

GRADE DETERMINATION FOR SPANISH MOUNTAIN GOLD PROJECT

Prepared by:

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1.0 INTRODUCTION

Available data have been critically analyzed to determine if the grade determination results for the Spanish Mountain Gold Project diamond drill samples that have been the basis for resource estimates to date have a bias. The data for the QA/QC programs followed to date, the results from the analysis of entire core intervals and the results of RC drilling are analyzed in this report. Based on the comparison of these various results with those obtained by diamond drilling with the standard sample preparation protocol it is concluded that there is a negative bias to the existing data base and that the resource grade is understated to a material degree. For the purpose of this analysis a "material" increase in grade is considered to be one of at least 15%.

This report has been prepared by Dr. Morris J.V. Beattie, P.Eng., the Chief Operating Officer for Spanish Mountain Gold Ltd, a "qualified person" under NI 43-101 who is not independent of the Company.



2.0 STANDARD SAMPLE PREPARATION PROTOCOL

The following describes the sampling methods used by Spanish Mountain Gold Ltd ("SMG") in the 2010, 2011 and 2012drilling programs. This information is this section was obtained from the NI 43-101 Resource Estimation Report co-authored by Giroux and Koffyberg dated August 31, 2012. The full report is available on SEDAR.

Drill core was transported to SMG's core logging facility, where rock quality designation (RQD) procedures, core logging, core splitting and core sampling were done. Also at this facility, blank samples and standards were inserted into the sample stream. This facility is located on SMG's privately-owned property in the village of Likely, located about 7 km from the Main and North Zones of the Spanish Mounain Project (the"Project"). Core storage is also located here. Core was generally sampled in 1.5metre intervals with shorter lengths given for lithology changes or the presence of visible gold. Core splitting was done using diamond bladed rock saws operated by SMG personnel. Half of the core was sent for analysis; the other half was returned to the core box for a permanent record. Drill core samples were placed plastic bags and shipped in rice bags through contract personnel (private courier) to ALS Laboratory ("ALS") in North Vancouver, BC, for sample preparation and analysis. The samples and QC/QA samples were tabulated on batch sheets, with every sample batch comprising 80 samples. This ALS facility is certified to standards within ISO 9001:2008 and has received accreditation to ISO/IEC 17025:2005 from the Standards Council of Canada (SQC).

Analytical procedures used for gold at ALS were:

Gold: Fire assay gold, specifically the 1 kg screen metallic method (Au-SCR21), which uses both an atomic absorption finish and a gravimetric finish. The 1 kg screen metallic method involved crushing the entire core interval sample in an oscillating steel jaw crusher for 70% to pass -10 mm. A 1 kg split of this crushed material was pulverized and passed through a 150 mesh (100 μ m grain size), producing a plus fraction (i.e., >100 μ m) and minus fraction (i.e., <100 μ m). Two 30 g sub-samples of the minus fraction were analysed by fire assay, with an AAS finish. The entire amount of the coarser material was also assayed by fire assay, with a gravimetric finish. The gold assays from the two fines were weight-averaged, and this assay was then weight-averaged with the assay from the coarser fraction, giving an overall assay for the sample.

3.0 QUALITY CONTROL QUALITY ASSURANCE RESULTS

Over the period from December 2011 through 2012, SMG retained Discovery Consultants ("Discovery") of Vernon, BC to independently monitor the quality control and quality assurance ("QC/QA") procedures. The monitoring was done under the supervision of W.R. Gilmour, PGeo, of Discovery. The following discussion of procedures and results is reproduced from the August 31, 2012 report referenced previously.

QC/QA procedures carried out included the insertion into the sample stream by SMG of:

- field blank samples
- empty bags with sample slips for insertion in ALS's lab of a duplicate reject (prep) samples
- duplicate core samples,
- various gold standards (reference material)

In addition, ALS carried out its own in-house procedures for monitoring quality control, with the addition of its own laboratory blanks, duplicates and standards.

