Clean Earth™ Technologies

THIOSULFATE MEASUREMENT

CleanMining™

FOR A RICHER EARTH

MARKET OPPORTUNITIES

- World cyanide market for gold processing at c. USD 5-7 billion p.a.
- Cyanide is predominately used in large-scale mining operations which represents c. 70% of gold production
- c. 20% of the world's gold is produced by the ASGM sector
- Target market of over 14,700 large-scale, new mines
- Over 6,300 mines banned or have an aversion to cyanide
- CET's non-toxic solution is applicable in 90% of gold production

MARKET PENETRATION

Active Leads
Countries or sub territories that have banned or have an aversion to cyanide for new projects

Active Leads
Countries with active leads which can still use cyanide for new projects

PROGRESS UPDATES

- Over **500** active leads since marketing commenced, of which 60 are going through test planning and logistics – 54 mines in various stages of testing and process evaluation.
- More than **150** tests done globally with recoveries as good as and if not better than cyanide. Carbonaceous ore tested resulted in 45% + improvement on cyanide in some cases.
- Plant and chemical manufacture, sales and distribution partnership discussions with 6 re-sellers globally.
- New patents identified and provisional lodgement completed in November 2020.

TARGET MARKET[1]

Development Stage	Total Mines	Cyanide Aversion
Exploration	4,963	2,215
Feasibility	483	216
Grassroots	3,049	1,039
Scoping	6,213	2,870
TOTAL	**14,708**	**6,340**
Region	**Total Mines**	**Cyanide Aversion**
Africa	1,228	38
Asia-Pacific	3,368	2,552
Europe	1,001	134
Latin America and Caribbean	2,733	1,340
Middle East	62	0
USA and Canada	6,316	2,276
TOTAL	**14,708**	**6,340**

1. Derived from S&P Analytics

MINING MAGAZINE AWARDS 2019

- Winner of “Mineral Processing” category
- Industry-choice award celebrates excellence and innovation

Excerpt from Mine Magazine Awards 2019 Winners page:

“In June 2019, Clean Mining launched a cleaner and safer processing solution for gold miners, which as the potential to transform the gold sector and responsible mining globally. The innovative and cost-effective solution replaces toxic sodium cyanide, used in gold processing since 1887…”

WHY CYANIDE IS A PROBLEM:

- **Accidents** / containment failures lead to catastrophic pollution
- **Massive** environmental and health risks
- **Significant** environmental incidents, some involving water bodies, have continued to occur globally

List of recent cyanide-caused gold mining disasters

WHAT IS OUR SOLUTION?

- **Award-winning, non-toxic** solution, developed alongside **CSIRO**
- Widely applicable / scalable to broad range of ores / operations
- Potential to eliminate hazardous tailings dams entirely
- Only genuine solution for **replacing mercury in ASGM**

Mining Magazine AWARDS 2019 WINNER

VALIDATION OF SOLUTION

MENZIES DEMONSTRATION PROJECT (2018)

- Project verified stability of leach solution in leaching gold with sustainable reagent.
- Demonstrated reagent consumption of less than 2 kg/t (majority of loss is entrained with solids going to tailings).
- The recoveries for vat leaching were typically >80% of leachable gold, benchmarked against bottle roll leach tests.
- While this project initially used vat leaching tanks, agitated tanks has since been implemented in the processes.

SOLUTION USED AT SCALE BARRICK GOLD.

- Developed by CSIRO for a minerology specific to the Barrick Goldstrike mine.
- This was the pre-curser to the current technology which has been expanded to other ore types by CSIRO & now owned by Clean Earth Technologies
- Current production Scaled to **13,400 tonnes per day since 2015**
- Maintained 350,000 – 450,000 oz/y of gold to operations

R&D TEST DEMONSTRATION: ARTISANAL SOLUTION

- **CLEAN PRODUCTION –** “Mercury Free” Simple & Rudimentary

- **COLLABORATIONS –** AGC shared values and mission to rid Artisanal Mining of Mercury

ARTISANAL GOLD COUNCIL

https://youtu.be/EeXIt1xpYh0

WHAT ARE THE STEPS?

