# 10 Sampling Method and Approach (Item 14)

***This section is partly excerpted from Technical Report Black Fox Project Matheson, Ontario, Canada by Mine Development Associates, August 14, 2006 and has been standardized to this report.***

## 10.1 Noranda Sampling

Little documentation is available describing the details of Noranda's sampling procedures. During the late 1980's it was not a standard component of project reporting to document the sampling procedures. Corporate standards of Noranda have always been to collect a representative sample. The core was logged for geology and geotechnical parameters and then cut in half with a diamond saw. The samples were then sent to either Swastika Labs or Chemex Labs in Rouyn, Quebec.

## 10.2 Exall Sampling

### 10.2.1 Exall Diamond Drilling

*The core was brought to the surface where the geologist logged and sampled it. The core was split in half with a diamond saw. Prior to the installation of the mine site laboratory, Techni-Lab provided sample preparation of a 30g sample and completed a fire assay of the sample. All samples above 34.3gpt-Au were check assayed, as well as each 20$^{th}$ sample.*

*When the mine site laboratory was operational, they completed the analysis of the split core. Techni-Lab assayed the occasional overflow that the Exall lab could not handle.*

## 10.3 Apollo Sampling

The sampling procedure begins with the geologist defining each sample interval and designating such with a sample tag documented in a sample book. They next mark the core with a center line cut mark and replace the core box lids for transfer to the sawing station. In the sawing room technicians saw the core sample in half with a diamond saw and place one half in a bag which is marked with the sample number and includes a sample tag. The half core that remains in the core box has the lid replaced and is placed back in the rack by the technician. Blank and standard samples are inserted approximately every twenty samples and are numbered in sequence with the core samples. The samples are then stored inside the core facility until they are picked up by Swastika Laboratories (Swastika) from Swastika, Ontario. The samples are placed into their truck, with each sample being checked off a list as it is being loaded and then taken directly to the laboratory where they are unloaded into a secure facility. At the logging area, once a truck load of split core has accumulated, the boxes are labeled with hole number and footage on stainless steel tags and then moved to, covered ,storage racks located outdoors.

## 10.4 Black Fox Deposit Sampling Issues

Prenn (2006) reports what MDA considers, two serious sampling issues at the Black Fox deposit. Both of which are related to coarse gold and sample size resulting in analyses that tend to report less gold than is actually present. The first issue relates to obtaining a large enough sample to represent the area it will influence. The gold at the Black Fox deposit appears to be concentrated in small areas causing drillhole samples to occasionally get too much gold in the sample or more commonly, missing the area of concentration and get too little gold in the sample.

The second issue relates to the particle size and distribution of the gold. When the particles are relatively large and not evenly distributed, the core holes can be too small to obtain a representative sample. This has a similar effect, in some cased it will over estimate the gold content but more typically underestimate it. Some samples may even appear to be waste having not encountered any gold particles that may be located relatively close by. It is likely that holes several meters in diameter would be required to obtain representative samples of the deposit. Prenn (2006) compared the areas that were mined with the drilling present and found many instances of drill indicated waste which were subsequently stoped.

This second issue is accentuated by getting the representative amount of gold in the sample pulp once the core sample has been split, crushed, split again and then pulverized. Gold particles up to 0.15cm have been observed and particles of 0.06cm are very common (Pitard, 2005). With gold this coarse, it is easy to create sub-samples that contain too many or too few gold particles if the sample size is not based on the size of the gold particles in the deposit. In order to sample the 0.15cm gold particles that occur at Black Fox, samples of up to 109kg must be processed in their entirety (Pitard, 2005). If the sample contains 0.06cm gold particles, which commonly occur in the deposit, a 7kg sample must be processed in its entirety (Pitard, 2005). These sample sizes are much larger than the typical 30g fire assay sample or even the generally larger than the 1,000g screen metallic assay sample. Once again, the samples result in a few assays containing too much gold, with far more containing less than is actually present in the whole sample.

Without proper size samples the database for the deposit likely contains a few samples that are too high in grade, but far more that are too low in grade. Francis Pitard concluded in his 2005 report on Black Fox mineralization that:

- *"The size of the core samples can account for local geology, but cannot account for the local gold content: Relative to the size of the coarse gold, the core mass is too small. The resulting effect is called the In Situ Nugget Effect: It is of the utmost importance for management to understand it;*
- *As a result, Poisson skewness enters the database, leading to a frequent under-estimation of many ore blocks, and an occasional over-estimation of a few ore blocks;*
- *Such skewness, if carried too far, as I believe is the case, can under-estimate the gold content of the deposit. However, and this is very important, it is an undeniable fact that the Ore Reserves are under-estimated. This is something to keep in mind: Poisson skewness affects the grade somewhat, but above all, makes a disaster on the estimation of the Ore Reserves, unless you are very lucky by having sharp, natural and obvious ore boundaries (e.g., Midas mine in Nevada); and*
- *By the time the sample is taken to the laboratory sample preparation, you have already lost its main purpose which is to be reasonably representative of all gold particle size fractions. Then, the preparation and assaying procedure, ignoring the potential presence of coarse gold, makes things even worse, most likely introducing a superimposed secondary Poisson skewness in the database."*

Prenn (2006) concurs with Pitard's (2005) conclusion, that the drillhole data is likely biased and will likely underestimate the contained gold within the deposit.

SRK concurs with the observations and opinions of Prenn (2006) and Pitard (2005) as discussed above. Based on these observations and opinions, SRK has put significant emphasis into

creating the Resource estimate described below which approximates the historical production while remaining conservative.

# 11 Sample Preparation, Analyses and Security (Item 15)

## 11.1 Sample Preparation and Analyses

***This section is partly excerpted from Technical Report Black Fox Project Matheson, Ontario Canada by Mine Development Associates, August 14, 2006 and has been standardized to this report.***

### 11.1.1 Noranda Drill Sample Preparation and Analysis

The first phase of the Noranda drilling was processed by Min-En Laboratories Ltd. and TSL Laboratories (Holes 1-17). Noranda then used Swastika or Chemex Labs for analysis of the remainder of the samples. Noranda instructed the assay lab to prepare a 15g sample for analysis, and to re-run samples if the initial analysis was greater than 2gpt-Au using a 30g sample. The Noranda assay lab used the flowsheet shown in Figure 11-1 to prepare and assay the samples received from Noranda, most of which weighed from 1 to 5kg.

### 11.1.2 Exall Drill Sample Preparation and Analysis

Exall utilized Techni-Lab to complete the assaying of their drillholes until the mine site lab was completed. After completion of the mine site lab in February 1999, most of the assaying for the muck and chip samples was completed at the on-site laboratory, with Techni-Lab used for the drillhole samples, overflow and check assaying.

Techni-Lab dried and crushed the sample to 10 mesh, where a 300g split was taken. The 300g sample was pulverized to 80% -200 mesh. A 30g sample was split from the pulverized material for fire assay with AA finish. Exall requested checks on all assays exceeding 34.3gpt-Au. The Techni-Lab internal checks agreed well with the original sample.

### 11.1.3 Exall Mine Site Assay Lab Procedures

Blank samples were introduced with regular samples to verify the accuracy and to see if any contamination was present at the lab. Split assay pulps were sent to an external lab for comparison to verify the accuracy of the Exall mine site laboratory. From January 27 to February 25, 1999 a total of 370 samples were sent to Techni-Lab in Ste. Germaine Boule, Quebec. The difference between the Exall Lab and Techni-Lab was an average of 1.45%.

### 11.1.4 Apollo's Drill Sample Preparation and Analysis

Apollo saws the core and ships ½ of the drill core to either Swastika or SGS Laboratories. The labs prepare a 30g sample for fire assay with a gravimetric finish. The core is first crushed -10 mesh and a 400g split is then pulverized. As a quality check, the coarse reject sample material from each mineralized zone, over 1.0gpt is sent to the other lab. The rejects are re-split, pulverized and re-assayed using a 30g fire assay with a gravimetric finish. This procedure provides a check on the entire assay process, from sample prep through the gravimetric finish. Many of the higher grade samples are run with a screened metallic fire assay. All check data is subjected to a standard QA/QC analysis.

