



# ***Crushed CRM™***

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## **CrushedCRMs™ RANGE PROFILE**

The only CRMs designed  
and certified for PAL  
and PhotonAssay™



# **Independent Mineral Standards are The CRM Specialists**

We provide technical leadership in the development, manufacture, and use of certified reference materials (CRMs).

At IM Standards, we specialise only in certified reference materials (CRMs). Our expertise and experience are driving innovation to reshape the industry.

## World Class Experts, Leading the Way

Engineered explicitly for large-mass analytical methods (like PAL and PhotonAssay™), CrushedCRMs™ are treated identically to routine samples during analysis, allowing greater precision and confidence in results.

**CrushedCRMs™ are essential for laboratory methods that analyse a crushed sample, with the following advantages over pulverised CRMs:**



### Particle Size

They have the same particle size as crushed routine samples analysed.



### Certification

They are certified for PAL, PhotonAssay™ and Fire Assay or independently of any method.



### Stability

For PhotonAssay™ quality control, they are stable over time.



### Sample Prep

They test the sample preparation process.



### Truly Blind

They are truly blind to analysis when submitted from the field.



## **What are CrushedCRMs™?**

Crushed Gold CRMs are ~3mm rock chips specifically produced using our patent-pending, in-house manufacturing process.

Engineered specifically for large mass analytical methods like PhotonAssay™ and PAL, they are the only CRMs designed for these laboratory techniques. They are certified and matrix-matched to routine samples.

Quality control programs for laboratory analysis rely on treating certified reference materials (CRMs) identically to routine samples. Matching the physical and chemical characteristics, method of use, and handling in all laboratory processes for both CRMs and routine samples develop superior confidence in the results.

Pulverised CRMs have been used for PhotonAssay™ and PAL, but they behave adversely compared to crushed samples. To solve this issue, CrushedCRM™s have been developed as the essential quality control material for these laboratory methods.

Produced under our 17034 accreditation, we guarantee the inter-comparability of measurement results worldwide and the highest level of quality assurance that an accredited impartial manufacturer can obtain.



## **Use CrushedCRMs™ for PhotonAssay™ (Testing Total Au, Ag and Cu)**

The use of pulverised CRMs in PhotonAssay™ can be problematic.

Our CrushedCRM™ - Primary product provides further confidence in the PhotonAssay™ Quality Control program by unlocking the following solutions:

- CrushedCRM™ - Primary has the same physical and bulk chemical properties as routine samples. The distribution of gold within the material is similar to a typical sample, located within the ~3mm particles.
- CrushedCRM™ - Primary is stable. Pulverised gold CRMs are challenging to pack consistently into the PhotonAssay™ jar and exhibit variable packing density between jars and within jars over time, causing analytical bias.
- CrushedCRM™ - Primary contains minimal fines, resulting in stable within-jar segregation of gold due to the elimination of gold-containing fine particle settling.
- CrushedCRM™ - Primary exhibits repeatable and precise PhotonAssay™ jar fill properties and does not stick to the inside of the jar.
- CrushedCRM™ - Primary is certified using a gravimetric method, therefore providing a completely independent assessment of PhotonAssay™ and restoring confidence in the technique. Neither our catalogue grades nor your tailored CrushedCRM™ product (Primary or Custom) have been used to build a PhotonAssay™ calibration, nor has their certified value been determined by a fire assay round-robin program.
- CrushedCRM™ - Primary is manufactured to specific gold grades to cover the full analytical range of the technique, with targeted grades at cutoff and at low levels where PhotonAssay™ precision needs careful monitoring.

Using our CrushedCRM™ - Pre-Mixed product, PhotonAssay™ users can benefit from submitting a truly blind CRM from the field alongside RC or blast hole samples.

- Due to its carefully designed level of internal (within-unit) heterogeneity, CrushedCRM™ - Pre-Mixed allows for the laboratory's ability to load and pack the PhotonAssay™ jars to be assessed consistently in terms of quality and reproducibility.
- CrushedCRM™ - Pre-Mixed can be truly blind when submitted to the lab from the field for analysis. All currently available pulverised gold CRMs with a PhotonAssay™ certification are controlled by the laboratories, and their properties are extensively recognised. CrushedCRM™ ensures your quality control program is controlled by you.