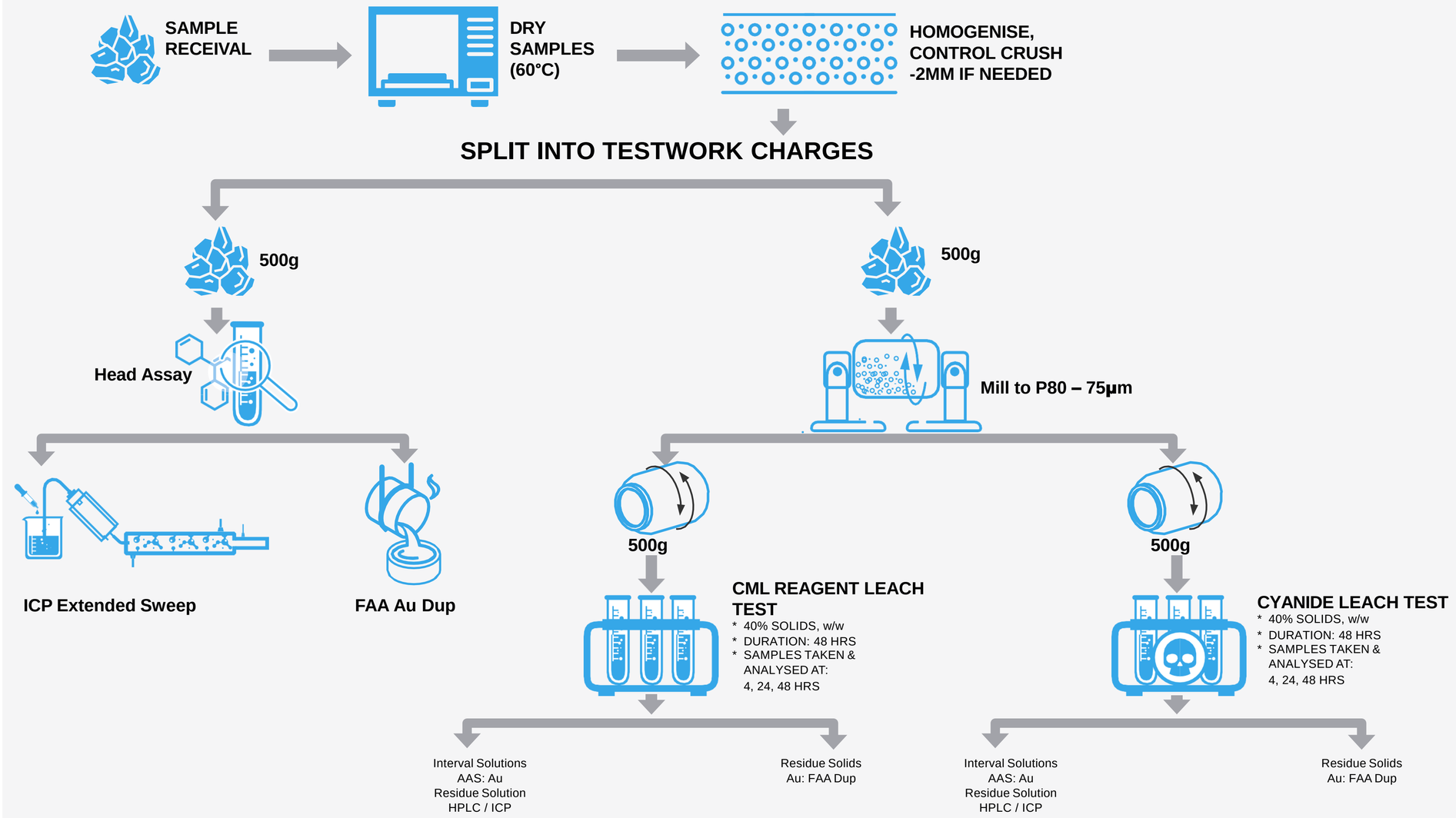
HOW IT WORKS

TESTING FLOWSHEET

CleanMining™
FOR A RICHER EARTH

ICP Extended Sweep
Ag
Al
Ba
Be
Bi
Ca
Cd
Co
Cr
Cu
Fe
K
Li
Mg
Mn
Mo
Na
Ni
P
Pb
SiO2
Sr
Ti
V
Y
Zn
As
Hg
Sb
Se
C - Total
C - Organic
S - Total
S - Sulfide

HPLC / ICP
CML Reagent
Free CN
Tetrathionate
Pentathionate
Trithionate
Ag
Cu
Fe
Zn
Ni
Pb
Ca
Mg
Co
Cd
Hg



TESTING FLOWSHEET

CleanMining™
FOR A RICHER EARTH

SCHEDULE A

1.SCOPE OF TEST WORKS - PHASE 1 A

In-Scope

Sample preparation, leach and assay:

a) Crushing and screening of ore samples to P80 75 micron

b) Head analysis
- ICP: Extended sweep including S and C
- FAA: Au (Dup)

c) Leaching of crushed ore – 48hr bottle roll
- CML Reagent leach solution (samples taken at 4, 24 & 48 HRS)

d) Assay of leach tails
- Leachable Au in solution + solid tail FAA Au (Dup)

e) Leach solution analysis
- HPLC

The Deliverables
- Gold Recovery
- Leaching kinetics - determines residence time
- Reagent consumption for leaching

1.SCOPE OF TEST WORKS - PHASE 1 B

In-Scope

Sample leach and assay:

a) Head analysis
- ICP: Extended sweep including S and C
- FAA: Au (Dup)

b) Leaching of ore – 48hr bottle roll
- CML Reagent leach solution (samples taken at 4, 24 & 48 HRS)

c) Assay of leach tails
- Leachable Au in solution + solid tail FAA Au (Dup)

d) Leach solution analysis
- HPLC

The Deliverables
- Gold Recovery
- Leaching kinetics - determines residence time
- Reagent consumption for leaching

1.SCOPE OF TEST WORKS - PHASE 1 C

In-Scope

Sample preparation, leach and assay:

a) Crushing and screening of ore samples to P80 75 micron

b) Head analysis
- ICP: Extended sweep including S and C
- FAA: Au (Dup)

c) Leaching of crushed ore
- 48hr bottle roll
- CML Reagent leach solution (samples taken at 4, 24 & 48 HRS)
- Cyanide leach solution (samples taken at 4, 24 & 48 HRS)

d) Assay of leach tails
- Leachable Au in solution + solid tail FAA Au (Dup)

e) Leach solution analysis
- HPLC

The Deliverables
- Gold Recovery
- Leaching kinetics - determines residence time
- Reagent consumption for leaching

1.SCOPE OF TEST WORKS - PHASE 1 D

In-Scope

Sample leach and assay:

a) Head analysis
- ICP: Extended sweep including S and C
- FAA: Au (Dup)

b) Leaching of ore – 48hr bottle roll
- CML Reagent leach solution (samples taken at 4, 24 & 48 HRS)
- Cyanide leach solution (samples taken at 4, 24 & 48 HRS)

c) Assay of leach tails
- Leachable Au in solution + solid tail FAA Au (Dup)

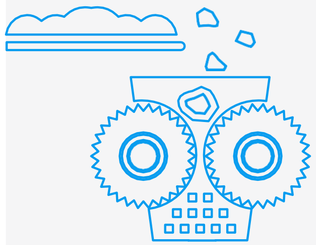
d) Leach solution analysis
- HPLC

The Deliverables
- Gold Recovery
- Leaching kinetics - determines residence time
- Reagent consumption for leaching

ARTISANAL

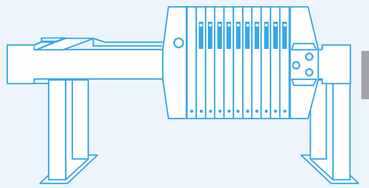
ARTISANAL FLOWSHEET ESTIMATES

CleanMining™ FOR A RICHER EARTH | CleanEarth Technologies™



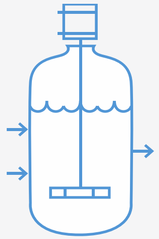
Crush/Grind

ASSUMPTIONS	
Ore	t
Density	%
Head Grade	g/t
Recovery	%
Reagent Use	kg/t
CM-R1	mL/L
GRA1	M
GRA2	M
GRA3	M



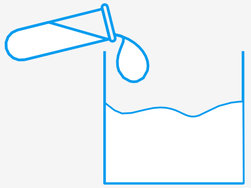
Dewatering

as dry as possible



Batch Leaching

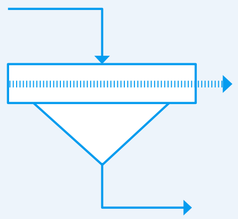
Ore	t
Solution	t
Resin	L
Residence Time	hrs