Swastika sends certificates of Analysis and electronic data files directly to the Apollo office in Matheson, Ontario. Hard copy results and assay certificate are also faxed to Apollo. The faxed certificates, are marked up with specific hole intervals and cross checked to the digital file for

errors. After confirmed to be correct, the faxed copies are stamped complete, and added to the audit file for back referencing. The digital assay file is cut and pasted directly into the electronic core logs. Once the results are pasted in, the sample numbers are cross-referenced to ensure no pasting errors occurred. The completed drilling logs are then saved into a separate file. Once the logs are complete with all assays, they are saved as a "DC" file. The "DC" files are put into a locked folder on the Black Fox database, which can only be accessed as a read-only file. All editing of these files must be done through the Administrator (Project Manager). Once the file has been saved to this folder, the file is sent to Apollo's offices in the USA for modeling and reporting purposes. If the assays results are not complete, the file will be saved as a "Pending" file, and is stored in an incomplete assays folder until final assay results are posted. All reported assays are final assays, and original certificates of analysis are stored in a separate binder and stored in a fire proof safe at the Black Fox mine site. All assay reporting goes through the Black Fox Project Manager.

## 11.2 QA/QC Analyses

### 11.2.1 Summary

During the development of the SRK pre-Feasibility Study, Analytical Solutions (ASL) of Toronto Canadawas contracted to provide an independent QA/QC review of historical and current sampling at Black Fox (Bloom 2006, 2007). The following paragraphs summarize their findings

*ASL has been contracted to review documentation related to assay quality control and sampling for the Black Fox mine. The principal objective is to justify use of the existing assay database for Resource calculations. There has been considerable work by other consultants on the same subject and it is no intention to repeat the previous work.*

*The focus of the studies by ASL is to determine (a) whether there is any evidence of bias in the assay database and (b) the effect of coarse gold on the reliability of the assays.*

*The Black Fox assay data includes 128,026 assays. The 50$^{th}$ percentile for the dataset is 0.06gpt, the 90$^{th}$ percentile is 0.77gpt and the 95$^{th}$ percentile is 2.23gpt. It is apparent that only the upper 5% of the samples will influence the Resource calculation and the focus of the review should be this relatively small percentage of samples in the database.*

*No evidence has been found by previous consultants, who have done extensive reviews of procedures and data, of a bias in the gold assays. A systematic bias over a significant amount of time would affect a Resource calculation but this problem has not been identified.*

*Concerns have been raised regarding sample representivity of the Black Fox deposit. Thousands of pulp and reject duplicates confirm that it is difficult to reproduce assays within an arbitrary ± 10% but the assay reproducibility is typical of similar deposits and does not represent a material* risk.

The historic check sampling on the project appears to be weak based on current QA/QC requirements for similar styles of gold mineralization. The Noranda check assays appear to be limited to only the same assay pulps. In general, they show reasonable agreement on the mean grade, however individual sample variance is relatively high. The Exall check assay program also was conducted on the same assay pulps. Techni-Lab, who conducted the majority of the

exploration assaying for Exall, have been shown in a previous report to produce good reproducibility of the assay pulps.

Apollo has implemented a significantly improved check assay program where there is a check assay on each mineralized interval. In addition to the blank and standard check samples, Swastika runs its own internal check samples. All of the samples are run using a 30g fire assay. Relatively higher-grade zones are selected from the fire assay results by Apollo personnel and these intervals are re-run with a 1,200g screened metallic assay. Two of these samples are selected out of each ore zone at random and the rejects are sent to SGS Laboratories in Rouyn, Quebec where they are re-prepped and run for a second screen metallic assay. This is used as the quality check on the first assay set run by Swastika. All of the assay data is sent to Apollo in digital format where it is merged with the geological spreadsheet for that hole.

### 11.2.2 Noranda Check Assays

The Noranda data includes 196 reruns of 15g samples of the original 15g samples. The reruns average 4.6% lower grade than the original samples, as shown in Figure 11-2. The samples over 2g were noted to be rerun by a 30g sample, however most of this data is not in the digital database. Reruns of 80 samples indicate the reruns of 30g are higher in grade by about 5% than the original 15g sample, as shown in Figure 11-3. Evens (1997) of Roscoe Postle Associates Inc. (RPA) reports that Noranda checked about 10% of their assays.

The Noranda assay sample distribution is missing the high-grade found in all the other drill programs as shown in Figure 11-3. Prenn (2006) has recommended that check assays should be completed on the Noranda core that remains by metallic assay. These should be completed on intervals inside mineralized zones and just to the outside.

### 11.2.3 Exall Check Sampling

Techni-Lab batched samples in groups of 24. Each group contained at least one blank sample, one standard sample and duplicate samples. Routine checks were taken on about 5% of the samples and all samples over 34.3gpt-Au, however the check assay data is not present in the assay database. The statistics from past programs however are included in past RPA audits of the deposit Resources and Reserves for Exall. These indicated very good agreement between the Techni-Lab original assay and the Techni-Lab duplicate on thousands of checks of the same pulp.

### 11.2.4 Apollo Check Assaying

**Metallic Check Assays**

Apollo has completed screen metallic assays on 594 samples. Of these, 512 assays can be compared to normal fire assays. The screen metallic assays are 17% higher in grade than the average of the fire assays from these intervals. A total of 289 screen metallic assays are higher in grade to the average of the fire assays, while 223 are equal to or lower in grade. Prenn (2006) believes that screen metallic assays are essential in obtaining a sample assay that is more representative of the gold in the core sampled. Other assay methods will find too much gold on occasion, but the majority will find less than is in the core. Figure 11-4 shows the comparison of the metallic assays to the fire assays.

## Standards and Blanks

Apollo submitted standards and blanks within each set of samples submitted for assay. Four labs were used with most of the assays completed by Swastika. Figure 11-5 shows that over several thousand tests that were completed the blanks typically agree.

A number of sample standards have been run within each group of samples. Figures 11-6 and 11-7 show the two most common high-grade and low-grade standards respectively. Swastika has reported reasonable ability to accurately assay the standards.

The following ranges were used to pass or fail the blanks and standards:

- Blank > 0.03gpt-Au = Fail;
- Standard 1.422 >1.528 or <1.322 = Fail;
- Standard 11.27 >12.03 or <10.63 = Fail; and
- Standard 9.62 >10.28 or <9.00 = Fail.

If the blank or standard failed, then the entire batch (20 samples) would be re-assayed, as well as the failed standard or blank.

## Check Assays on Sample Pulps

A total of 8,425 sample pulps have been rerun by the original assayer. These samples indicate good agreement between the original sample and the rerun sample as shown in Figure 11-8. The check needed to be within ± 10%. If not, the pulp would be re-assayed a second time.

## Checks on Sample Rejects

A total of 2,618 assay intervals have been checked by a different lab using splits from the sample rejects. The results indicate that the original sample is higher than the check by about 4%. This comparison is shown graphically in Figure 11-9. Of the 2,618 checks, a total of 905 or about 35% have differences of greater than 30%. If the checks were not within 20%, a second pulp would be prepared from the rejects. Figure 11-10 is a graph of the relative difference between the original and the checks. These differences are very significant and point out the need for a more substantial sampling and assaying program.

