Precious Metals Reconciliation Report

14 December 2009

Royal Canadian Mint
Monnaie royale canadienne

Preface

This report has been prepared by management for the Royal Canadian Mint's Board of Directors. It summarizes the analysis and conclusions reached by four outside expert firms commissioned by the Mint to examine the circumstances and possible explanations for the unreconciled gold inventory balance as of October 2008. It also sets out management's assessment of the reports, provides a summary table which reconciles the inventory balance and identifies 'lessons learned' from the incident and the technical reviews which have been undertaken.

Four independent reports and the Royal Canadian Mounted Police letter are included as Annexes.

- *Assessment of Royal Canadian Mint* Security - prepared by The Banks Group

- *BPCS to Dynamics AX Integration Review* - prepared by Microsoft Services - Premier Support (Microsoft)

- *Continuous Improvement Program Refinery Operation - Technical Review* - prepared by IBI Group/Giffels Associates Limited (IBI Group)

- *Special Review and Assessment of Unaccounted for Differences - Prior Years Review* - prepared by Deloitte & Touche, LLP (Deloitte)

- As well, a letter from the Royal Canadian Mounted Police (RCMP) dated November 18, 2009 is attached which sets out the conclusion reached as a result of their investigation. This letter was made public by the government and by the Mint on November 24, 2009.

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Executive Summary

A precious metal count conducted by the Mint in October 2008, revealed an unreconciled difference of 17,500 troy ounces of gold which represented 0.3% of the Mint's refinery throughput for that fiscal year. The difference represented stock-keeping records that reflected a higher amount of gold than the physical amount of gold on hand.

The Mint undertook immediate measures to ensure that all explanations for this difference were investigated. Deloitte, a prominent auditing firm, was engaged to examine whether or not the difference in the October 2008 count was the result of a 2008 accounting or transactional error. Its report, released publicly in June 2009, concluded that the unreconciled difference was not the result of accounting or transactional 2008 errors and recommended that the following be conducted by the Mint:

- Security and computer systems reviews;
- A technical/engineering review of its operations; and
- An accounting review of prior periods.

Without delay, the Mint engaged expert firms to conduct thorough, forensic reviews of each of these areas. These reviews were recently completed and the results were submitted to the Auditor General of Canada.

First and foremost, it was determined that the unreconciled difference was not the result of criminal activities, either by theft, fraud or reasons relating to data manipulations of the IT systems.

Secondly and just as importantly, the reasons for the difference were identified and the Mint's management is now satisfied that the inventory balance of October 2008 has been fully accounted for.

The results of the reviews are summarized in the following table:

Overall Reconciliation[1]

Unreconciled difference as of October 2008	17,500 ounces

Less adjustments that increased the amount of physical gold on hand at October 2008[2]:	
• underestimate of gold in the on hand balance from slag by-products processed internally	5,400 ounces
• recovery of gold accumulated within the facility	1,500 ounces
Less adjustments that reduced the amount of gold in stock-keeping records at October 2008[2]:	
• underestimate of gold consumed in the by-products processed externally[3]	3,600 ounces
• underestimate of gold in by-products consumed as part of internal refining process	350 ounces
• prior period transaction discrepancies	6,650 ounces
Total:	**17,500 ounces**

[1] The annexed copies of the various reports provide ranges and/or approximations of the results of their work. The above noted items are consistent, where applicable, with those ranges/approximations.

[2] These adjustments are reflected in the Mint's 2008 audited financial statements.

[3] The decision to conduct external processing was driven by the unprecedented volumes of salt slag created by record activities in the refinery. Normal amounts of slag can be safely processed internally, but the large volumes in 2008 created health and safety concerns for employees.

2008 Precious Metal Reconciliation Report

Introduction

By their very nature, precious metals refineries present unique and difficult challenges to those responsible for managing inventories. The storage and count procedures of physical finished gold products are relatively straightforward and uncontroversial, and the Mint has never encountered difficulty in managing its accounts and inventory of physical gold stored in its vaults, either owned by customers or by the Mint. The difficulties arise not with the storage of gold, but in its processing. Gold in a refinery can take many forms: solid, liquid, in alloy with other metals or in vapour as refining takes place.