LR1 Usage	kg

Initial Solution Makeup

LR1	M
LR1	kg



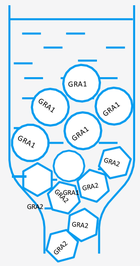
Screening

Slurry

Dewatering/Settling Pond

Solids to tails as dry as possible

Resin



Resin Elution

Water	L
GRA1	kg
GRA2	kg

Precipitate

GRA3 kg

Drying Oven

Furnace

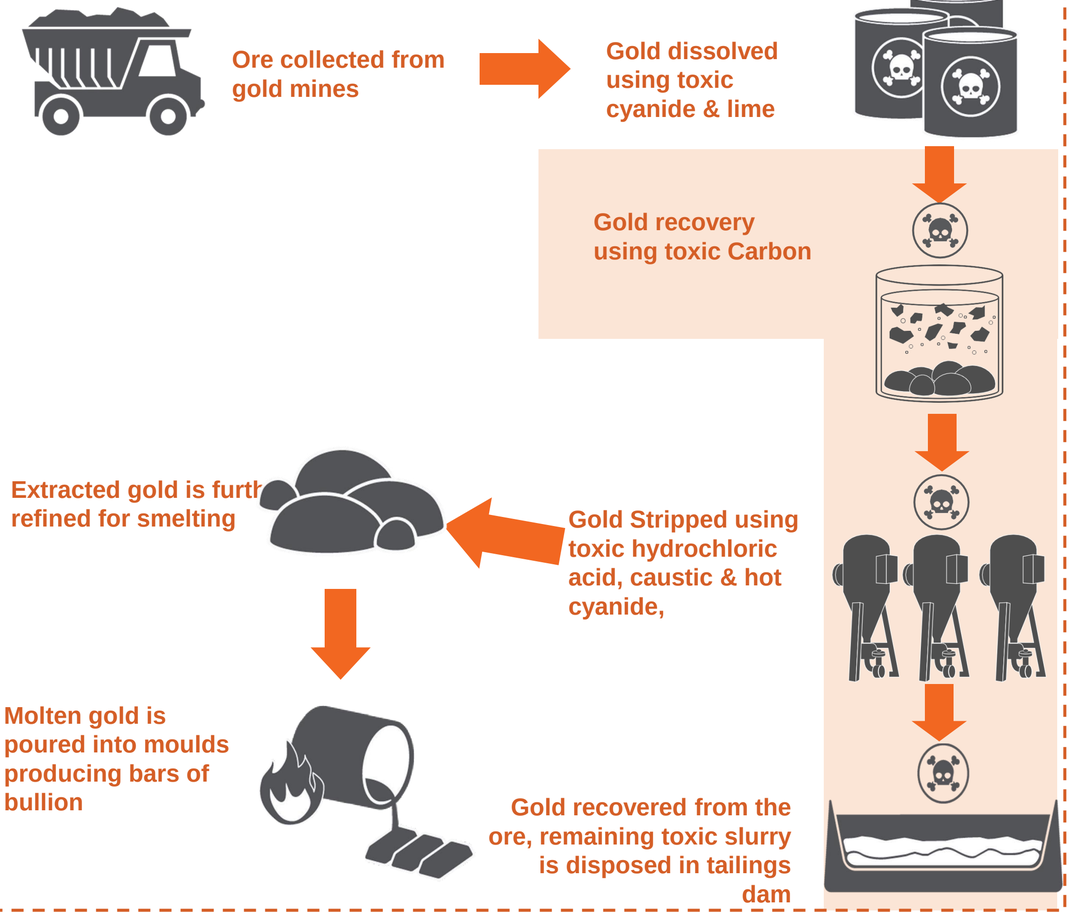
Dore

WHAT SETS US APART?