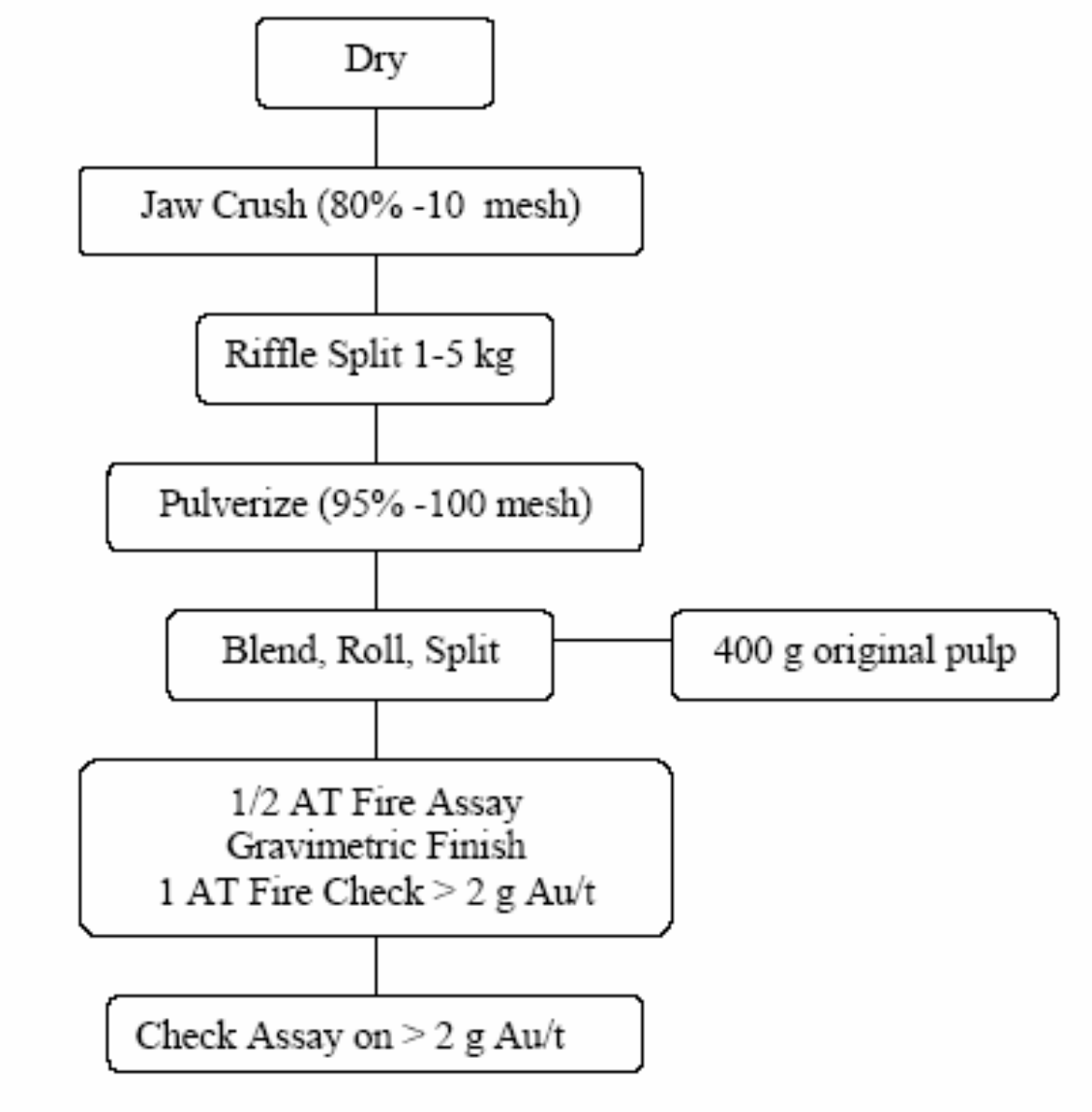
## Mini-Bulk Sample Checks

Large composites averaging about 14kg in weight were made by combining drillhole core and/or rejects. Typically, nine drillhole intervals were composited into one mini-bulk sample, however the range was 4 to 17kg. A total of 47 composites were made from mostly ore-grade intervals. Twenty-one of the 47 ore-grade composites contained high-grade. Since these tests use a much larger sample than the assay pulp, one would expect in a coarse gold deposit that the results of the mini-bulk sample gravity tests would be more reliable than the 30g pulps used for fire assay. The results of the 47 ore-grade mini-bulk gravity tests indicated a 9% lower grade in the mini-bulk samples compared to the individual assays. This is the opposite of what would be expected, and it is likely due to more high-grade material being in the mini-bulk samples than in the deposit as an average. Figure 11-11 shows the comparison of the original drillhole assays to the mini-bulk sample average grade. The six waste mini-bulk samples showed an improvement in grade of 1382.3% compared to the individual core assays. One of the waste samples averaged 0.00gpt-Au from the drillhole intervals and 2.82gpt-Au from the mini-bulk composites. The

other five mini-bulk samples were not assayed prior to testing. One of these samples averaged 1.38gpt-Au from the mini-bulk test.

## 11.3 Summary

After the core was logged, the core samples were split by a diamond saw to obtain the assay lab sample. The 50% split was bagged at the site and either picked up by assay lab personnel or shipped to the assay lab. The sample was dried, crushed, split, pulverized, and blended to obtain fire assay pulps. The labs prepared 15g to 30g assay ton samples for assay. Most of the assays were completed by fire assay methods with a gravimetric finish.

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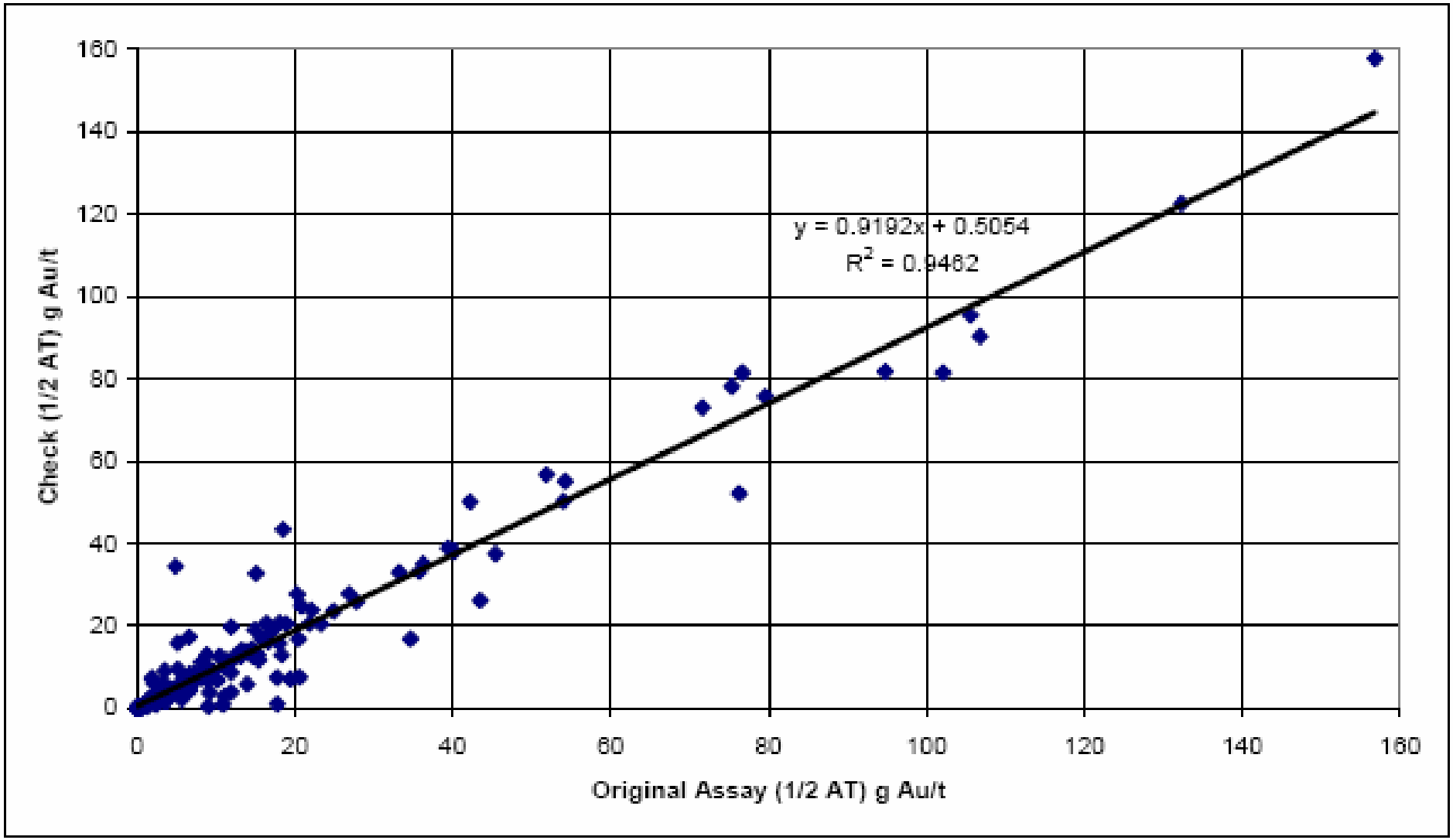
| SRK Consulting<br>Engineers and Scientists | **Black Fox,<br>Timmins, Ontario, Canada** | **Flowsheet for Swastica and Chemex Lab Sample Preparation and Assaying Procedure for Noranda** |
| SRK Job No.: 144418 | **Source: Mine Development Associates** | Date: 07-10-07 \| Approved: BAS \| Figure: 11-1 |
| File Name: Figure 11-1.doc | | |