Contamination

The purpose of field blank sample was to check for contamination within the preparation (crushing, pulverizing) process. Field blanks consisted of sand collected from a gravel pit 30 km west of the Property. These samples, being sand, were not blind to the laboratory. In 2011, each 200 sample batch of blank sand was routinely checked by 15 samples sent for analysis at Eco-Tech Laboratory in Kamloops, BC. This sand was routinely found

to be "clean" or devoid of gold mineralization. The blanks were inserted randomly in the sample stream within every batch of 30 samples.

During the 2012 program, blank samples were inserted into the sample stream at the rate of one every 20 samples; that is, 4 blank samples in each 80-sample batch. Repeat analysis of blank material sent to ALS within the sample stream gave results within acceptable tolerances – with almost every sample being less than the 0.05 g/t detection for metallic gold analysis - demonstrating no significant contamination during the sample preparation process.

Precision

Duplicate samples were prepared and analysed to measure precision. Precision is defined as the percent relative variation at the two standard deviation (95%) confidence level. In other words, a result should be within two standard deviations of the mean, 19 times out of 20. The higher the precision number the less precise the results. Precision varies with



concentration – commonly, but not always, the lower the concentration the higher the precision number. The precision values are determined from Thompson-Howarth plots. The duplicate sample results pair the original result with another sub-sample from the core. Note that the statistical analysis included all 2011 and 2012 data and did not include earlier data. Precision is a measure of the error in the analytical results from a variety of sources:

- core sampling
- sample preparation and sub-sampling
- analysis

The three type of duplicates measure precision in the following processes:

- **core duplicates:** the error in the sampling (splitting) of the core, in the subsampling of crushed and pulverized core, and in analysis
- **reject (prep) duplicates**: the error in the sub-sampling of crushed and pulverized core, and in analysis
- **pulp duplicates**: the error in the sub-sampling of pulverized core, and in analysis

The duplicates were inserted into the sample stream after the original sample.

Core Duplicates

There were no core duplicates (for example, the other half of the core) for pre-2012 drilling. For the 2012 drill program, duplicate core (the other half of the split core) samples were inserted into the sample stream at the rate of one every 40 samples (427 pairs); that is, 2 duplicate samples in each 80-sample batch.

Sample pairs containing an average grade of at least 0.06 g/t Au (202 pairs) were plotted by the Thompson-Howarth method. These duplicate samples underwent the same metallic gold analysis as did the regular samples. The results are summarized in Table 3.1.

Table 3.12012 Core Duplicates - Precision Values

Precision Values (%)				
Au, g/t	0.20	0.50	0.75	1.00
Au	42.2%	83.6%	92.8%	97.4%

At the 95% confidence level the precision values indicate about a ± 21 % error for 0.20 g/t Au values and about a ± 42 % error for 0.50 g/t Au values. This is the total error for core sampling, sub-sampling of crushed and pulverized core, and analysis.



Reject (or Prep) Duplicates

For the 2011 drilling used in the 2011 resource estimate, the laboratory systematically produced, every 30 samples (901 pairs), another sample from the saved reject (crushed) core. Sample pairs containing an average grade of at least 0.040 g/t Au (418 pairs) were plotted by the Thompson-Howarth method. These duplicate samples underwent the standard fire assay gold analysis on the -150 mesh pulp. The results are summarized in Table 3.2.

Precision Values (%)				
Au, g/t	0.20	0.35	0.50	0.75
Au	41.6%	36.3%	34.3%	32.6%

Table 3.2	2011 Reject Duplicates - Precision V	Values
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At the 95% confidence level the precision values indicate about a ± 21 % error for 0.20 g/t Au values and about a ± 17 % error for 0.50 g/t Au values. This is the total error for subsampling of crushed and pulverize core, and for analysis.

For the late 2011 and the complete 2012 drilling, SMG selected samples, one in every 40 (492 pairs), for a duplicate sample; that is, 2 samples in each 80-sample batch. An empty bag with a sample slip was inserted into the sample stream and ALS filled the bag with a duplicate sample from the crushed core. These duplicate samples underwent the same metallic gold analysis as did the regular samples.

Sample pairs containing an average grade of at least 0.06 g/t Au (209 pairs) were plotted by the Thompson-Howarth method. The results are summarized in the following table.