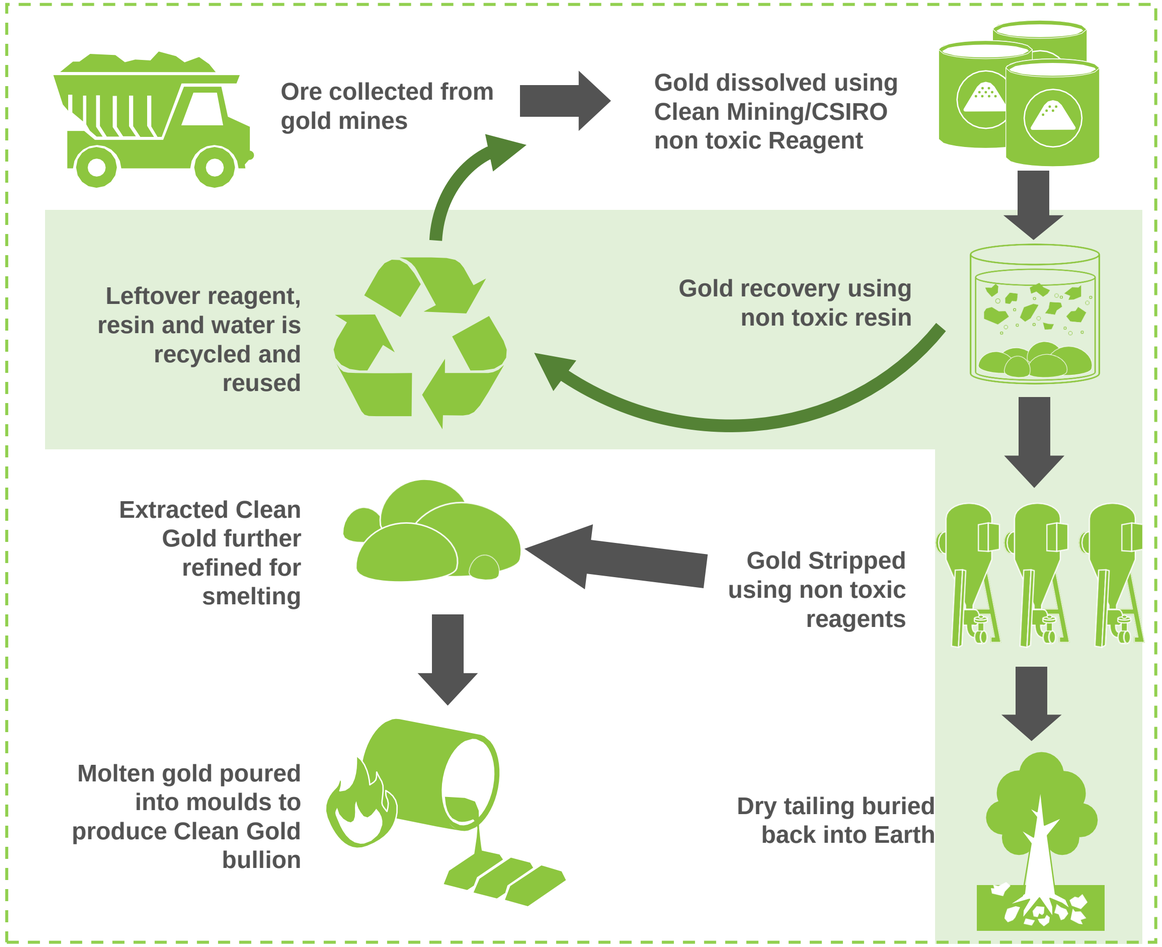
CleanMining™
FOR A RICHER EARTH

CleanEarth™ Technologies

TRADITIONAL - “DIRTY GOLD”



CET - “CLEAN GOLD”



TRULY “CLEAN GOLD”

Cleaner planet, healthier communities

- Brand promotes ethical production methods
- Retailers and consumers assured of premium product
- With social license and sustainability credentials

Leaf logo

- Prominent on all gold produced by the Clean Mining technology and where similar philosophies are implemented

CleanGold™
CYANIDE AND MERCURY FREE
CERTIFIED

RATE OF GOLD EXTRACTION

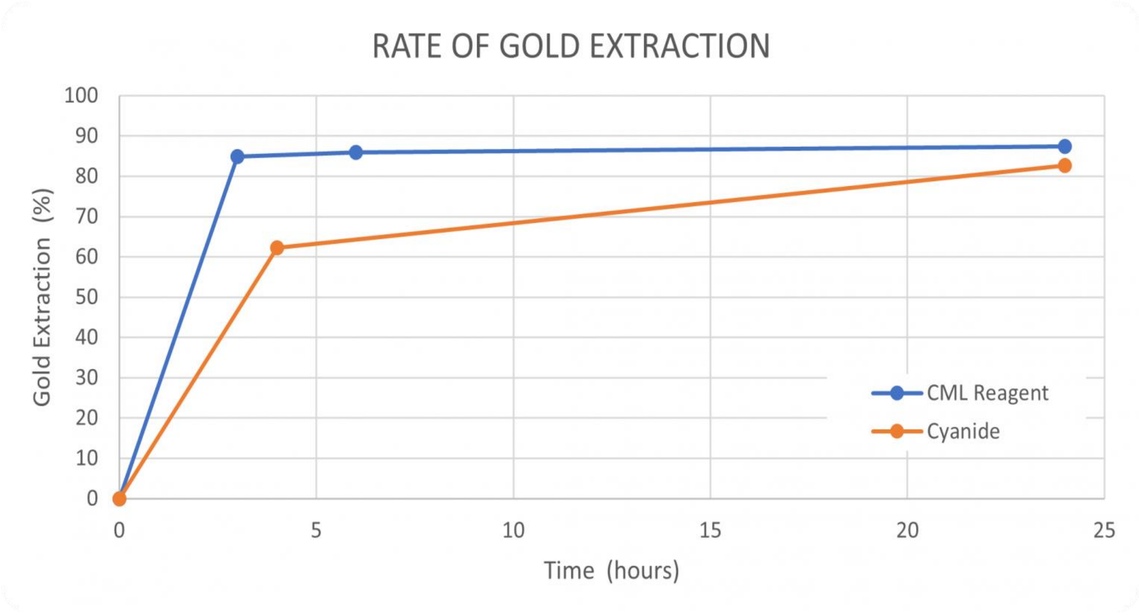
We have conducted over 150 tests globally on
the rate of gold extraction using our non-toxic solution

CSIRO LAB TEST

Description	Size (µm)	Head (g/t)	NaCN Leach Recovery	CML Leach Recovery
Sulfide (Refractory)	841	43.9	82.63 @ 24hrs	87.38 @ 24hrs
Oxide	58.5	1.78	88.38 @ 24hrs	92.01 @ 24hrs
Oxide	75	1.32	88.62 @ 24hrs	92.07 @ 24hrs
Arsenic Bearing Formation	75	1.23	80.88 @ 24hrs	85.13 @ 24hrs
Porphyry Gold, Chalcopyrite	68	1.35	50.98 @ 48hrs	78.77 @ 48hrs
Organic Contaminated	>2000	17.25	97.11 @ 48hrs	97.05 @ 48hrs
Sulfide (Refractory)	126.9	1.85	71.74 @ 24hrs	79.99 @ 24hrs
Oxide	75	2.99	86.67 @ 24hrs	91.09 @ 24hrs
Concentrate	>2000	706	88.8 @ 24hrs	92.13 @ 24hrs
Banded-Iron Formation	75	449	98.25 @ 24hrs	97.76 @ 24hrs
Oxide	75	5.23	98.59 @ 24hrs	95.29 @ 24hrs
Concentrate Tail	>2000	506	94.21 @ 24hrs	87.07 @ 24hrs
Sulfide (Refractory)	841	43.9	82.63 @ 24hrs	87.38 @ 24hrs
Oxide	58.5	1.78	88.38 @ 24hrs	92.01 @ 24hrs
Concentrate	75	1.32	88.62 @ 24hrs	92.07 @ 24hrs
Banded-Iron Formation	75	1.23	80.88 @ 24hrs	85.13 @ 24hrs
Oxide	68	1.35	50.98 @ 24hrs	78.77 @ 24hrs
Concentrate Tail	>2000	17.25	97.11 @ 24hrs	97.05 @ 24hrs