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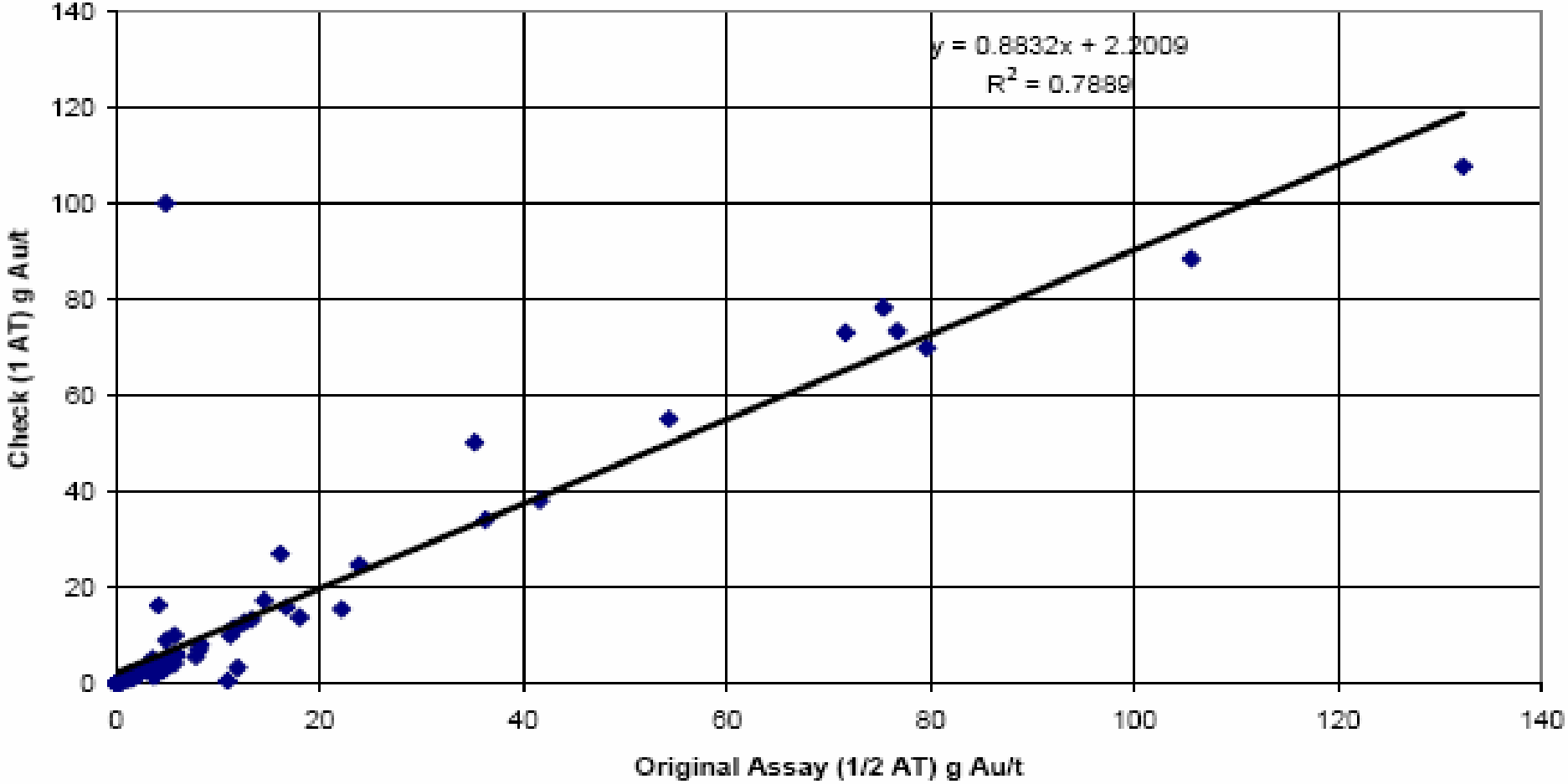


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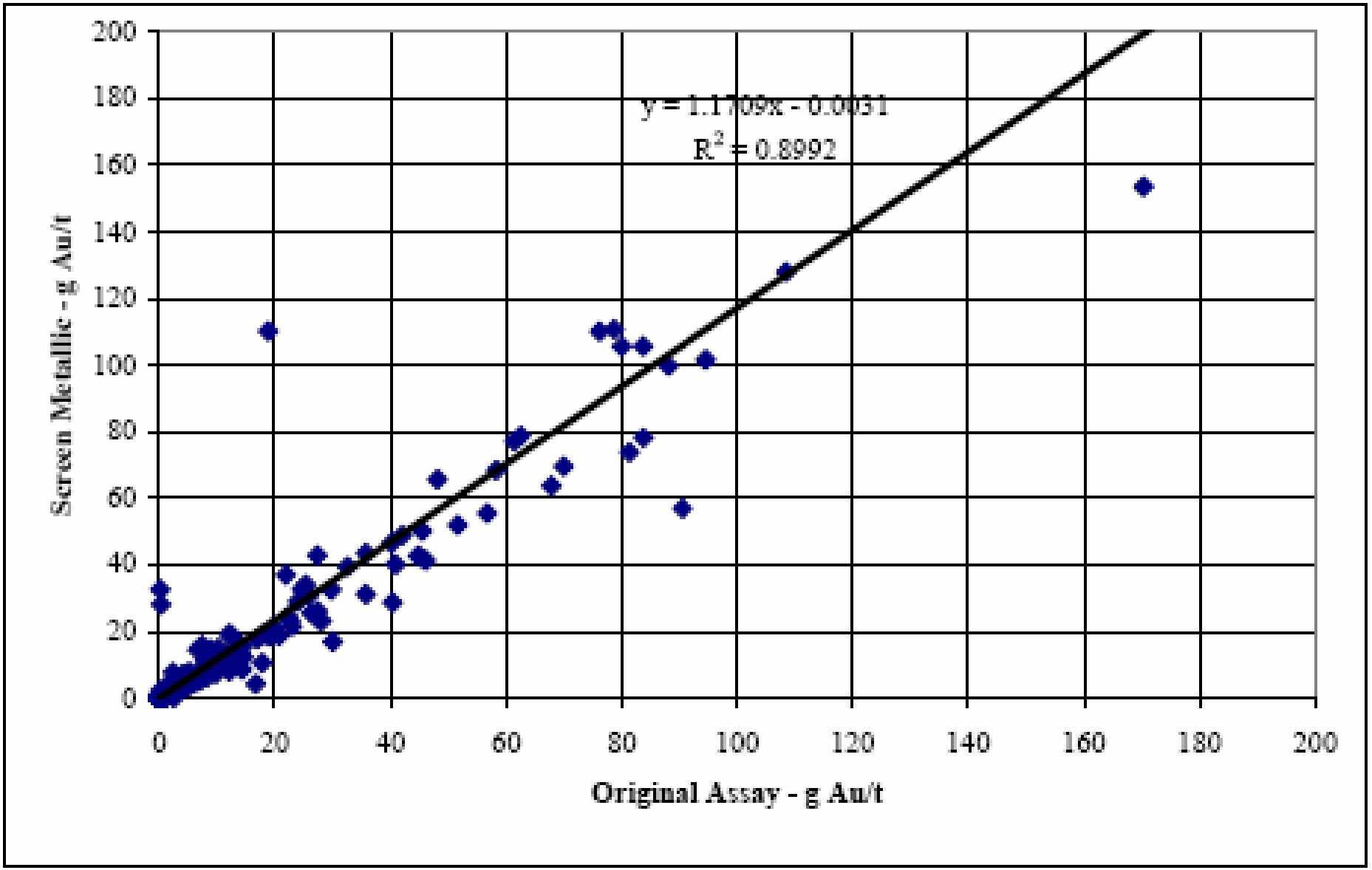


