Lead in water project, sample prep and analytical protocols

Internal standard solution

1. Partially fill a 500 ml plastic bottle with DI water.
2. Add 7 ml of high-purity nitric acid.
3. Add 0.25 ml of each of the single-element, 1000 µg/g solutions (Ga, La, Bi).
4. Fill with DI water. Element concentrations are about 500 ppb. You don't need a volumetric flask for this. All that matters is that the concentrations in the samples are all the same.

Standard stock solution

1. Partially fill a 100 ml volumetric flask with DI water.
2. Add 1.4 ml of high-purity nitric acid.
3. Add appropriate amounts of single-element, 1000 µg/g solutions.

Element	ml added to flask	Approximate concentrations, ppb
Cu	1	10000
Zn	0.5	5000
Rb	0.02	200
Sr	3	30000
Ba	0.25	2500
Pb	0.2	2000
U	0.02	200

4. Fill to volume with DI water. Transfer to a 125 ml plastic bottle.

Initial sample processing

1. Weigh the bottle on the kitchen scale, and subtract the estimated bottle weight.
2. Add to the bottle the amount of high-purity HNO_3 indicated by this formula:

$$Added\ acid\ ml = (sample\ wt. - bottle\ wt.) * 0.007\ ml$$

3. Shake the bottle.
4. Complete steps 1-3 for all samples, trying to be as efficient and accurate as possible.
5. Add 50 ml (5*10) of deionized water to blank and standard tubes (two each).
6. Add 5*0.07 ml of HNO3 to the blank and standard tubes.
7. Pipette† 10 ml of each acidified sample into a 13 ml test tube†.

Sample, blank, standard, blank processing

1. To each sample add 0.1 ml of the internal standard solution.
2. To each 50 ml blank and standard tubes add 5*0.1 ml of internal standard solution.
3. To each 50 ml standard tube add 0.5 ml of the standard stock solution.

†10 ml pipette tips are too expensive, and too hard to put on to the pipette and then throw away after each sample. Instead, leave it on the pipette and rinse by filling and emptying 10 ml of DI water.

Note that all of the solutions are diluted slightly by adding acid and the internal standard solution, but the standard is diluted a little more because of the added Standard Stock Solution. However, the calculated standard concentrations already take that into account. Therefore, no dilution factors are necessary.