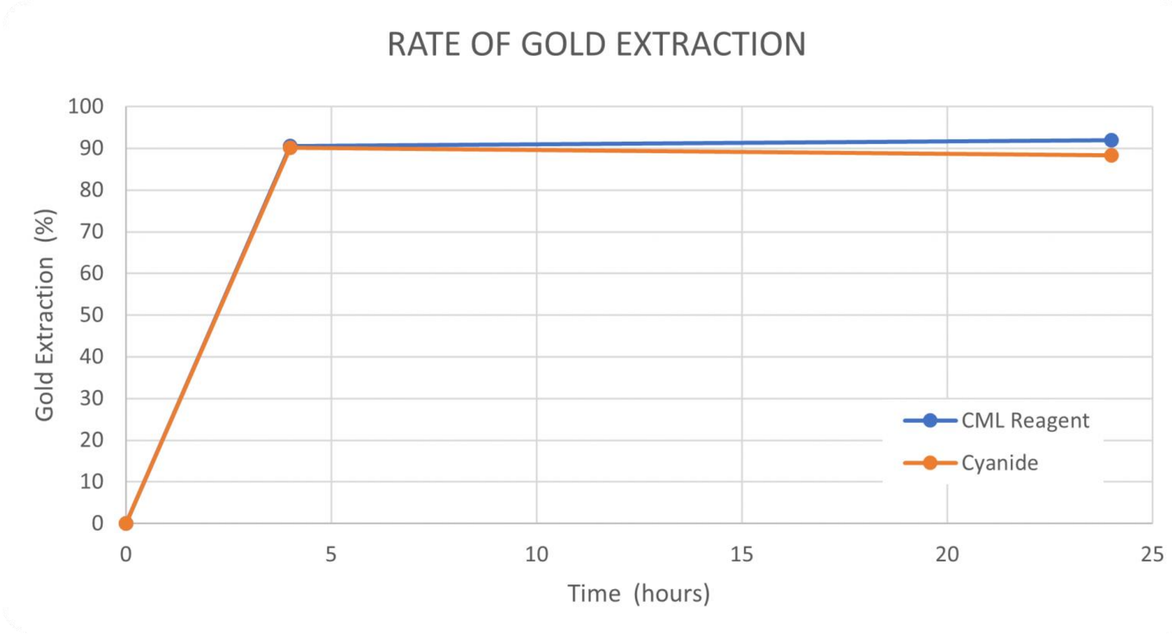
USA - PHASE 1

- Sample Head Grade: 43.9g/t Au
- Ore Type: Sulfide (Refractory)
- Restricted approval process for toxic practices