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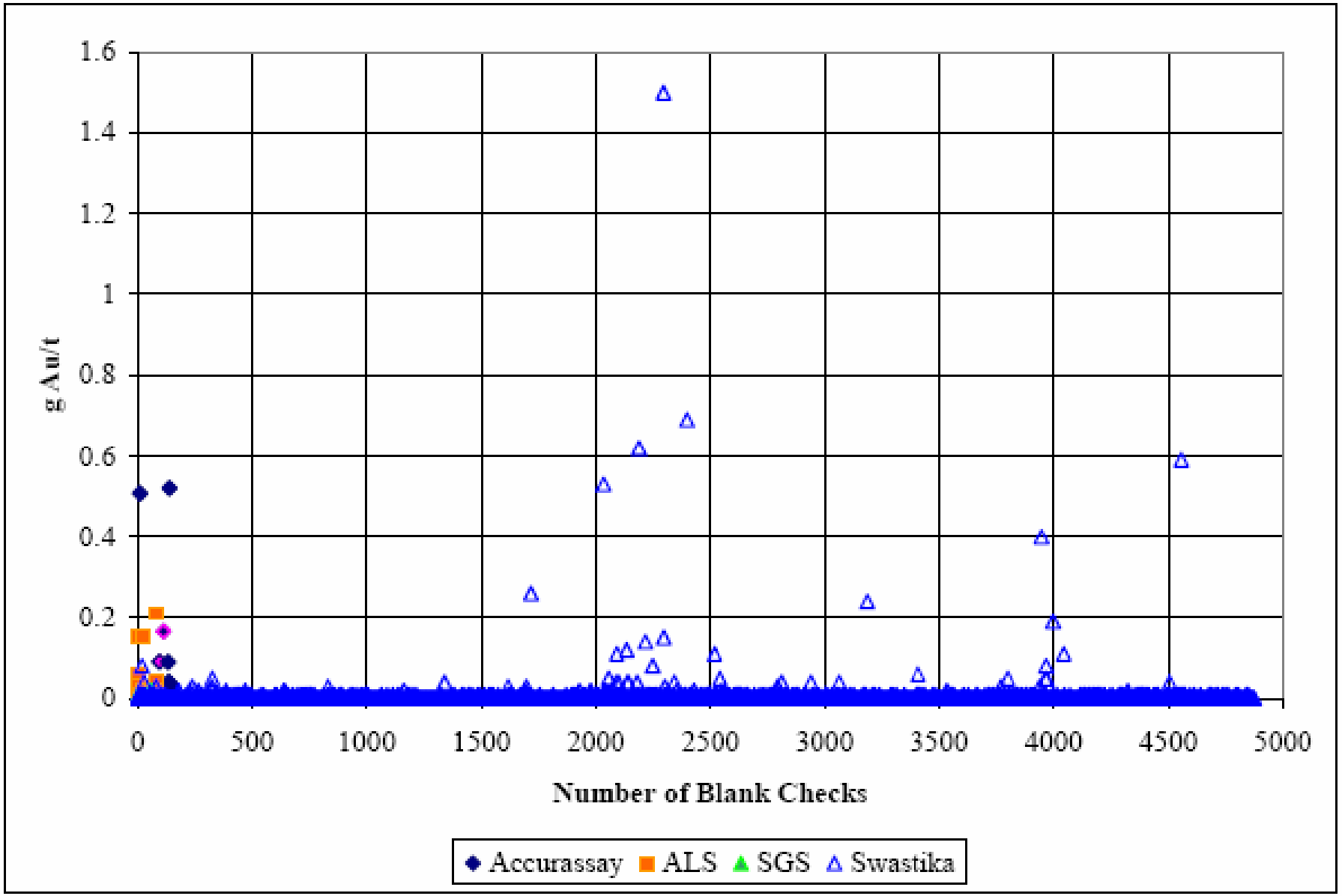


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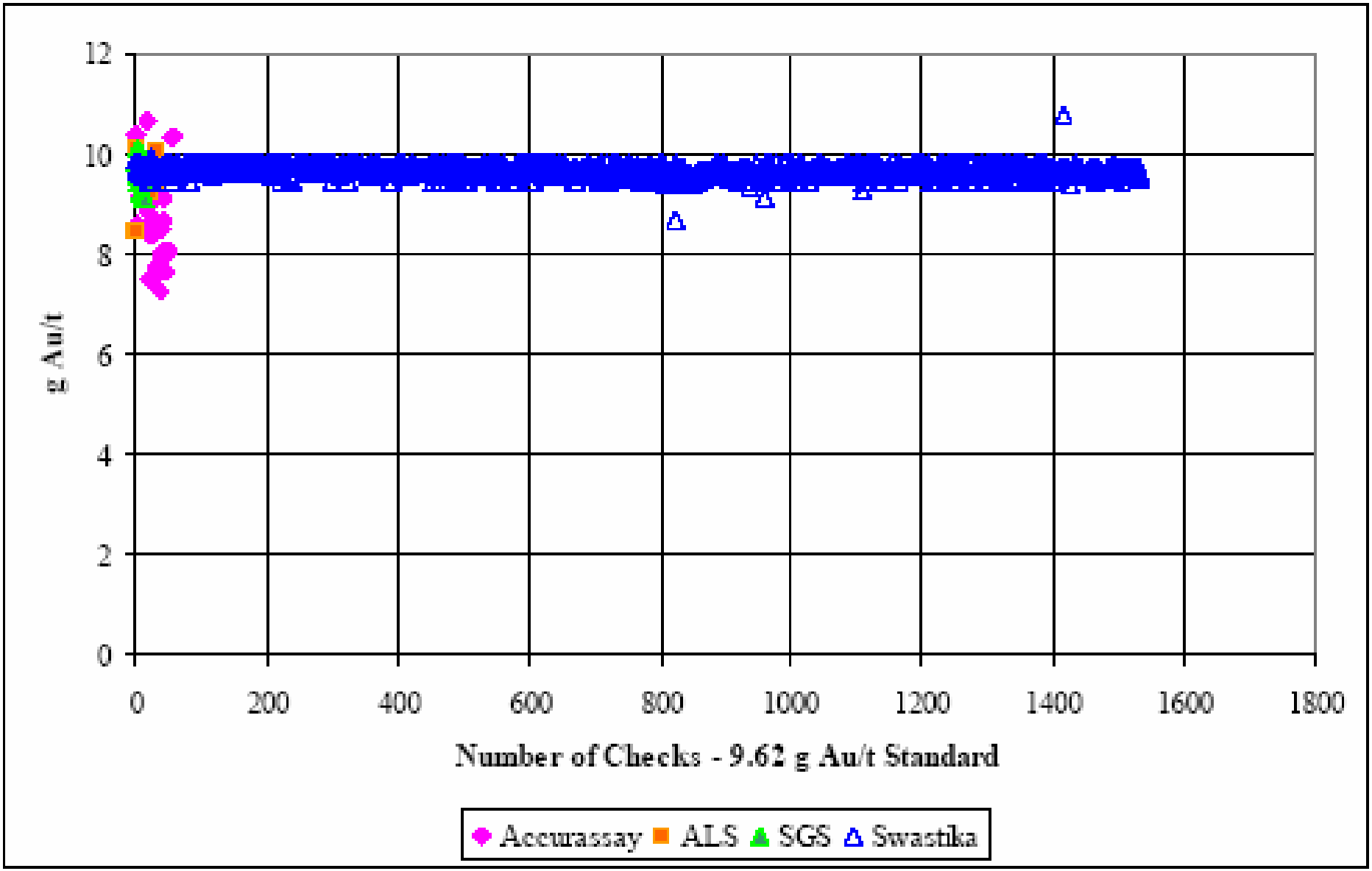