For a complete matrix-matched solution, CrushedCRM™ - Custom is a -3mm chip product that can be manufactured from clients' ore. Our unique patent-pending manufacturing process allows us to engineer a CrushedCRM™ product while minimising the gold nugget effect, which ensures between-unit homogeneity is fit for purpose.

## **Use CrushedCRMs™ for PAL (Testing Recoverable Au)**

The use of pulverised CRMs in PAL can be problematic.

Our CrushedCRM™ - Pre-Mixed product restores confidence in the PAL technique by unlocking the following solutions:

- CrushedCRM™ - Pre-Mixed offers a more precise solution based on CRM mass and grade.
- CrushedCRM™ - Pre-Mixed are packaged at the aliquot size. They are a single-shot, ready-to-use product.
- CrushedCRM™ - Pre-Mixed test the pulverisation step in the process, and the gold is leached over time, unlike pulverised gold CRMs, which will leach very quickly as the gold is already liberated.
- CrushedCRM™ - Pre-Mixed can be submitted blindly to the lab from the field, unlike pulverised gold CRMs.
- CrushedCRM™ - Pre-Mixed are designed and certified for the PAL method. Some gold will be retained in the tails, allowing for a more complete quality control program to be established from a single source.
- CrushedCRM™ - Pre-Mixed are also certified by PhotonAssay™ and Fire Assay for total gold content.

### **The key benefits of using CrushedCRM™ for PAL are:**

- CrushedCRMs™ are pulverised and leached in the method like a routine sample.
- CrushedCRMs™ are certified for PAL at the method aliquot mass.

## **Use CrushedCRMs™ for Fire Assay**

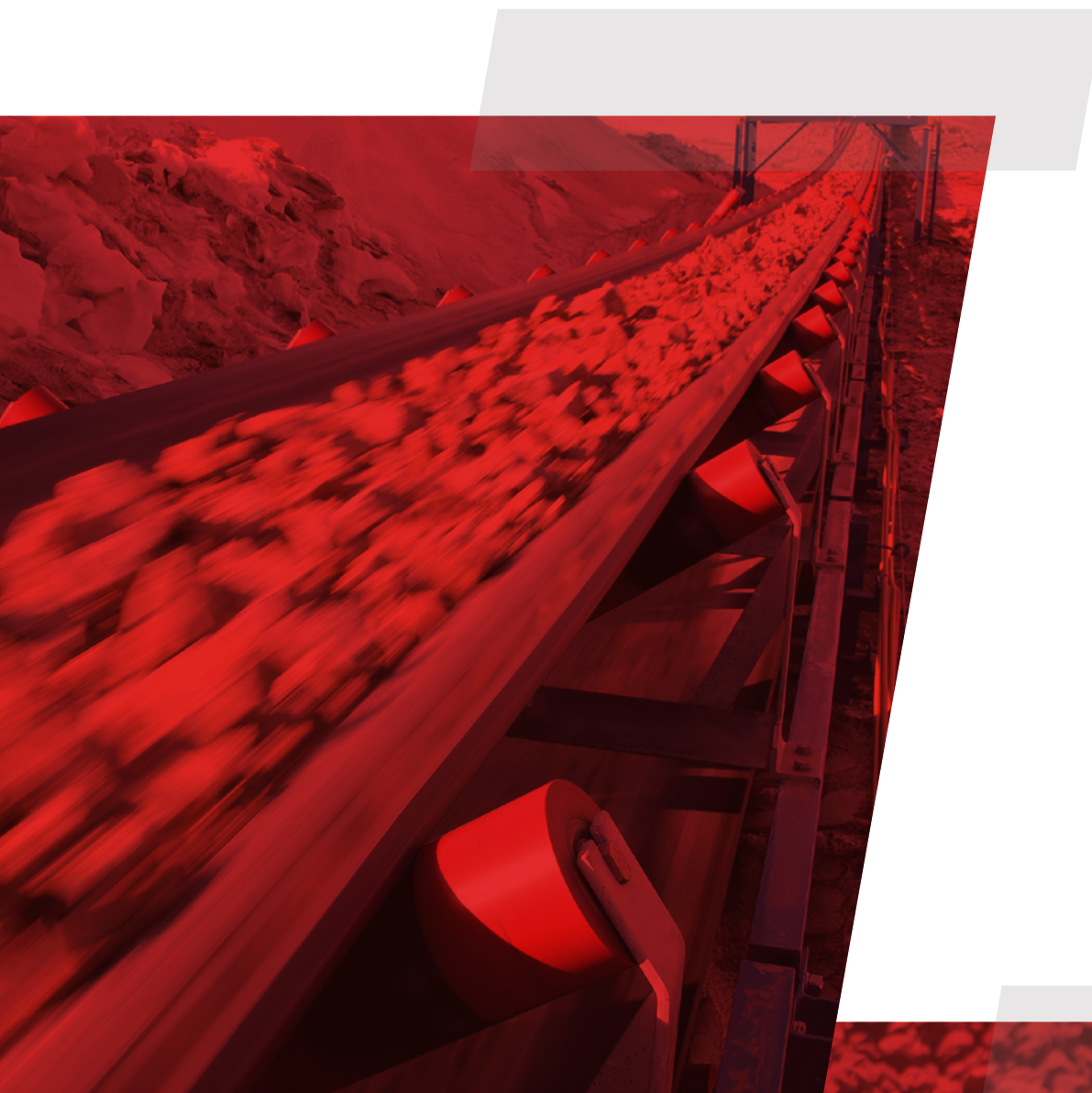
The use of Pulverised CRMs in Fire Assay can be problematic.