An important aspect to recognize about the process of refining gold is the simple and inescapable scientific fact that to refine gold, especially to the highest standard in the world, one will lose some gold in the process. Hence, gold refiners must not only make allowances for projected losses but strive to keep them to an absolute minimum through processes of applied sciences and technologies as well.

Issue

The 2008 year-end precious metal reconciliation was initiated by the Mint on October 26, 2008. In March 2009, the Mint's management reported to the Board of Directors an unreconciled quantity of 17,500 ounces from this reconciliation process. This amount represented approximately *0.3%* of the Mint's throughput for the 2008 fiscal year.

The unreconciled difference represented stock-keeping records that reflected a higher amount of gold than the physical amount of gold on hand. The difference was outside of an acceptable level of tolerance (± 500 ounces) and that of previous counts.

Background

Until 2009, the Mint performed a count of stock containing precious metals twice a year. This count included raw materials, work in process, finished goods and estimates of precious metals in by-products.

The count for year-end financial reporting purposes was performed at the end of each October and updated to the end of the fiscal year to reflect transactions during that period. Following completion of the stock count containing precious metals, the precise amount of precious metal within each specific stock item was calculated. This amount was compared and reconciled to the stock-keeping records maintained by the Mint.

In the precious metals refining industry, the reconciliation between the count and the stock-keeping records is a complex, multi-month process because of the different process streams, the different forms of the metal and the wide range and concentrations of by-products.

In order to account for all precious metals present at the count date, the count procedures also involve cleaning out all processing equipment, sweeps of the floor areas, and the processing of all by-products which result from the refining process.

It should also be noted that 2008 was an extremely busy year for the Mint which saw an increase of over 250% in its gold bullion business due to record volatility in the market value of gold.

Actions Taken and Results Achieved

The Mint, in keeping with its long-standing commitment to transparency and accountability, immediately ordered a comprehensive and independent review of its accounting procedures and practices to arrive at an explanation for the unreconciled difference.

Deloitte, one of Canada's leading auditing firms, was retained by the Mint to investigate the possibility that the unreconciled difference in gold was the result of a 2008 accounting and/or transaction recording error.

Every major element of the Mint's accounting practices and procedures was examined and assessed. Deloitte concluded that the unaccounted difference was *not* the result of accounting errors in 2008 and recommended that the three following other areas be examined and analyzed.

Security, Computer System and RCMP Reviews

The Banks Group, a company specializing in physical and procedural security environments, was contracted to conduct a thorough assessment of the Mint's physical protections and security procedures and determine if either the protections and procedures, or both, contributed to or explained the difference found in the October 2008 count.

Based upon facility visits and assessments, interviews, document reviews, research and the lack of evidence to the contrary - the Banks Group concluded that; "…there is no evidence of unauthorized removal of precious metals from the Mint…"[4] The Banks report is attached at Annex A.

In addition, the Mint engaged Microsoft to audit the interactions related to the precious metal refining process between the Dynamics AX 4.0 and AS 400 computer systems with the aim of determining whether or not there was any manipulation of data and data flow in regard to the unreconciled difference of the precious metal inventory of October 2008.

[4] The Banks Group report (page 4)

Microsoft in its report (Annex B) stated that "…no evidence was found of an unexpected inventory impact caused by this integration" and "…the BPCS to Dynamics DAX integration is working as designed and the integration scenarios reviewed in this engagement did not lead to the unreconciled difference…"[5]

The RCMP was requested to conduct its own independent investigation. Following "a thorough investigation of all investigative leads which could have conceivably supported criminal wrongdoing" and keeping "abreast of internal efforts initiated by the Mint in order to identify any potential investigative leads and/or explanations for the unreconciled difference", the RCMP reported that its inquiries and investigation "…do not support further effort in the continuance of a criminal investigation into this matter."[6] The RCMP letter is attached at Annex E.

Technical Engineering Reviews

The Mint applies scientific processes and scientifically derived formulae to various aspects of refining, particularly with regard to process losses. Certain processes and formulae are subject to benchmarking and/or third party studies.