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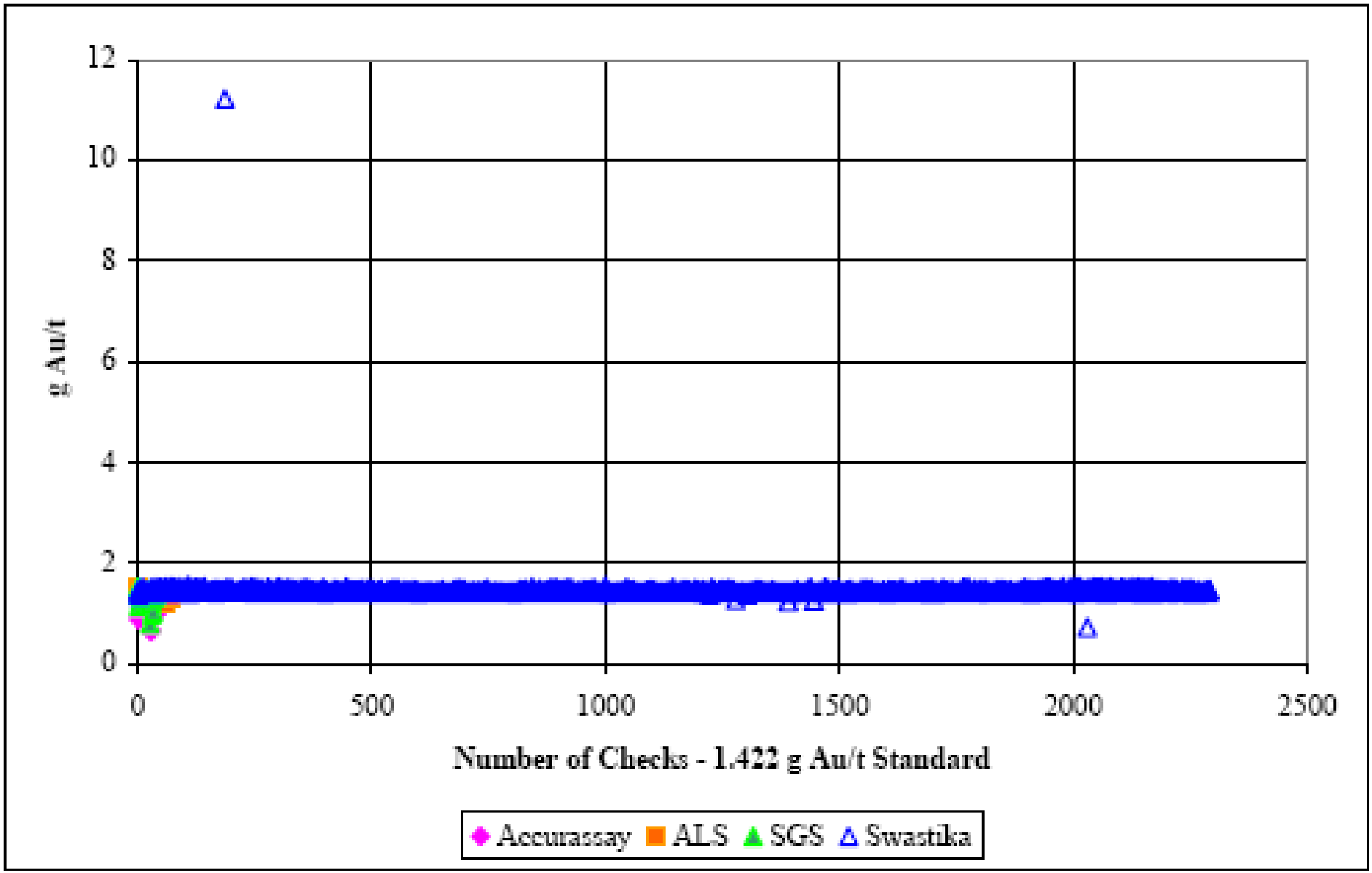


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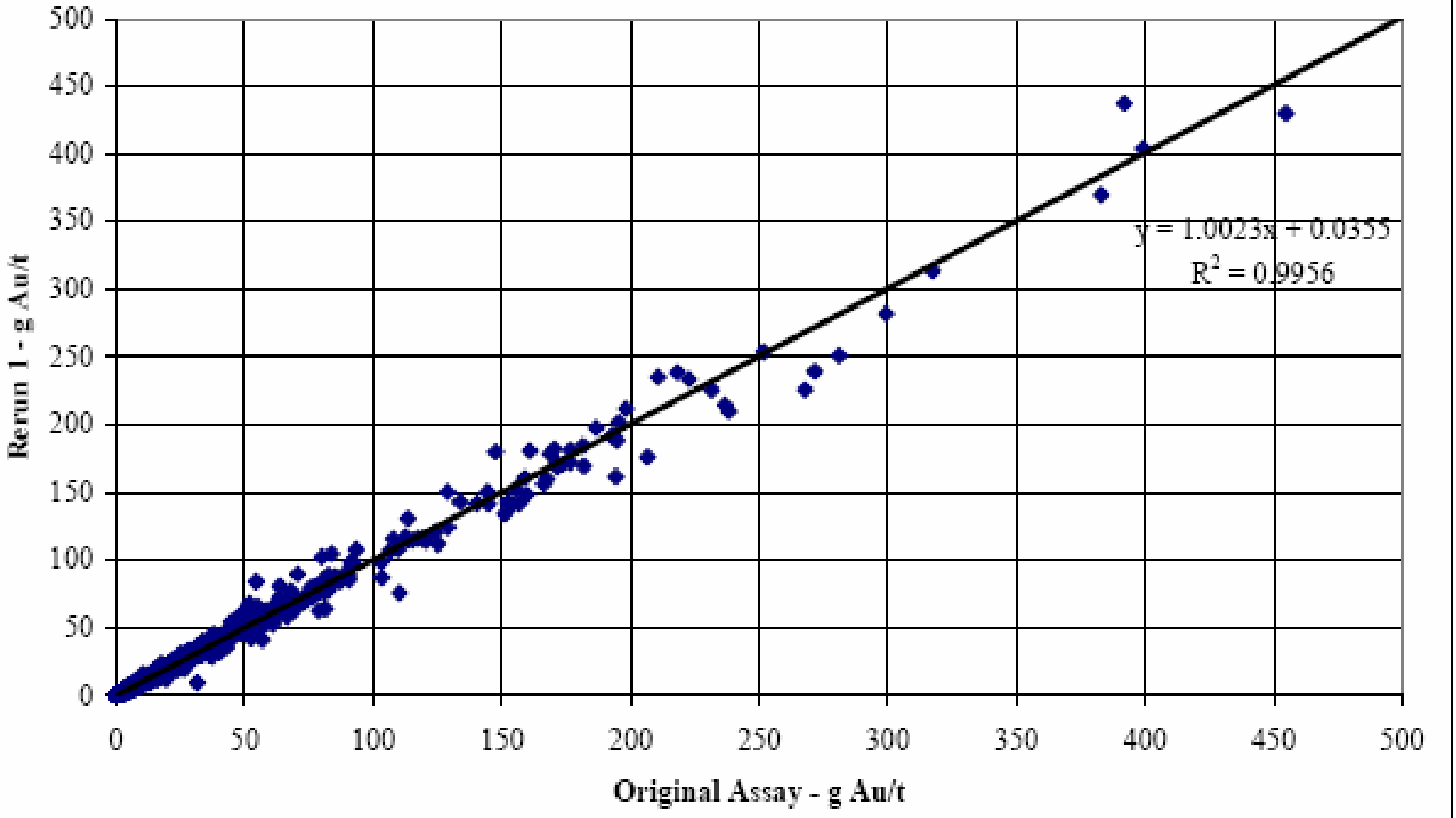