CrushedCRM™ brings the following solutions:

- CrushedCRM™ - Pre-Mixed test for errors in preparation and are blind to the lab, unlike pulverised gold CRMs, which do not test for mistakes in preparation and are not blind to the lab.

Our Pre-Mixed product is specifically designed for Fire Assay. Our Custom product can also be designed for use in Fire Assay. The key benefits are:

- They are truly blind to the lab as they are submitted with the drill samples.
- The use of the Pre-Mixed 2kg tests the sample preparation.



# **Crushed CRM™ GOLD**

## **PRE-MIXED**

CrushedCRM™ – Pre-Mixed is a ready-to-use single-shot gold CRM certified for PAL and PhotonAssay™ at the method aliquot mass.

### **Product Benefits**

- Certification for the aliquot mass method.
- Tests the entire sample preparation process.
- Leaches over time like geological samples.
- Requires pulverising during the test.
- QC confidence over time.
- Sample-to-sample variance similar to Pulverised Gold.
- Easy to swap to CrushedCRM™ from Pulverised Gold.
- Long-term, guaranteed product supply.
- PAL & PhotonAssay™ certifications provide trust and confidence in your results.

### **Product Features**

- Crushed ~3mm rock chip.
- Certified by PAL and PhotonAssay™ method through international round robin, treated the same way as the analytical method.
- Within unit heterogeneity to identify sample preparation issues.
- Between unit homogeneity similar to pulverised CRM.
- Large production batch sizes (multi-ton).

### **Product Usage**

CrushedCRM™ - Pre-Mixed CRMs are suitable for use:

- PhotonAssay™.
- PAL.
- Fire Assay.

### **They are available in:**

- 500g units. Ready to use. Suitable for PhotonAssay™ and PAL. The certified 'value' and 'uncertainty' are certified for the PAL and aliquot mass methods.
- 2kg Pack. This tests the uncertainty of sample preparation (crushed, split, pulverised). It is for use in the Fire Assay.

### **Product Grades**

It is available in the following grades from 0.1 – 3.0.



# **Crushed CRM™ GOLD**

## **PRIMARY**

CrushedCRM™ – Primary is manufactured to precise specifications with a Gravimetric Certified Value For PhotonAssay™.