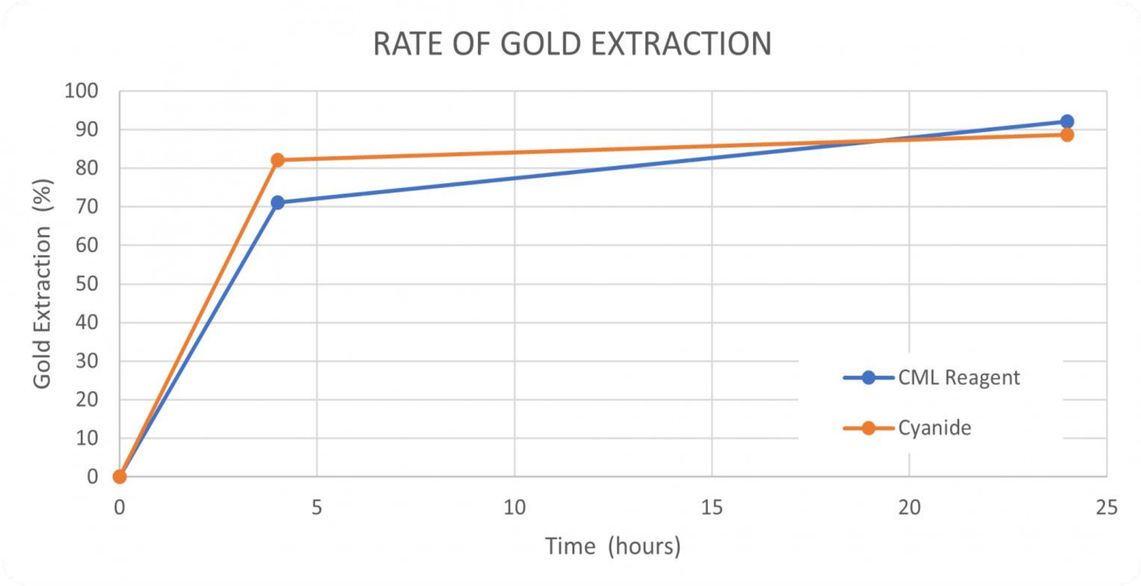
EUROPE - PHASE 1

- Sample Head Grade: 1.78g/t Au
- Ore Type: Oxide
- Cyanide Banned



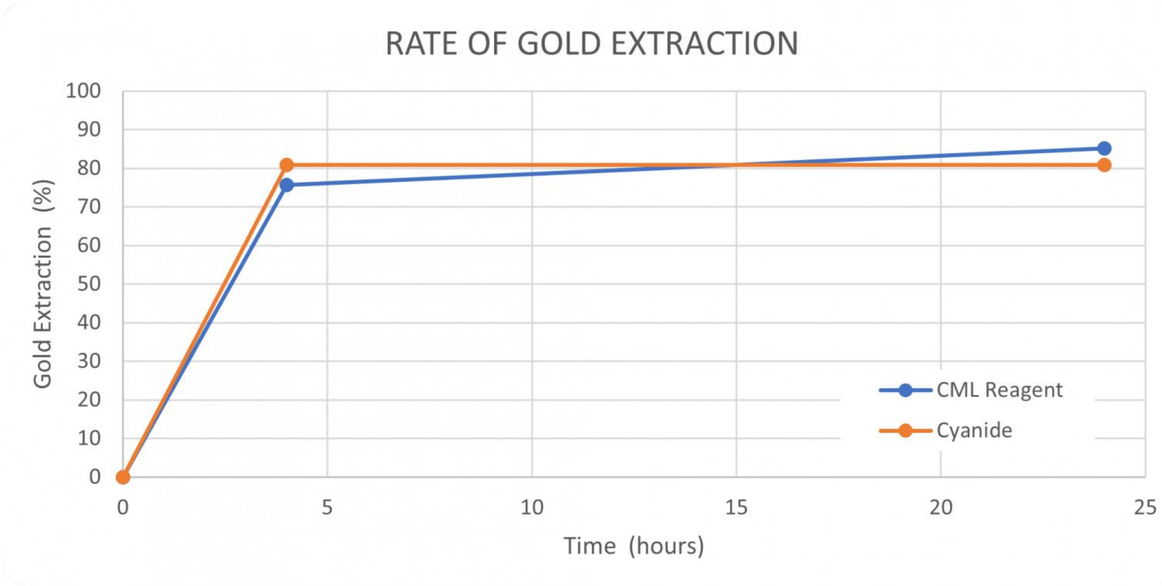
SOUTH AMERICA - PHASE 1

- Sample Head Grade: 1.32g/t Au
- Ore Type: Oxide



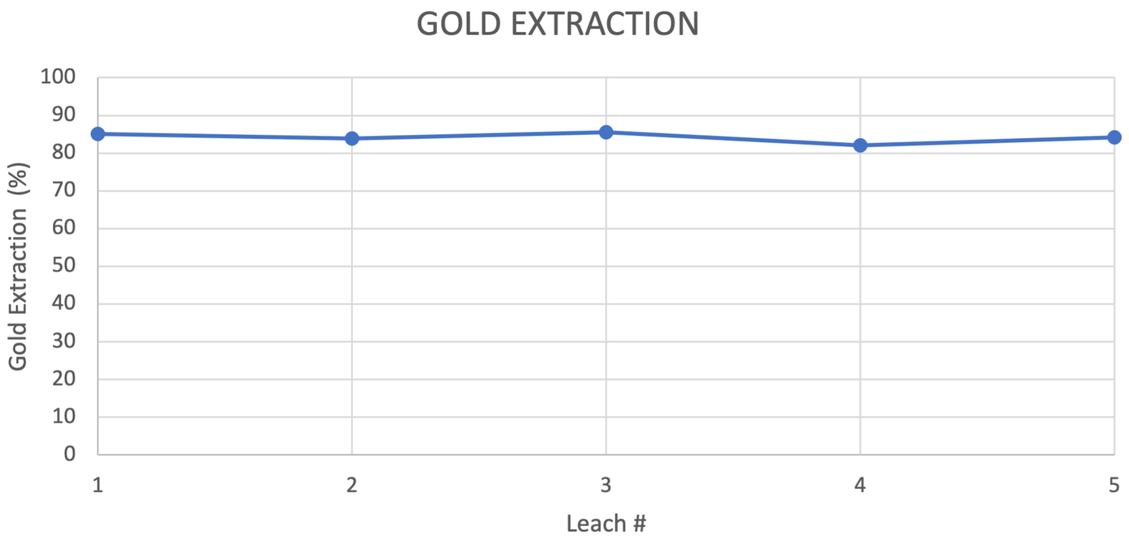
EUROPE - PHASE 1

- Sample Head Grade: 1.23g/t Au
- Ore Type: Arsenic bearing formation
- Cyanide Banned