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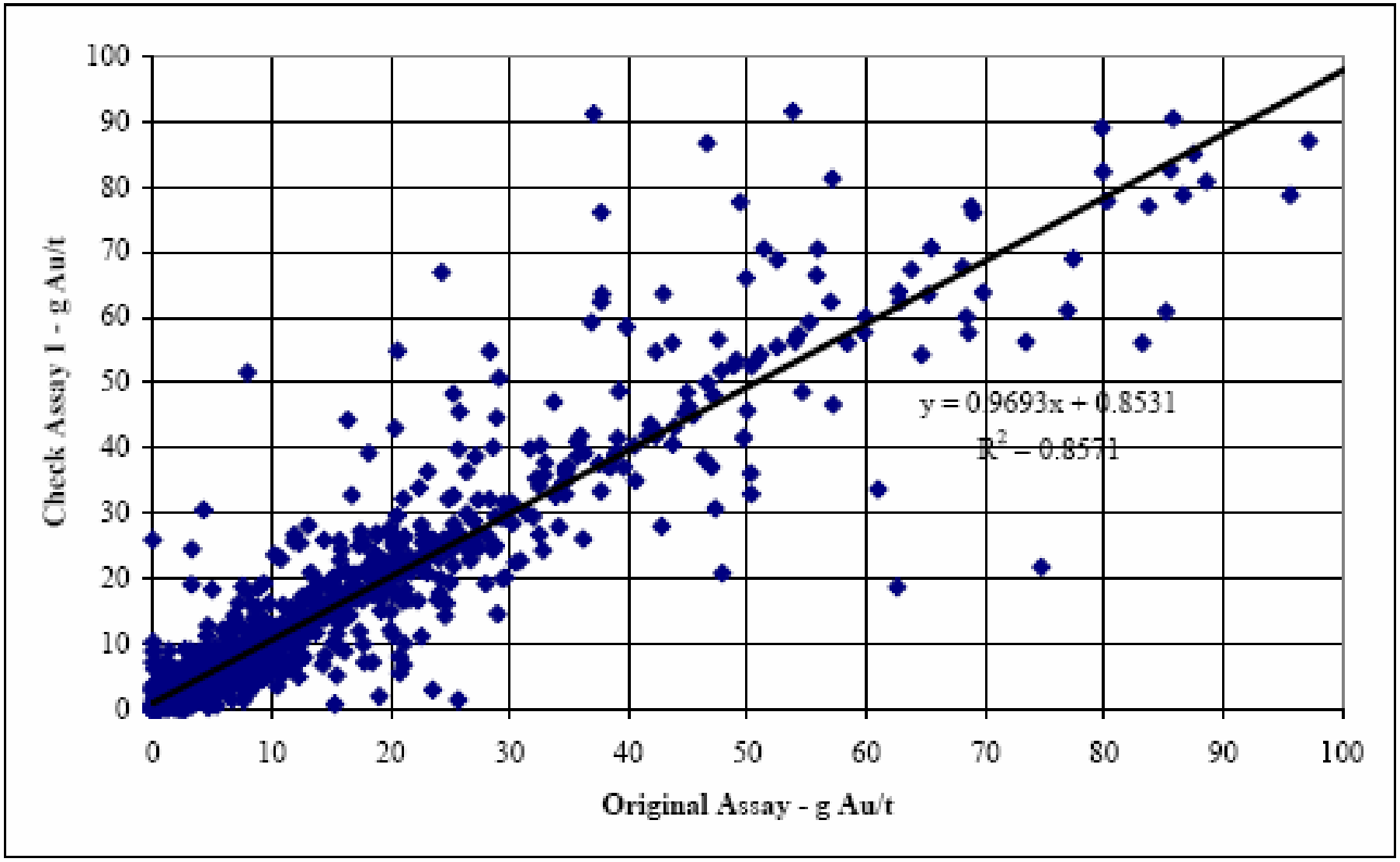


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| SRK Job No.: 144418 | **Source: Mine Development Associates** | Date: 07-10-07 \| Approved: BAS \| Figure: 11-9 |
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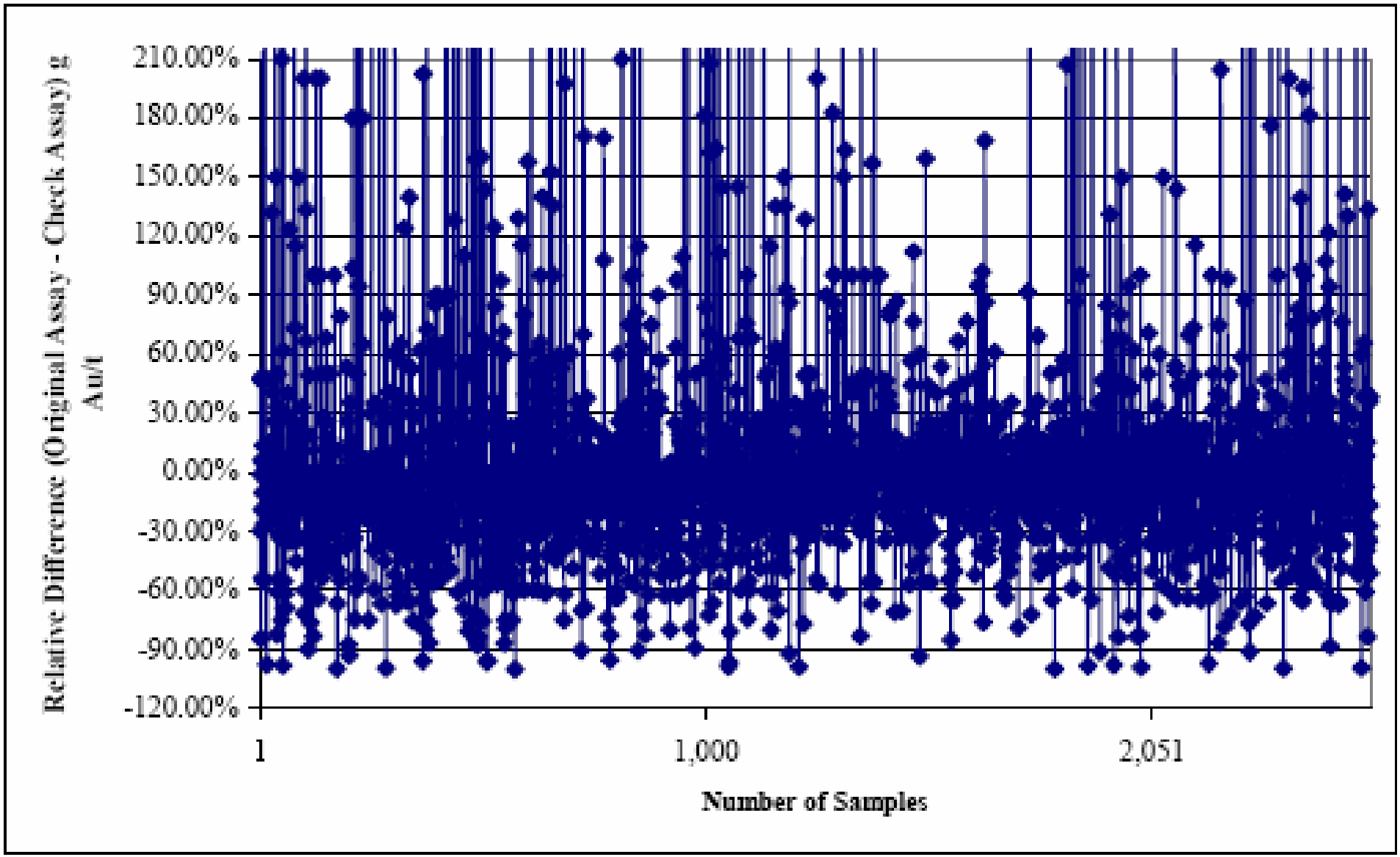