Table 3.32012 Reject Duplicates - Precision Values

Precision Values (%)				
Au, g/t	0.20	0.50	0.75	1.00
Au	31.6%	27.0%	26.0%	25.4%

At the 95% confidence level the precision values indicate about a ± 16 % error for 0.20 g/t Au values, about a 14 % error for 0.50 g/t Au, and about a ± 13 % error for 1.00 g/t Au values. This is the total error for sub-sampling of crushed core (reject or prep) and pulverized core, and analysis.

Pulp Duplicates

For the 2010, 2011 and 2012 drilling, ALS prepared two 30 g sub-samples per sample for every sample of core, producing 15,317 pairs. Sample pairs containing an average grade



of at least 0.040 g/t Au (7,278 pairs) were plotted by the Thompson- Howarth method. The results are summarized in Table 3.4.

Precision Values (%)				
Au, g/t	0.20	0.50	0.75	1.00
Au	48.6%	23.4%	18.3%	15.6%

Table 3.4Pulp Duplicates - Precision Values

At the 95% confidence level the precision values indicate about a $\pm 24\%$ error for 0.20 g/t Au values, a $\pm 12\%$ error for 0.50 g/t Au values and a $\pm 8\%$ error for 1.00 g/t Au values. This is the error for the sub-sampling of the pulverized core (pulp), and analysis. Note that the pulp samples exclude the coarser metallic gold.

Accuracy

All but one of the SMG inserted gold standards were produced by CDN Resources Labs Ltd ("CDN") of Langley, BC, and were certified to 2 standard deviations by a certified assayer and by a professional geochemist. One standard was produced by Ore Research & Exploration of Australia.

Standards have been analysed throughout the drill programs from 2005 to 2012. In the 2010 and 2011 drill programs, one of three standards was added randomly to a batch of 30 samples. For the 2010 drilling, standards were submitted with expected grades of 0.39, 0.78, 1.16 and 4.83 g/t Au and for the 2011 drilling standards had expected grades of 0.21, 0.39, 0.78, 1.14, 1.16 and 3.77 g/t Au.

In the 2012 drilling, standards were inserted into the sample stream at the rate of one every 20 samples; that is, 4 standard samples in each 80-sample batch. During this program, some CDN standards were replaced, as others were depleted, with ones of similar grade. In total, 7 different standards were used with expected grades of 0.34, 0.41, 1.14, 1.47, 1.97, 2.71 and 3.77 g/t Au

The QA monitoring of the results included plotting the results for each SMG and ALS standard in order of report completion. The charts were regularity reviewed for results outside of the expected values ranges. Occasionally re-analysis of a group of samples was done. However, for the 2012 drill program, no changes in the results were warranted.

3.1 Discussion

The % error at the different stages of preparation derived from the data in Tables 3.1 through 3.4 is summarized in Table 3.5. As would be expected, the greatest error is observed for the core duplicates, demonstrating that the error primarily occurs in the initial sampling, rather than during subsequent lab procedures.



	% Error, ±			
Au, g/t	0.20	0.50	0.75	1.00
Core duplicates, 2012	21	42	46	49
Reject duplicates, 2011	21	17	16	
Reject duplicates, 2012	16	14	13	13
Pulp duplicates	24	12	9	8

Table 3.5Summary of Sampling Errors

The error for the core duplicates includes the total error derived from sampling of the core, sub-sampling of crushed and pulverized material and the analysis. The error for rejects and pulps are lower than for the core duplicates as has been previously reported in published studies for gold sampling (Stanley and Smee, 2007). The pulp duplicates are for samples from which the coarse gold has been screened resulting in less variation at higher grades. The greatest error is generally derived from obtaining the initial sample.

These results make it clear that unless the entire core sample is analyzed, significant variations in the results can be expected. They also imply that unless larger samples than NQ diamond drill core are taken, similar or even greater variations will be observed for a given block of the deposit.



