# TUKHMANUK DEPOSIT

## TWO DATA SETS -- COMPARISON OF RESOURCES.

04/08/2015

### FIRST DATA SET.

The dataset represents collection of the sampling units collected between 2003 and 2008 and assayed at the lab located in Yerevan. The data was entered into spreadsheets by Linne Mining and Mego Gold staff. The data was collected at Mego Gold office using stamped and signed drill hole logs. Total number of samples -- 8,500.

### SECOND DATA SET.

The data set is a collection of the assay analyses of 2013 and 2014 years, sampled by Linne Mining lab at Tukhmanuk. The data includes sampling units (duplicate samples) taken in first data set as well as those not sampled ever before. So that the Second Data Set is an updated version of the First Data Set with extra values as well as replaced ones. Total number of samples -- 13,500.

### CONSISTENCY OF DATA SETS.

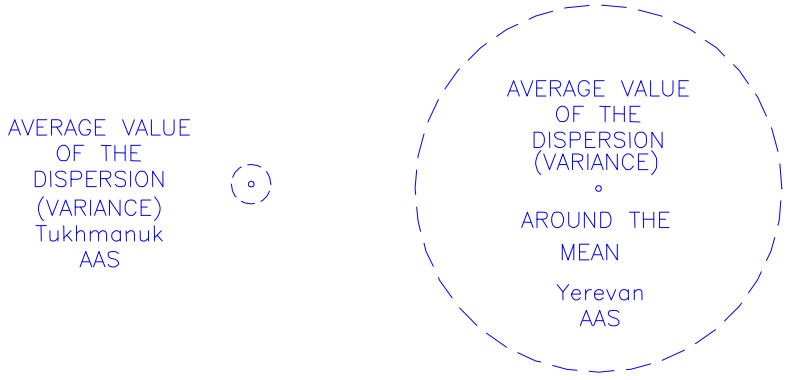
A study was done on duplicate samples, 1,500 pairs in size. The study revealed that second data set (Tukhmanuk Lab) is a lot more accurate.

ANALYSES OF VARIANCES

| MEAN | | VARIANCE | |
|---|---|---|---|
| **E-AAS** | **T-AAS** | **E-AAS** | **T-AAS** |
| 0.33875 | 0.13125 | 0.47544 | 0.05138 |

Variance, or average value of dispersion around the mean, significantly differs. In Yerevan AAS data the variance is widely dispersed around the mean, while for Tukhmanuk AAS data it is comparatively narrow with individual values dispersed narrowly around the mean.

COMPARISON BETWEEN VARIANCES OF THE TWO POPULATIONS.



***The null hypothesis*** is that there is no difference between the grades of the two measurements, that is the difference between the mean is zero since both means are supposed to be equal because we deal with *duplicate sampling units obtained from the same splits*. Therefore, the mean μ of zero is also zero.

***The alternative*** **hypothesis** is that the measurements come from population with different means, or the mean of the population from which the sample has been taken is significantly different to the known population μ.

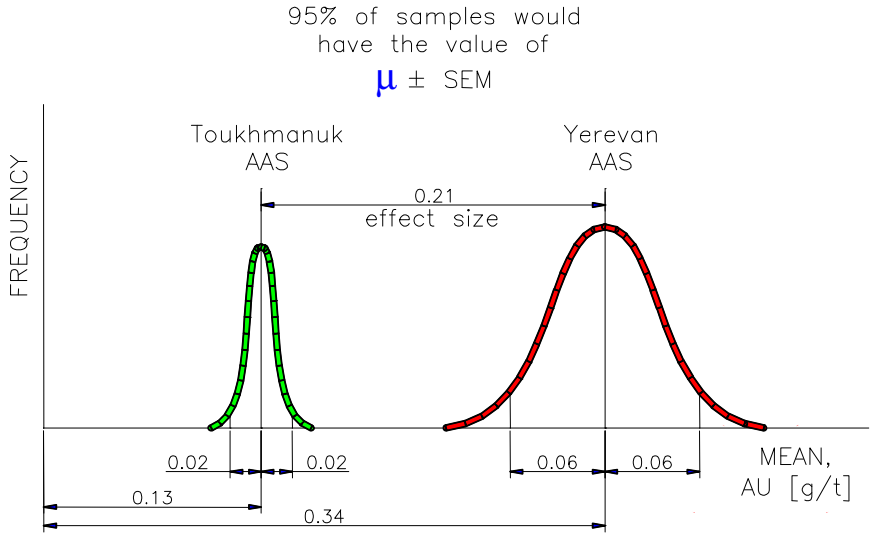
***t***-Statistics shows the number of 7.28 standard deviations it is away from the sample mean, which exceeds greatly the 95% confidence level of 1.964. The difference is significant.

**The result is consistent with the alternative hypothesis!**

The risk of inappropriately rejecting the null hypothesis (Type 1 error) is very little since the ***t***-Statistics is far above the confidence level, 7.28 against 1.96.

Type 2 error $\beta$, when the null hypothesis is not rejected even though it is false, is also not significant because of the rather wide **side effect** compared to the range of mean (1.96*SEM) for both treatments. Drawing shows no potential for overlap of the two distributions due to wide side effect, narrow expected range of the mean (variance) in Tukhmanuk AAS measurement and despite comparatively wide range of the mean in Yerevan AAS.

Probability of making the correct decision, **power of test**, being a converse value of probability of Type 2 error ($\beta$), calculated as 1- $\beta$, is close to 100%, which is common for a large number of sampling units.