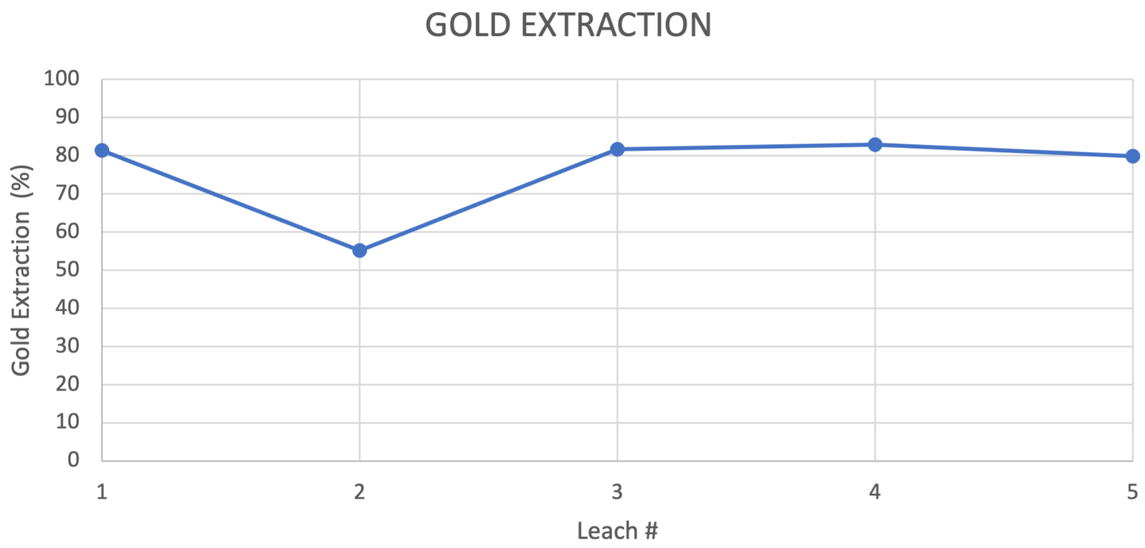
SOUTH AMERICA - PHASE 2

Gold leaching and IX recovery conducted by five sequential elution cycles



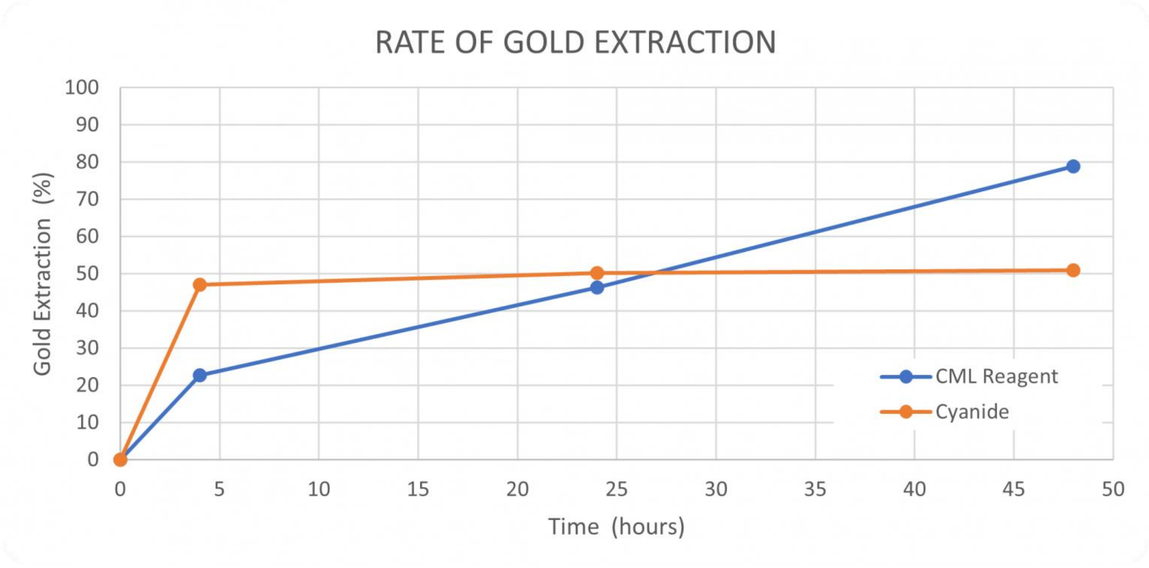
EUROPE - PHASE 2

Gold leaching and IX recovery conducted by five sequential elution cycles



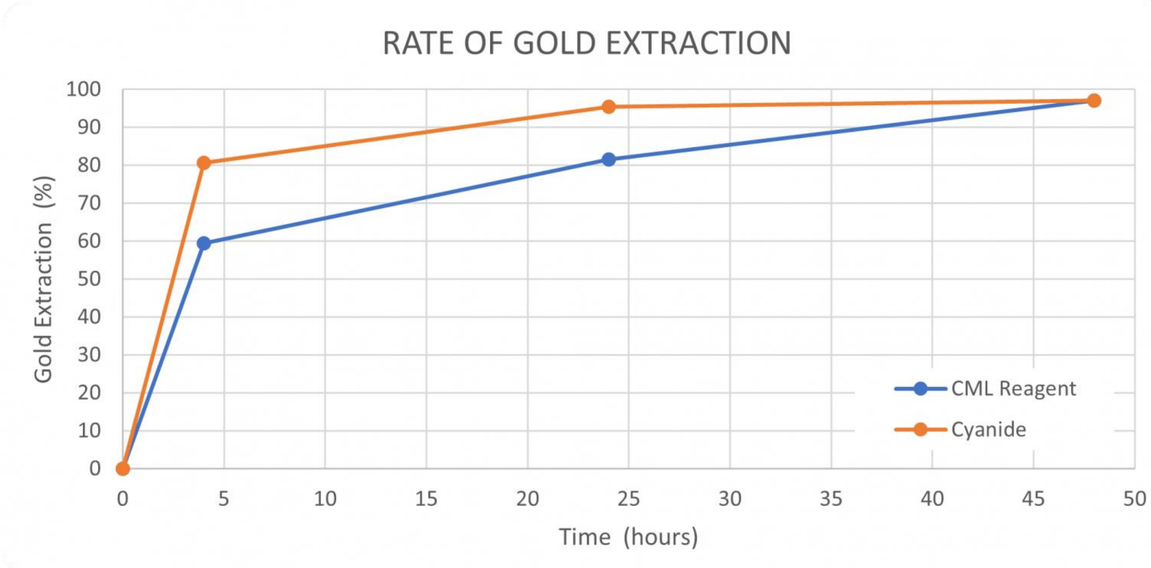
MIDDLE EAST – PHASE 1

- Sample Head Grade: 1.35g/t Au
- Ore Type: Chalcopyrite, porphyry with gold
- Aversion to toxic practices



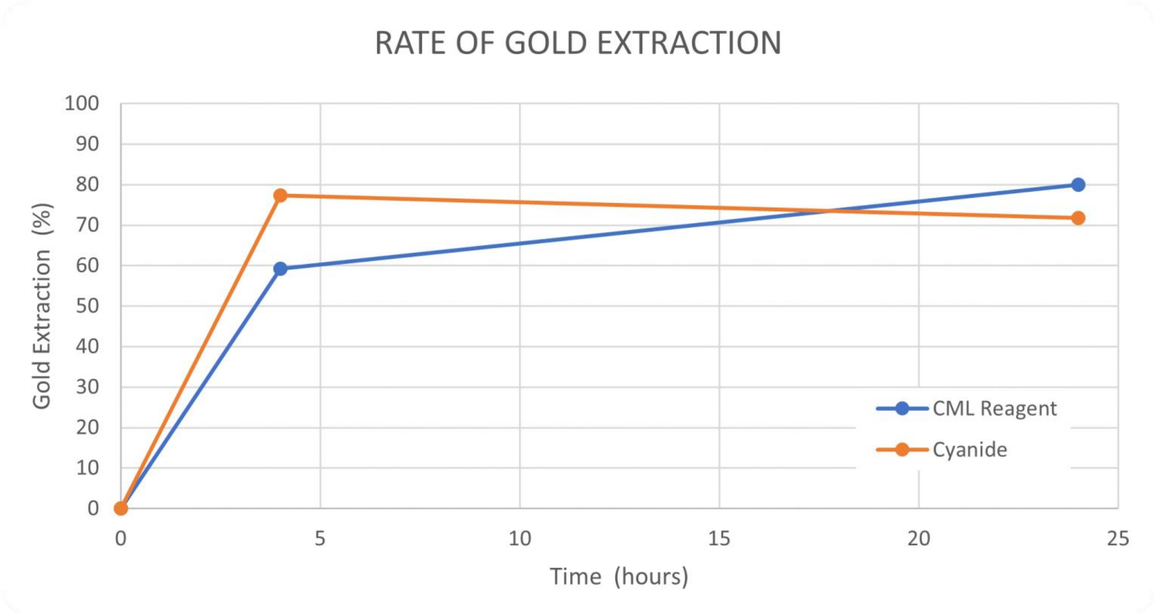
ASIA – PHASE 1

- Sample Head Grade: 17.25g/t Au
- Ore Type: Organic Contaminated
- Aversion to Cyanide and Mercury