Figure 3.1 Repeat Assays for Drill Core



4.0 LARGE SAMPLE ANALYTICAL RESULTS

During 2009 several analytical programs were conducted that considered alternative procedures for analyzing samples such as 50 gram vs 30 gram assays, assaying with and without screening of coarse gold, original sample size, etc. (Beattie 2009). The results of these programs indicate that as a minimum the metallics screen procedure is necessary to reduce the error in assays. The conclusion of this work was also that samples larger than the 1 kg batch size in use are required for a reliable estimate of the gold content. An interesting result observed during this work was that when samples weighing about 10 kg were analyzed and the results were compared against those obtained for 1 kg samples, there was a positive bias for the larger samples. The large samples were processed by passing the finely ground sample through a gravity concentrator, analyzing the concentrate to extinction and sampling the gravity tailings for assay to calculate an overall result. The results for the large sample assays (Knelson) vs the initial standard protocol results are summarized in Table 4.1. The same results plotted on the basis of % relative difference are summarized in Figure 4.2.



Figure 4.1 Large Sample Assays vs 1 kg Sample Assays





Figure 4.2 Results of Figure 4.1 Plotted as % Relative Difference and Showing Positive Bias for larger Samples.

In order to confirm these findings in 2010 an additional test program (G&T Metallurgical 2010) that utilized 148 entire core intervals from two HQ diameter drill holes was completed. An initial assay utilizing the standard 1 kilogram sample protocol for each sample was obtained. The remaining half core and sample rejects were combined for the comparative analysis.

The samples selected for this study were from 09-DDH-866 (10.0m to 146.5m) and 09-DDH-867 (21.0m to 94.5m) and were generally 1.5 meters in length. The combined rejects and remaining core for each sample were crushed and ground to a target product sizing of about 80% passing 100 microns. The ground product was passed through a laboratory-scale gravity concentrator to produce a concentrate and gravity tailing. The concentrate was assayed to extinction while the tailing was assayed in duplicate.

The results for all samples from hole 866 are summarized in Figure 4.3. The results for samples that had original assays greater than 2.5 g/t Au indicate that the standard procedure can be expected to show excessively large variations for such material as a particle of free gold in such a sample would have a major impact. The large variation shows that coarse gold is present, consistent with the large precision values shown in Table 3.1. Considering that the average resource grade is less than 0.5 g/t, the samples in this range are of greater interest. The results for samples having an initial assay less than 1 g/t Au are summarized in Figure 4.4.





Figure 4.3 Large Sample Assays vs Original Assays for Hole 09-DDH-866



Figure 4.4 Large Sample Assays vs Original Assays over 1 g/t Au



It appears from Figure 4.4 that the larger (total core) samples on average have an increased gold content over the original protocol samples. This observation is more apparent in Figure 4.5 which presents the results on the basis of % relative difference between the two analyses. For all the samples from Hole 866 the relative difference indicates an increase of 6% while for the samples under 1 g/t Au the increase is 15.7%.



Figure 4.5 % Relative Difference for all samples under 1 g/t Au.

The results for all samples from hole DDH-09-867 are summarized in Figure 4.6 while Figure 4.7 summarizes the results below 0.6 g/t Au. As for hole 866 the higher initial assays are suspect while below 0.6 g/t the majority of assays increased. Figure 4.8 summarizes the results below 0.6 g/t on the basis of % relative difference.





Figure 4.6 Large Sample Assays vs Original Assay for Hole 09-DDH-867



Figure 4.7 Large Sample Assays vs Original over 0.6 g/t Au





Figure 4.8 % Relative Difference for all Samples Under 0.6 g/t Au

The average % relative difference increase for all samples from hole 867 is 22.7% while the increase for samples below 0.6 g/t Au is 39.6%. <u>The average increase for all the samples that assayed greater than 1 g/t Au from the two holes is 24%</u>. The HQ core used for this program is not substantially larger than the NQ core used for most of the resource definition. Larger diameter, and therefore much larger weight, samples would be expected to provide better estimates of the true grade of the deposit.

The increase in assay at the lower end of the range is particularly significant around the cut-off grade of 0.2 g/t Au established by the November 14, 2012 Preliminary Economic Assessment (Tetra Tech). Figure 4.4 and 4.7 both have red ellipses that outline samples that were below the cut-off grade based on the original analysis but were indicated to be above this grade based on the large sample assays. In each case, about 30% of the samples below the cut-off grade were misclassified. This change in classification would have a significant impact on mine and waste handling planning as well as extending the potential mine life.