Other way of comparing a sample mean of the two measurements to determine if the Tukmmanuk AAS sample comes from the Yerevan AAS population, is to check if Tukhmanuk mean occurs within the range of of Yerevan mean μ ± 1.96*SEM, which is the 95% confidence interval. Tukhmanuk mean is out of the interval.

**The mean of the population assayed at Tukhmanuk is significantly different to the known mean of the population assayed at Yerevan AAS.**

It is easier to calculate the confidence level dividing the distance between the sample mean (Tukhmanuk lab) and known population mean (Yerevan lab) by stabdard error of the mean. This ratio gives a number called **Z statistics** (www.cambridge.org/9780521763226):

$$Z = \frac{\overline{X} - \mu}{SEM}$$

If the value of Z is below −1.96 or above +1.96, the mean of the population is significantly different to the sample mean

$$Z = \frac{0.131252 - 0.338748}{0.0284} = -7.2993$$

There is only 5% probability ($\alpha$) of rejecting the null hypothesis (of no difference between two means). The Z statistics being far away from the interval of ±1.96 gives zero chances to Type 1 error – rejecting the null hypothesis even if in reality the hypothesis is correct. Converse to $\alpha$, the probability of not making Type 1 error is 1–$\alpha$, or 95%.

**The confidence level shows the control sample is not from the population with the same mean. Though, it does not specify, which of the two treatments is correct.**

# RESOURCE MODELS.

## FIRST DATA SET (Mego Gold Data)

Block model **##tmmod.bm**, populated with grades from the First Data Set. Preliminary mining plans include the following data:

| Plan | Ore [t] | Waste [t] | Strip R. | AU g/t | AG g/t |
|---|---|---|---|---|---|
| 1 Year | 470,690.74 | 3,098,757.48 | 1/7 | 0.78 | 3.07 |
| * 3 Years | 1,017,781.96 | 15,522,384.54 | 1/15 | 0.87 | 3.16 |
| ** 5 Years | 4,758,011.44 | 164,070,388.56 | 1/34 | 0.62 | 3.78 |

| | | | Metal In-situ | |
|---|---|---|---|---|
| | Tons | Grade | g | oz |
| **Ore** | 4,758,011.44 | 0.62 | 2,966,673.60 | 95,380.77 |
| **Dilution** | – | 0.85 | 2,521,672.56 | 81,073.66 |
| **Recovery** | – | 0.75 | 1,891,254.42 | 60,805.24 |

## SECOND DATA SET (Mego Gold data updated with Tukhmanuk Lab figures of 2013.)

Block model **##tmmod.bm**, populated with grades from the Second Data Set. Preliminary mining plans include the following data:

| Plan | Ore [t] | Waste [t] | Strip R. | AU g/t |
|---|---|---|---|---|
| 1 Year | 285,393.42 | 4,632,110.08 | 1/16 | 0.82 |
| * 3 Years | 750,014.46 | 20,453,999.28 | 1/27 | 0.79 |
| ** 5 Years | 2,940,425.28 | 165,887,974.72 | 1/56 | 0.86 |

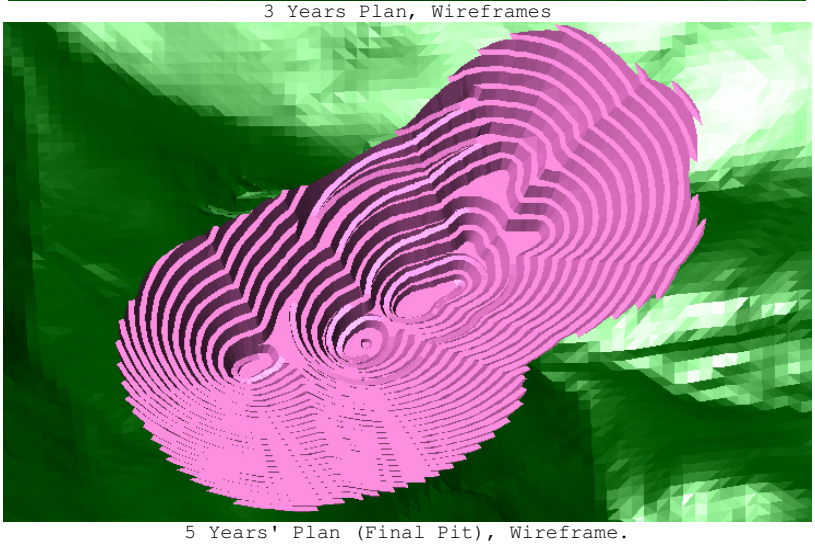
| | | | Metal In-situ | |
|---|---|---|---|---|
| | Tons | Grade | g | oz |
| **Ore** | 2,940,425.28 | 0.86 | 2,533,219.61 | 81,444.90 |
| **Dilution** | – | 0.85 | 2,153,236.67 | 69,228.17 |
| **Recovery** | – | 0.75 | 1,614,927.50 | 51,921.12 |

*) Scenario of 3 years' plan does not include 1st year plan.
**) Scenario of the 5 years' plan (final pit) was to estimate the whole mineralization and waste required to mine it. Includes 1 and 3 year plans.

CONCLUSION. The updated model shows a little bit higher grade at the expense of extra data, though less ore in resources.

First Year Plan, Wireframes

3 Years Plan, Wireframes



5 Years' Plan (Final Pit), Wireframe.

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