The services of IBI Group, a leading Canadian firm which specializes in process engineering, was retained to review the process loss estimates, which the Mint used in 2008. IBI Group was also asked to review existing third party studies regarding technical processes and formulae and, where appropriate, update the Mint's benchmark estimates for process losses. The IBI Group report is attached at Annex C.

A primary aim of the review was to also determine whether losses due to technical processes could have contributed to the unreconciled difference of the precious metals as found in October 2008.

The review involved all processes of the refinery operations and they were found to be at par with industry standards. IBI Group stated, "It is important to note that the Mint's precious metal refining process has the same characteristic as any other refinery process; losses are inevitable and unavoidable."[7]

They went on to say that "…assaying and the technical expertise at the Mint exceed those standards. The level of expertise of the Mint staff was demonstrated in the level of detail they provided and the in-depth knowledge of each process."[8]

Based on the engineering review and analysis of the refinery operations, industry benchmarks, external refinery operations, available data, previous studies as well as the independent testing done on key processes, it was concluded that the range of 2008

[5] Microsoft report (page 4)
[6] RCMP letter dated November 18, 2009
[7] IBI Group report (page 1)
[8] IBI Group report (page 2)

refinery losses at the Mint could be within 465 ounces to 1240 ounces per year. The Mint had reported 886 ounces for the refinery losses in 2008. Based on the foregoing, a reasonable estimate of the understatement of process losses is 350 ounces.

The Mint had estimated external refining losses to be 150 ounces. The IBI Group report identified losses associated with external refiners to be in the range of 297 to 4,274 ounces per year. Based upon this range, a reasonable estimate of process losses related to external processing of 2008 by-products is 3600 ounces.

The heterogeneous nature of the slag by-product makes processing of this material very difficult. The amount of gold reclaimed from that by-product will vary depending on many factors including material preparation, mixing, milling, sampling, etc. Few suppliers are available to handle this by-product and their services are in high demand.

Independent testing witnessed and documented by IBI showed that RCM's assaying of this by-product yielded comparable results to those of external processors ACC and SGS. Given the nature of the material; processing methods used by the qualified third parties; the large volume and short time frame the material in question was to be processed; IBI Group's upper limit estimate of 10%, as an underestimate of gold in by-products processed externally is reasonable and in line with industry standards.

In addition, IBI Group evaluated the internal hydromet by-product process against the results obtained using external refiners. The objective of any refinery is to reduce the amount of gold in the by-product material to as low as possible before sending this material to external refining. As identified by the IBI Group report, salt slag contains 3-4% gold and the hydromet process reduces the gold left in the slag to 0.1-0.2%. The Mint introduced its new process in early 2008 and the process became fully operational in February 2009.

Of the 68 tons of slag on hand at the October stocktaking, 18 tons were processed internally through the hydromet process starting in 2009. The gold content of the 18 tons was initially recorded in the Mint's records at 1.87 % yet the actual recovery was about 2.80% due to the use of the new process. This underestimation represents 5400 ounces of gold and reduces the reconciliation discrepancy.

Precious metal refineries typically engage in an aggressive and thorough recovery program of their refinery buildings and equipment every three or four years. These programs are designed to recover material otherwise classified as "an appropriate loss". In March and June of this year, the Mint advanced the timing of such a process which recovered a further 1,500 ounces.

As stated in the IBI Group report, "gold can become embedded into the fabric of the refinery building or process equipment and is only recoverable after demolition. This is considered to be an *unrecoverable loss*. The gold will be recovered eventually as a windfall in the year of the demolition. Unrecoverable losses will always occur in a refinery operation."[9]

While the focus of this report is on the reconciliation of the Mint`s gold inventory, the October count also yielded a discrepancy in silver, although much smaller in value. The conclusions in the technical engineering review also apply to silver and resulted in the reconciliation of the silver inventory at October 2008.

Accounting Review of Prior Periods

Year-end inventory reconciliations have as their opening position or balance, the prior year's ending position or balance. In practical terms, this means that the October 2008 inventory results are directly impacted by the accuracy of the 2007 and prior years' inventory calculations. The Mint engaged the forensic auditing services of Deloitte to review and assess the precious metal reconciliations for the periods ended October 2007, October 2006 and October 2005.