5.0 RC DRILLING RESULTS

Based on the large variations in gold assays that are demonstrated by duplicate core samples from the same diamond drill holes, twinning of existing diamond drill holes, which are largely NQ in diameter, with larger diameter diamond drill holes or RC drill holes cannot be expected to result in a meaningful comparison of variations in the gold content on a hole by hole basis. Figure 5.1 shows the location of diamond and RC drill holes located near the centre of the deposit.





Figure 5.1 Location of Diamond Drill Holes and nearby RC Holes.



Figures 5.2 through 5.4 summarize the results for diamond drill holes that are in reasonably close proximity to each other.



Figure 5.2 Assays for DDH 975 and 1086 located about 7 meters apart.



Figure 5.3 Assays for DDH 650 and 1114 located about 11 meters apart.





Figure 5.4 Assays for DDH 908 and 1123 located about 1 meter apart.

It is apparent from Figures 5.2 through 5.4 that significant assay variations will be indicated for diamond drill holes that are very close together. Whether these variations are due to a highly variable gold content over short distances or are due to an inherent deficiency in the original drill sample size taken is not apparent. It is clear however that only larger samples could result in a more meaningful estimate of the gold content of a given mass of rock. The diamond drill results do indicate the mineralized versus the barren horizons quite consistently.

Figure 5.5 through 5.9 summarize the results for several RC holes with nearby diamond drill holes. It is apparent from these figures that the RC and DDH holes are identifying the same mineralized horizons. In some instances the RC assays are greater and in other instances the DDH results are greater. The overall visual impression is that the RC results demonstrate an increase over the diamond drill results. Considering the variation in results between adjacent diamond drill results it is not meaningful to calculate the magnitude of an increase based on the results from adjacent DDH and RC holes. The only meaningful determination of the variation in assays will be to do statistical analyses on the two sets of data and to calculate a resource grade based on diamond drill results and then compare this grade to that calculated for the same portion of the deposit based on RC results. Due to the excellent definition of geology obtained from the diamond drilling the geological model should be derived from these diamond drill holes and, while there is no indication that RC drilling is resulting in smearing of grades down the hole, the same mass of rock (tonnage) should be used in each case.







Figure 5.5 Comparison of RC and DDH results for holes about 6 meters apart.



Figure 5.6 Comparison of RC and DDH results for holes about 4 meters apart.





Figure 5.7 Comparison for RC and DDH results for holes about 3 meters apart.



Figure 5.8 Comparison for RC and DDH results for holes about 5 meters apart.







Figure 5.9 Comparison of RC and DDH results for holes about 6 meters apart.



Figure 5.10 Cumulative Frequency Plot for RC and DDH Results



Figure 5.10 shows a cumulative frequency plot for the DDH and RC results obtained to date as presented in the 2012 resource estimate (43-101) report by Giroux and Koffyberg. The RC grades are higher in all percentiles and in the range of the resource estimate for this deposit are about 60% higher than the DDH results. Additional RC drilling to confirm and quantify these observed differences is warranted.



6.0 **DISCUSSION**

The work completed on this project and results presented in published studies makes it evident that the confidence to be placed on gold assays depends to a large degree on the size of the initial sample taken from the deposit (Clifton et al). As a minimum it will be accepted that 20 particles of gold are required for a sample to provide an acceptable gold analysis. More particles will increase the confidence in the assay and fewer will diminish the confidence (Francois-Bongarcon 2009). It has been demonstrated that if the sample size in combination with the size of the gold particles is such that the expected number of particles falls below five, there is in fact an increased probability that the sample will have no gold particles. The implication is that samples that are too small will tend to understate the gold content of the material being sampled rather than just causing a high variation in the analysis.

The number of gold particles in a sample will be dependent on the gold grade and the gold particle size, not the host rock particle size. For the Spanish Mountain deposit it has been demonstrated that a significant proportion of the gold (20 to 50%) can be recovered by gravity means. This indicates that much of the gold has a significant size in the range of 30 to 100 microns (0.03 to 0.1 mm). During the gravity concentration testwork gold particles as coarse as 0.5 mm have been observed. For 100 micron particles and finer and a gold grade of 0.25 g/t a 2 kg sample will provide 20 particles. However with gold particles that are 0.5 mm in size the same grade of sample will have to be about 70 kg in order to have the same confidence in the resulting assay.

