



**CHRYSOS
CORPORATION**
Assays at the speed of light

Technical Note TN-403

Chrysos PhotonAssay™ Monitoring
Standard Recommendations

Contents

Contents	1
Introduction	2
Monitoring standard quantity	2
Monitoring standard grade and standard deviation	2
Monitoring standard selection.....	2
Gold Services.....	2
Gold and Silver Services.....	3
Copper Services.....	4

Related Documents

Technical Note TN-401 QA&QC Procedures for Chrysos PhotonAssay™ Systems

Performance Note PN-000 Chrysos PhotonAssay™ Services Summary

Performance Note PN-001 Chrysos PhotonAssay™ Gold Services

Performance Note PN-002 Chrysos PhotonAssay™ Concurrent Gold and Silver Services



Introduction

This note outlines the recommended monitoring standards to be used for QAQC of the PhotonAssay™ units.

Monitoring standards allow the unit to automatically check and rapidly detect any changes with instrument performance, reporting processes and data quality. Monitoring standards should be included at a rate of 1 per 20 customer samples. The inclusion of monitoring standards interleaved through batches of customer materials is an important part of the quality control processes for PhotonAssay™. For information on the internal and user-initiated procedures (including monitoring standards) used to monitor data quality of a Chrysos PhotonAssay™ unit, please refer to TN-401.

Over time the monitoring standards listed below will change due to availability by suppliers. When these changes occur, an updated technical note can be provided. The monitoring standards selected for PhotonAssay™ quality control do not need to reflect the grade range of materials run for customers.

Monitoring standard quantity

Enough of each monitoring standards should be initially purchased to allow 5-6 jars of each material to be prepared. Typically, a 2.5 kg tub of material should be sufficient. The monitoring standard jars should be kept topped up (see TN-401 for the procedure) as material settles or is lost during jar mishandling, so spare material from the same batch should be kept available.

Monitoring standard grade and standard deviation

Many materials do not yet have certified grade and standard deviation values for the PhotonAssay™ technique. When a new monitoring standard is adopted for laboratory quality control, Chrysos will perform a set of repeated measurements on that material. This allows a suitable grade and standard deviation for quality control to be determined. Monitoring standards jars must be registered in advance within the Chrysos database, as this will enable their observed grades to be used for automatic quality control tracking.

Monitoring standard selection

Gold Services

For the standard gold analysis service (PAAU02) which covers the nominal range of 0.01-350 ppm, use of a range of materials across the nominal range is promoted. An example of a suitable monitoring standard suite is found below:

- OREAS 237b (Medium Au grade)
- OREAS 239b (Medium Au grade)
- OREAS 247 (High Au grade)
- Geostats G319-9 (Very high Au grade)
- Blank

For the higher range gold assay services (PAAU02H and PAAU02HH), which cover the nominal ranges of 350-3,500 ppm and 1000-10,000 ppm, respectively, the following monitoring standard suite is suggested:

- OREAS 247 (High Au grade)
- Geostats G319-9 (Very High Au grade)

- KLEN 81980 (Very High Au grade)
- Blank

Alternatively monitoring standards can be selected from Table 1. When selecting monitoring standards for the standard gold service, it is recommended to include at least one medium grade and two high or very high-grade materials. Samples with Au grades below 0.3 ppm should not be used for PhotonAssay monitoring due to the reduced instrument precision. The selected samples should be relatively free of interfering elements (combined U + Th grade < 10 ppm). Materials with over 2 wt.% lead should not be used as this will be detrimental to assay performance.

Table 1. Grade ranges for gold monitoring standards. * denotes monitoring standards available with certified grades obtained through PhotonAssay™ analysis.

Designation	Au Grade range (ppm)	Commercial examples
Blank	< 0.005	Blank material obtained locally or provided by Chrysos U + Th grades can be checked using PhotonAssay™
Low	0.3-2.0	AMIS0805* OREAS 232b*, 233*, 251b*, 264*, 624 Rocklabs OxE182, SF100
Medium	2.0-10.0	CDN GS-2U, GS-27, GS-7J OREAS 238, 237b*, 238b*, 239b* Rocklabs OxK160, OxK175
High	10.0-80.0	CDN GS-12A, GS-20C, GS-50A Geostats G301-9, G317-3, G916-5 Rocklabs HiSilP5, OxP172, OxQ170 OREAS 247*,
Very high	> 80	Geostats G319-9 KLEN 81980

Gold and Silver Services

When using the simultaneous gold and silver analysis services (PAAGAU01, PAAUAG02), which cover up to 350 ppm for gold and 5000 ppm for silver, a suitable monitoring standard suite is:

- OREAS 282 (High Au)
- OREAS 247 (High Au)
- Rocklabs OxQ153 (High Au, Low Ag)
- CDN-ME-2001 (Low Au, High Ag)
- CDN-ME-1903 (Medium Au, Low Ag)
- Blank

These monitoring standards have been selected because they cover the measured grades for both gold and silver. Alternatively monitoring standards can be selected from Table 2. When selecting monitoring standards, it is recommended to include at least three silver materials, with at least one high grade; and at least two high grade gold. Samples with Ag grades below 40 ppm should not be used for PhotonAssay monitoring due to the lower instrument precision. Materials with over 2 wt.% lead should not be used.

Samples in the blank and low categories should be free of interfering elements (combined U + Th grade < 10 ppm).

Table 2. Grade ranges for silver monitoring standards.

Designation	Ag Grade range (ppm)	Commercial examples
Blank	< 0.2	Blank material obtained locally or provided by Chrysos U + Th grades can be checked using PhotonAssay™
Low	40-200	CDN-ME-1903 Rocklabs OxQ153 Klen 74358
High	> 200	CDN-ME-2001, 2002 Klen 24465 OREAS 603c

Copper Services

Copper assay is performed using a dedicated copper assay service. For routine monitoring of machine performance, the use of monitoring standards where the induced copper activity far outweighs the signal produced by any Interfering Elements (IEs) that may also be present, is recommended.

For the standard copper analysis service (PACU01) which covers the nominal range of 0.005-4 wt.%, the recommended monitoring standard suite is:

- OREAS 924
- OREAS 925
- OREAS 926
- OREAS 927
- OREAS 928
- OREAS 929
- OREAS 930
- Blank

For the high range copper analysis service (PACU01H) which covers the nominal range of 4-30 wt.%, the recommended monitoring standard suite is:

- OREAS 932
- OREAS 933
- OREAS 934
- OREAS 935
- OREAS 993
- Blank

Alternatively monitoring standards can be selected from Table 2. Samples with grades of Cu below 0.5 wt.% should not be used for PhotonAssay monitoring due to the likely presence of interfering elements. Materials with over 2 wt.% lead should not be used. Samples in the blank categories must be free of interfering elements.

Table 3. Grade ranges for copper monitoring standards samples.

Designation	Cu Grade range (wt%)	Commercial examples
Blank	< 0.01	Blank material obtained locally or provided by Chrysos.
Low	0.01-0.5	Monitoring standards are NOT recommended for routine monitoring within this grade range.
Medium	0.5-4.0	OREAS 923, 924, 925, 926, 927, 928, 929, 930, 931
High	>4.0	OREAS 932, 933, 934, 935, 991, 992, 993, 994

