	0.01%	0.0285					
Total Cation Wt%/(+)			22.96%	110.6663	**Total Anion Wt%/(-)**			51.45%	-110.6899
Wt% Cation + Anion			74.41%						
					Al (total)		26.98	4.80%	
					Cr (total)		52.00	1.33%	

Notes

1) Assumes that in addition to B as B4O7, As as AsO4, Si as SiO4 and Se as SeO4, Mo also exists as the oxyanion MoO4.

2) Chromium is assumed to be 67% Cr(III) and 33% chromate based on Lumetta and Swanson's sludge washing expt. This in turn requires the aluminum to be 30% Al(OH)3 and 70% the Al(OH)4 anion to achieve charge balance.

4) Iron assumed to be present as FeOOH and manganese as MnO(OH)2.

5) Data from Scheele and Peterson's analysis of 102-SY-4B solid

ChargeBalance.complete REASONABLE CHARGE BALANCE

	REALISTIC NEGATIVE ION CASE - ACCOUNTING FOR MISSING MASS IN SY-102-4B								
Cation	**(+/-)**	**Mass**	**Wt%**	**Net (+)**	**Anion**	**(+/-)**	**Mass**	**Wt%**	**Net (-)**
Ag	1	107.87			F	-1	19.00	0.17%	-0.8701
Al	3	26.98	4.80%	53.3698	Cl	-1	35.45	0.71%	-2.0001
As	5	74.92			Br	-1	79.91		
B	3	10.81			I	-1	126.90		
Ba	2	137.33	0.00%	0.0039	NO2	-1	46.01	4.58%	-9.9499
Bi	3	208.98			NO3	-1	62.00	20.15%	-32.5000
Ca	2	40.08	0.04%	0.2101	PO4	-3	94.97	4.56%	-14.3999
Cd	2	112.41			SO4	-2	96.06	0.77%	-1.6000
Cr	3	52.00	1.33%	7.6500	CO3	-2	60.01		
Cu	2	63.55			OH(anal)	-1	17.01	1.70%	-9.9998
Fe	3	55.85	0.45%	2.4001	Al(OH)4	-1	26.98	0.00%	0.0000
K	1	39.10	0.24%	0.6100	AsO4	-3	74.92	0.68%	-2.7228
Li	1	6.94	0.00%	0.0202	B4O7	-0.5	10.81	0.02%	-0.0800
Ln	3	157.00	0.10%	0.1911	CrO4	-2	52.00	0.00%	0.0000
Mg	2	24.31	0.01%	0.0798	MoO4	-2	95.94	0.01%	-0.0200
Mn	4	54.94	0.14%	0.9997	VO4	-3	50.94		
Mo	3	95.94			SeO4	-2	78.96	0.71%	-1.7999
Na	1	22.99	19.43%	84.5002	SiO4	-4	28.09	0.08%	-1.2006
Ni	2	58.71	0.03%	0.1002	O	-2	16.00		
Pb	2	207.20			N	-3	14.01		
Rh	3	102.91	0.02%	0.0601	P	-3	30.97		
Ru	3	101.07	0.00%	0.0119	S	-2	32.06		
Sb	3	121.75			C	-4	12.01		
Se	-2	78.96			H	1	1.01		
Si	-4	28.09			OH (MnO(OH)2)	-1	17.01	0.09%	-0.4998
Sr	2	87.62	0.00%	0.0041	O (MnO(OH)2)	-2	16.00	0.04%	-0.4998
Te	2	127.60	0.03%	0.0400	OH (Al(OH)3)	-1	17.01	9.08%	-53.3698
Th	4	232.04			OH (Al(OH)4)	0	17.01	0.00%	0.0000
Ti	4	47.90	0.00%	0.0317	OH (FeOOH)	-1	17.01	0.14%	-0.8000
Tl	3	204.37			O (FeOOH)	-2	16.00	0.13%	-1.6001
U	4	238.03	0.13%	0.2185	O (CrO4)	0	16.00	0.00%	0.0000
V	3	50.94			O (anions)	0	16.00	1.40%	0.0000
Zn	2	65.38	0.01%	0.0199	SO4 (not anal)	-2	96.06	8.00%	-16.6560
Zr	4	91.22	0.01%	0.0285					
Total Cation Wt%/(+)			26.76%	150.5497	**Total Anion Wt%/(-)**			53.00%	-150.5688
Wt% Cation + Anion			79.76%						
					Al (tot)		26.98	4.80%	
					Cr (tot)		52.00	1.33%	

Notes

1) Assumes that in addition to B as B4O7, As as AsO4, Si as SiO4 and Se as SeO4, Mo also exists as the oxyanion MoO4.

2) Aluminum is assumed to be 100% Al(OH)3 and chromium 100% Cr(III) in order to maximize the positive charge.

3) Includes the effect on the mass and the charge of adding 8% sulfate missing from the anion analysis.

4) Iron assumed to be present as FeOOH and manganese as MnO(OH)2.

5) Data from Scheele and Peterson's analysis of 102-SY-4B solid.

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END