The HQ samples that were used for the work discussed in Section 4 weighed about 12 kg per 1.5 meter interval. The same length of NQ core would weigh just under 7 kg. By contrast an RC drill hole will provide about 55 kg for the same interval. On a weight consideration basis an RC drill hole will clearly provide a sample that is more representative for analytical purposes.

While using RC drills in order to obtain larger and therefore more meaningful samples seems an obvious route, it is critical that a rigorous sample handling protocol be implemented as part of such a program. As the drilling for the Spanish Mountain Project will go through wet ground it will be assumed that the RC drilling will be by a Rotary Tri-Cone method using a mix of water and air, resulting in a wet sample. The handling of such samples has previously been described for the Fort Knox Mine (Kinross 2008). It should be noted that Fort Knox noted a grade increase with RC drilling over PQ diameter (1.8 times diameter of NQ) drill core. The grade increase was subsequently verified from mine production figures. The sampling method utilizes an automated rotary wet splitter (Ref 11) at the drill to produce a sub-sample for analysis. While the fraction of the total sample that is collected can be varied with such a splitter, for the current program a ratio of 1/6 is appropriate, resulting in a sample of about 9 kg. The sample is collected in plastic buckets making certain that all the fines are collected and retained. Alternatives for collection of the fines include collecting the water in large containers and using



flocculant to settle the fines, as is done by Fort Knox, or using Micro Por bags, as was done at Frasergold (Kerr 2013).

The sample split is to be taken to a laboratory and dried in its entirety and weighed before further size reduction and sampling.



7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on all the data available for the Spanish Mountain Project it is concluded that the sample size provided by the sub-sampling of NQ core is resulting in an understated grade for the deposit. It is further concluded that the understatement of the grade may be near 25%.

RC drilling conducted to date has given an indication that this drilling technique may overcome the sampling bias and a further RC drilling program of 12,000 meters is recommended in the area of the previous RC drilling. Once these additional results are obtained it is proposed that the geostatistics be reviewed and resource estimates be completed based separately on the diamond drill results and RC drill results for the same mass of rock to demonstrate the magnitude of a possible grade increase. A proposed budget for this program is as follows:

Total Program	\$770,000
Contingency	<u>100,000</u>
Modelling of drill results	20,000
12,000 meters @ \$50/meter	600,000
Planning of program details	\$50,000



REFERENCES

1. Giroux, G.H. and Koffyberg, A (2012 August), *Technical Report on an Updated Mineral Resource Estimate on the Spanish Mountain Gold Deposit.*

2. Beattie, M.J.V, (2009 October), *Spanish Mountain Assay Protocol*, Internal memo.

3. G&T Metallurgical Services Ltd, (2010 April), *Comparative Gold Content in Core Using Gravity Concentration Techniques - Spanish Mountain Project.*

4. Tetra Tech, (December 2012), *Technical Report and Preliminary Economic* Assessment of the Spanish Mountain Gold Project, Likely, BC.

5. Stanley, C.R. and Smee, B.W., (November 2007), *Strategies for reducing sampling errors in exploration and resource definition drilling programmes for gold deposits*, Geochemistry, Exploration, Environment, Analysis, Vol 7, p329-340.

6. Stanley, C.R. and Smee, B.W. (2005), *Sample Preparation of "Nuggety" Samples: Dispelling Some Myths about Sample Size and Sampling Errors*, Association of Exploration Geochemists Newsletter, Vol 126, p21-25.

7. Clifton, H.E., Hunter, R.E., Swanson, F.J., Phillips, R.L., (1969), *Sample Size and Meaningful Gold Analysis*, US Geological Survey Professional Paper 625-C.

8. B. Francois-Bongarcon, D (January 2009), *Fishy Samples: how big a sample to avoid the infamous Poisson effect?*, Fourth Conference of Sampling and Blending, SAIMM.

Kinross/Fort Knox (March 2008), *Technical Report for the Fort Knox Mine*, page 38.

10. Kerr, J.R. (March 2013), personal communication.

11. http://www.drillingsupplystore.com/rc-drilling-accessories/splitter-rc/automated-rotary-wet-splitter-rc.html