



A Ventyx Guide to Operational Excellence:

Metal Accounting Best Practice Checklist



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Introduction

With the increasing push towards operational excellence at all levels of mining operations, metal mining organizations face unique and difficult challenges to ensure compliance – especially when it comes to metal accounting. Because of the very low concentrations of valuable metals, ore processing is often slow complex, involving multiple phase transitions. This complexity makes it hard to track and account for metal in the plant, in turn, making overall plant performance optimization difficult.

The scarcity and unreliability of measures and plant lag times make metal accounting time-consuming and often unrepeatable. Deriving the operational and financial performance – especially by tracking changes due to the time lag between mining and sales – is of critical importance. A rigorous metal accounting solution, based on operational excellence best practices, is required to address these challenges.

Metal Accounting Best Practices

A metal accounting system designed using best practices provides the most accurate estimate of metal along all stages of the operation, including:

- Mined metal delivered to a plant
- Metal held within the plant's circuits
- Metal lost to waste
- Saleable metal processed by the plant

The real value in implementing metal accounting best practices comes from providing the best baseline for plant optimization. Ultimately, a processing facility must be optimized around the financials, and reconciled metal accounts give the best representation of financial performance expressed in physical terms.

A well designed metal accounting system allows the location of metal losses to be identified, giving operational staff a huge head start in optimizing overall plant recovery. Similarly, if reconciled recoveries for each of the unit processes are available, the financial value of further optimizing or eliminating those processes can be quickly established.

Additionally, governance issues surrounding reporting of financial performance require metal accounting processes and systems to be as transparent, reliable, repeatable and auditable as the financial systems they feed.

Given the importance of the metal accounting systems on site, it is critical to assess quality and performance. That is why Ventyx provides this proven checklist to assess your compliance with established best practices and help you navigate the journey to operational excellence.

Metal Accounting Best Practice Checklist

This self-audit checklist is designed to quickly identify key areas for improvement and align your processes with operational excellence best practices. Refer to AMIRA P754 “Metal Accounting and Reconciliation” for more comprehensive checklists and guidelines covering all aspects of metal accounting.

BEST PRACTICE



- 1 You can trace which ore block(s) are being fed to the plant**
Your system should allow you to track geological domains, ore blocks and grades delivered to the plant over a particular time period.
- 2 Authorized users can generate month-end metal accounts**
Your system should not rely on a single user. Any suitably authorized user should be able to follow a clear procedure to generate the month end metal accounts.
- 3 Your system is secure from unauthorized/accidental updates**
Your system should have adequate security to prevent unauthorized modification of data or any modification of data after it has been published to the finance department and wider world.
- 4 Your system can handle adjustments robustly**
It is a fact of life that many measurements are not available until month end books have been closed and published. Late arriving changes or late detected errors need to be handled within the system. An average user or auditor should be able to trace these late updates and their effect on the published results.
- 5 Your system is transparent and auditable**
Auditors and general users should be able to trace from published accounts through to raw input data and all the calculations in between. There should be no breaks in the system audit trail (e.g. arising from copying and pasting of data).
- 6 It is possible to trend reconciled data and recoveries**
It should be easy to extract derived plant performance KPIs over long periods, such as unit process recovery performance. This is extremely useful for justifying plant capital spending or optimization work.
- 7 Assay quality control procedures are in place and results regularly reviewed**
Biases or excess variability in analytical data around key streams can significantly affect the apparent plant performance thereby masking hidden losses. Sampling and analysis quality control should be built into the metal accounting process so that it is reviewed on a regular basis.

BEST PRACTICE



- 8 There are adequate and automated data quality checks within your system**
Your data validation procedures should be automated and users should be alerted early when there are issues. There are multiple levels of validation to be considered:
 - Simple data point validation (e.g. daily mass < 10,000t, Au% < 97.5)
 - Validation across the flowsheet for a single period (i.e. inputs, outputs and stock changes must be consistent)
 - Validation over time (i.e. outlier detection)
- 9 Procedures for applying inventory adjustments are well understood and adequately secured**
Adjusting inventory is equivalent to a write-on or write-off of the operation's financial value. Authority to do this within the system must be controlled and the effects of stock adjustments should be well defined.
- 10 Your system incorporates the outcomes of any risk assessments or audits**
Most mining companies are subject to regular audits of their systems, particularly those with a financial impact. The metal accounting systems are no different and need to incorporate outcomes of these audits.
- 11 Your system shows the source and reason for any changes to raw data**
There can be many reasons why historic data is corrected. The system should allow a user to capture the reason why the change was necessary, record the previous value, date of change and user. A lot of time can be wasted on site trying to determine why data has changed.
- 12 Human interaction is minimized by using automatically captured data**
Many of the data sources used to generate metal accounts are other systems, such as SCADAs, lab instrumentation, etc. The system should access this kind of data automatically to minimize the chance of a manual transcription error.

Analyzing Your Results

While each of these best practices are important in their own right, the key aspect of a best practice metal accounting process is that it provides an end-to-end, unbroken audit trail. If you did not check any of the items on this checklist, your metal accounting process may contain gaps that can leave you out of compliance and vulnerable to errors, or even malicious abuse.

Your metal accounting process should also provide enough flexibility to cater to diverse site and business requirements while enabling you to use a single solution across all operations. Your process should enable:

- Proactive risk management
- Timely and accurate recognition of revenue
- Enhanced production performance measurement
- Early detection of plant performance and measurement problems
- Bonus scheme calculations
- Improved production planning and forecasting
- Timely and relevant production information for the monthly financial reporting cycle
- Increased accuracy in matching production costs to stages the production process
- Calculation of royalty payments

Ventyx Solutions for Metal Accounting and Beyond

Ventyx specializes in helping mining organizations optimize their metal accounting processes. Leveraging more than 30 years of mining experience, Ventyx delivers industry-leading solutions that help you implement metal accounting best practices and standardized business processes across your organization – regardless of the flowsheet, measurement and cultural differences between your sites.

The **Ventyx Intelligent Mining Solution (IMS)** provides a comprehensive range of technical mining solutions, covering the entire spectrum of mining processes from exploration to outbound logistics and sales. An integral part of Ventyx IMS, **Ventyx Production Accounting** is a complete metal accounting solution that delivers comprehensive, timely and validated information to support decision-making, reduce risk, maximize profitability, and ensure your organization is following best practices.

Contact Ventyx

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