### **Product Benefits**

- Certified independent of the analytical method.
- QC departments can ensure results without referencing any analytical method (PhotonAssay™, PAL or Fire Assay).
- Can be used to compare analytical outcomes across multiple methods.
- It is volumetrically stable over time, allowing for stable bulk density estimates and is particularly suitable for PhotonAssay™ use.
- Minimised segregation by particle size, eliminating unmatched concentration of Au within the jar.
- Accurate bulk density measurements.
- No volume obscuration within PhotonAssay™ jars by dust adhesion.
- QC departments can confidently use it for instrument calibrations and calibration validation.

### **Product Features**

- Crushed ~3mm rock chip.
- No dust or fines in the material.
- Gravimetric Certified Value and Certified Uncertainty.
- Manufactured to precise specifications.

### **Product Usage**

CrushedCRM™ Primary CRMs are suitable for use:

- In PhotonAssay™.
- By Geologists, Laboratories and Custom Chrysos.

# **Crushed CRM™ GOLD**

## **CUSTOM**

CrushedCRM™ - Custom CRMs are manufactured from natural ore material for matrix-matched confidence.

### **Product Benefits:**

- Matrix matched. Manufactured from field materials, they naturally cover any unique ore characteristics that will affect the method. This can incorporate refractory and complex ores, which require matrix-matched CRM.
- Minimised between-unit heterogeneity that would make a crushed CRM unviable as a matrix-matched CRM.

### **Product Features**

- Crushed ~3mm rock chip.
- Manufactured from mine site material supplied by the client.
- Created using a patent-pending manufacturing process created by IM Standards, the CRM Experts.

### **Product Usage**

Custom CrushedCRMs™ are suitable for use:

- In PhotonAssay™, PAL and Fire Assay.
- By geologists and laboratories.
- Are manufactured to specific customer requirements.

## World Class Experts, Leading the Way

IM Standards is led by an experienced, specialist management team, globally acknowledged as leaders and innovators in their field.

The management team includes significant experience in:



### Economic Geology

Precious and base metals exploration and production, resource estimation as a JORC competent person role, and geo-metallurgy expertise.



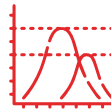
### Analytical Chemistry

Operation and management of geo-analytical laboratory facilities servicing global exploration, mining and mineral markets. Development of innovative solutions for chemical, mineralogical and metallurgical analysis.



### Materials Science

The technology and design of advanced mineral products and the production and operations of powder processing and materials handling systems.



### Statistics

In-house capabilities in advanced mathematics and statistics. This has enabled IM Standards to develop proprietary models for ISO 17034 accredited certification and proficiency testing capabilities.



## ABOUT IM STANDARDS

Independent Mineral Standards is based in Western Australia, a part of the world known for its strong mining and resource sectors.

**Our team boasts outstanding technical capabilities**, along with exceptional expertise in geology, resource modelling, minerals analysis, data analysis, geo-chemical laboratories, data analysis, materials processing and engineering.

Originally Pilbara Standards, IM Standards have been operating since 2012. From humble beginnings we have become **the world's largest supplier of iron ore certified reference materials**, supplying every top-tier iron ore company in Australia and many specialist laboratories.

In 2021 we rebranded to Independent Mineral Standards, to better reflect the growing breadth of our product range and our focus on certified reference materials across all commodities.

**We care passionately about our customers and the quality and consistency of our products.**

We are meticulous about data and detail, backed by the expertise, experience and technical know-how of our team.

Our product range covers major commodities (including iron, bauxite, gold and more). If you can't find what you need, we can make it for you. In addition to a large catalogue of in-stock CRMs, we custom-produce CRMs to client specifications from client material. **We are the only company in the world that offers both custom and catalogue crushed CRMs** and are at the forefront of innovation in this essential category with our newly released crushed gold CRMs.





**Independent Mineral Standards –  
The CRM Specialists.**

**IM Standards are ISO17034 accredited by ANAB as a Reference Materials Producer.**





**PLEASE VISIT OUR WEBSITE TO  
DISCOVER MORE ABOUT IM STANDARDS.**

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