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| SRK Job No.: 144418 | | |
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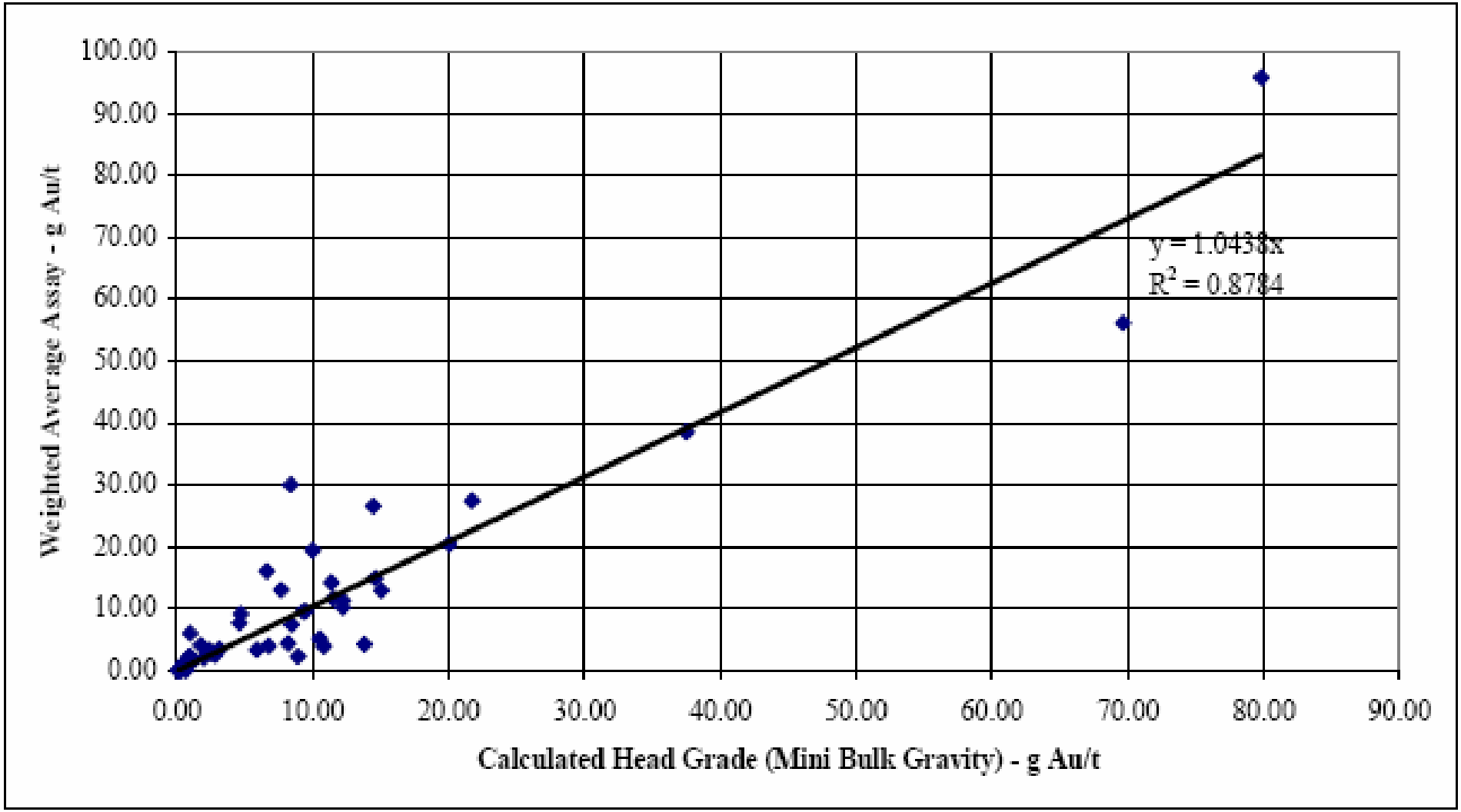


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| SRK Job No.: 144418 | **Source: Mine Development Associates** | |
| File Name: Figure 11-11.doc | Date: 07-10-07 / Approved: BAS | Figure: 11-11 |

# 12 Data Verification (Item 16)

Data verification at Black Fox consists of two primary areas of focus. The first pertains to verification of assay results obtained from an individual sample at a particular lab. The second pertains to verification of the numerical values contained in the electronic database to those reported on the original hard copy assay certificate.

The historic check assaying conducted by previous operators Exall and Noranda are considered substandard by today's requirements. However, the QA/QC study discussed above indicates that this data set presents no material risk to the current Resource estimation. Prenn (2006) reviewed Apollo's individual assay verification program and provided the following synopsis.

*Apollo's program for data verification is a considerable improvement of the past checks, however, while the number of checks have improved, the sampling problems have become more evident. The metallic assays have shown a grade improvement of about 17% over the average of the fire assays for the same intervals. Check assays from pulps have shown good agreement with the original assays, while new pulps prepared from rejects have not shown good agreement with the original assays. MDA believes that the samples from drilling contain less gold than is representative from the area drilled, and that the fire assay samples contain less gold than is in the core sample.*

*MDA recommends that Apollo consider using metallic assays as the only appropriate method to sample the core, and that additional mini-bulk gravity tests and full scale bulk samples be completed for the main types of mineralization in the deposit.*

SRK agrees with the recommendations of Prenn (2006) presented above but recognizes that screen metallic assays are quite expensive and typically provide a slow turn around time. One problem associated with a change in assay procedures at this stage of the project is that is would require a re-assay of as many pulps as are available in order to standardize the database. The benefits of such a program may not outweigh the time and cost associated with it. Considering that Apollo currently intends to move forward with a test mining program contingent on a positive Feasibility Study, model reconciliation with actual mining will provide a valid method to verify the proper usage of the assay data in the estimation technique. Additionally, ASL has reviewed the data set subsequent to the Prenn (2006) review and has concluded that it presents no material risk to the Resource estimation.

The second aspect of the data verification pertains to comparison of the numerical values contained in the electronic database to those reported on the original hard copy assay certificates. This work has been conducted by several reviewers and no problems have been reported to date. The original database was validated by RPA and subsequently by Prenn (2006). Further to this work, ASL cross-checked portions of electronic database to original certificates and reported no issues. SRK has provided independent verification of the electronic database subsequent to previous reviews in two ways. The first was to evaluate the current procedures used by Apollo to transfer the assay results obtained from the lab to its electronic database. SRK notes that these procedures provide adequate safeguards to the integrity of the assay database and meet or exceed current industry standards. Additionally, SRK was provided with original signed assay certificates from recent drilling and conducted spot checks comparing the certificate values to the electronic database and no errors were found.