The review was conducted with the understanding that it would be difficult to complete due to the passage of time, availability of supporting documentation, and the turnover of the Mint staff who participated in the transactions and carried out the count stocks in the years noted. In addition to these limitations, as stated by Deloitte, "…we determined that the RCM file documentation supporting the prior years' reconciliations was much less robust than what is maintained currently by RCM, and was examined by Deloitte, for the 2008 reconciliation."[10]

This review concluded that according to the procedures adopted and performed to date, transactions and calculations were identified that would cause a questioning of the accuracy of prior period reconciliations.

The transactions and calculations identified 6650 ounces in the prior years' reconciliations and "…are indicative of precious metals differences that existed before the October 2008 reconciliation and that would influence or impact the calculation that resulted in the October 2008 unaccounted for difference".[11] Deloitte's report is attached at Annex D.

Summary

The comprehensive security reviews conducted by The Banks Group of the Mint's physical security, and by Microsoft of the organization's computer records and security protocols confirmed that the *unreconciled difference was not the result of criminal activities, either by theft, fraud or reasons relating to data manipulation of the IT systems.*

[9] IBI Group report (page 6)
[10] Deloitte report (page i)
[11] Deloitte report (page 1)

The RCMP confirmed that its inquiries and investigation did not *support further effort in the continuance of a criminal investigation.*

The technical/engineering review undertaken by IBI Group, confirmed *an underestimate of gold (**5,400 ounces**) in the October 2008 on hand balance from slag by-products processed internally; an underestimate of gold (**3600 ounces**) consumed in the external processing of by-products, and an underestimate of gold (**350 ounces**) in by-products consumed as part of internal refining process.*

The accounting review of prior periods conducted by Deloitte to examine the accounting procedures and transactions of prior periods that led up to the 2008 inventory count, identified *transactions and calculations in the amount of approximately **6,650** ounces that contributed to the overall discrepancy found in the October 2008 count**.***

Finally, through the aggressive and thorough recovery program of the refinery buildings and equipment the Mint recovered a *quantity of **1,500 ounces** of gold.*

Financial Statements

This report provides for the full accounting of the October 2008 inventory balance. The Mint's financial statements were adjusted accordingly.

The Auditor General of Canada has completed its work and has provided an unqualified opinion with respect to the financial statements being in accordance with Canadian generally accepted accounting principles.

Lessons Learned

As a result of the extensive work done by the Mint itself, and drawing on the comprehensive reviews conducted by the external third parties, the Mint has learned some valuable lessons.

Industry experts have brought best practices to the Mint's stock counts. As of 2009, the Mint has implemented refinery counts on a quarterly basis that will include the addition of three (3) days to the process of preparation for each count, improved documentation regarding count instructions and better segregation of duties in the planning and execution of the counts. More robust reconciliation processes and procedures have been consolidated under the management of the senior finance professionals and a new Precious Metals Controller in March 2008.

The internal refining of slag by-products will be the normal operating procedure in order to maximize precious metal recovery. Should a situation arise, during periods of intense bullion and refinery activity or as a result of unexpected equipment breakdown, where external refinery processing may be required, large accumulations of slag will be avoided to ensure external refining capacity is available on a timely basis.

As stated in the technical/engineering review report, process losses are a normal part of any refinery operation. During periods of major equipment replacement and process improvement, the Mint will improve its planning tools to include the impact of these activities on the efficiency of the operations. Steps have been taken to review the process loss standards annually and adjust the standards to recognize planned activities and the potential impact on efficiencies that may arise.

Continuous process manufacturing activities that operate 24 hours a day create additional complexity for tracking the variety of in-process inventories through the stages of manufacturing. A Director, Material Control for the Refinery has been hired with the responsibility to develop an improved inventory tracking system to allow balancing of inputs and outputs at various stages of the refinery process. This will enable the Mint to identify potential process and accounting issues earlier through the quarterly counts.

A Refinery Renewal Steering Committee has been established, chaired by the CEO, to ensure that all recommendations from the various reviews are addressed in a timely manner.