EUROPE– PHASE 1

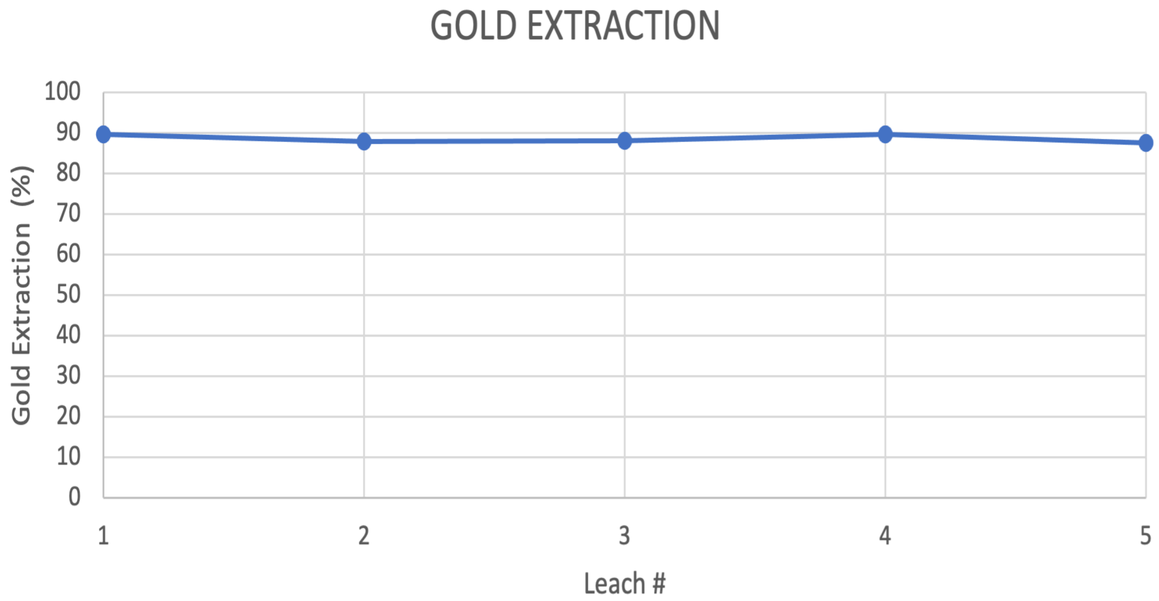
- Sample Head Grade: 1.85g/t Au
- Ore Type: Sulfide (Refractory)
- Cyanide Banned



EUROPE – PHASE 2

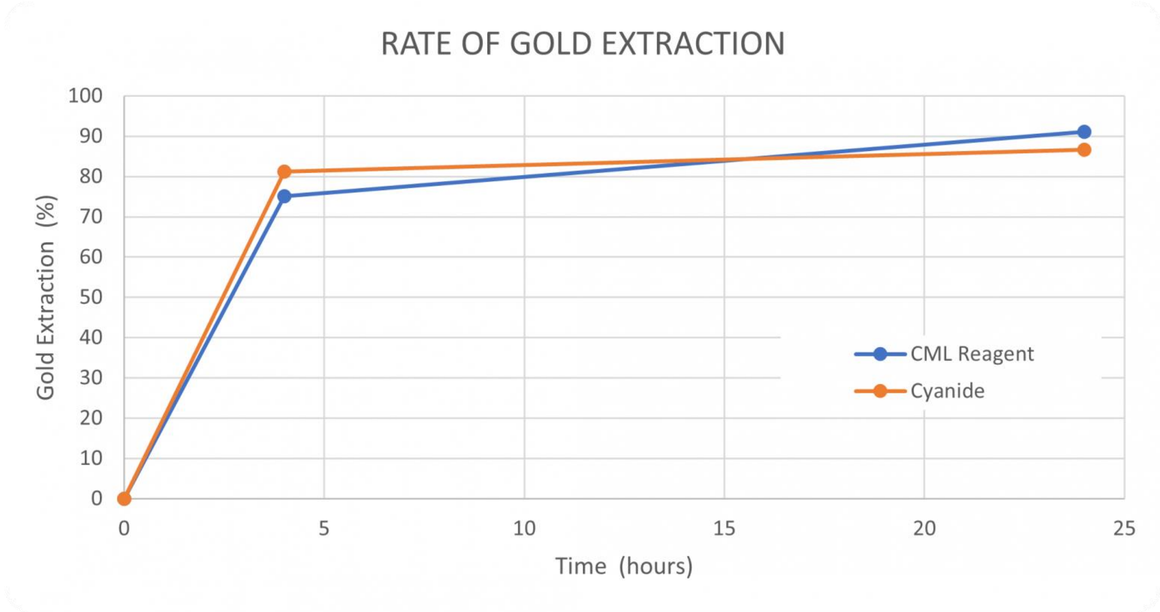
Gold leaching and IX recovery conducted by five sequential elution cycles

- Ore Type: Oxide



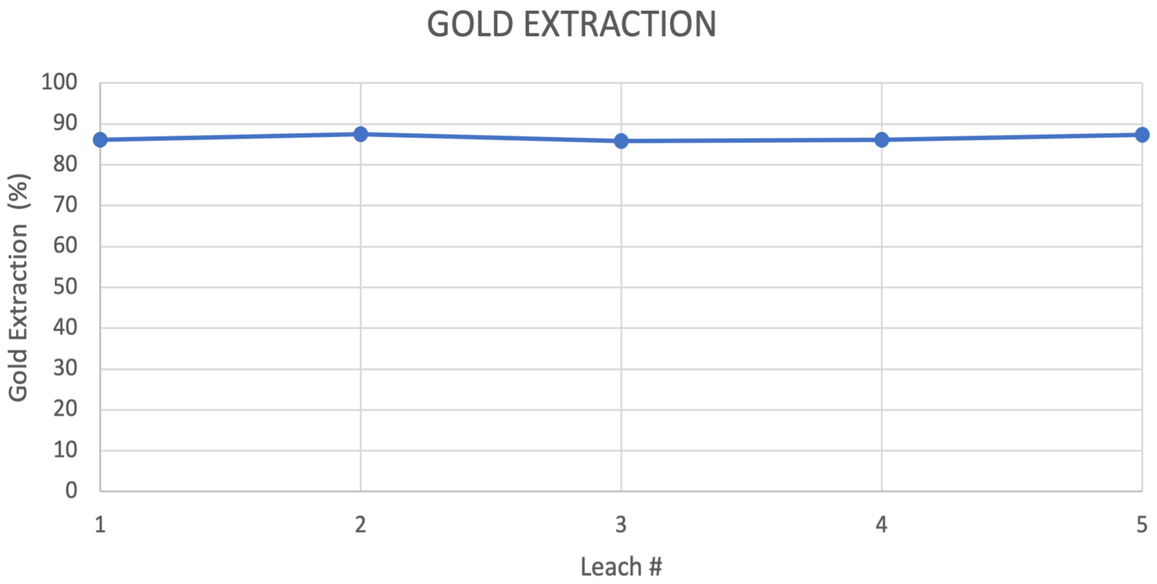
WESTERN AUSTRALIA – PHASE 1

- Sample Head Grade: 2.99/t Au
- Ore Type: Oxide



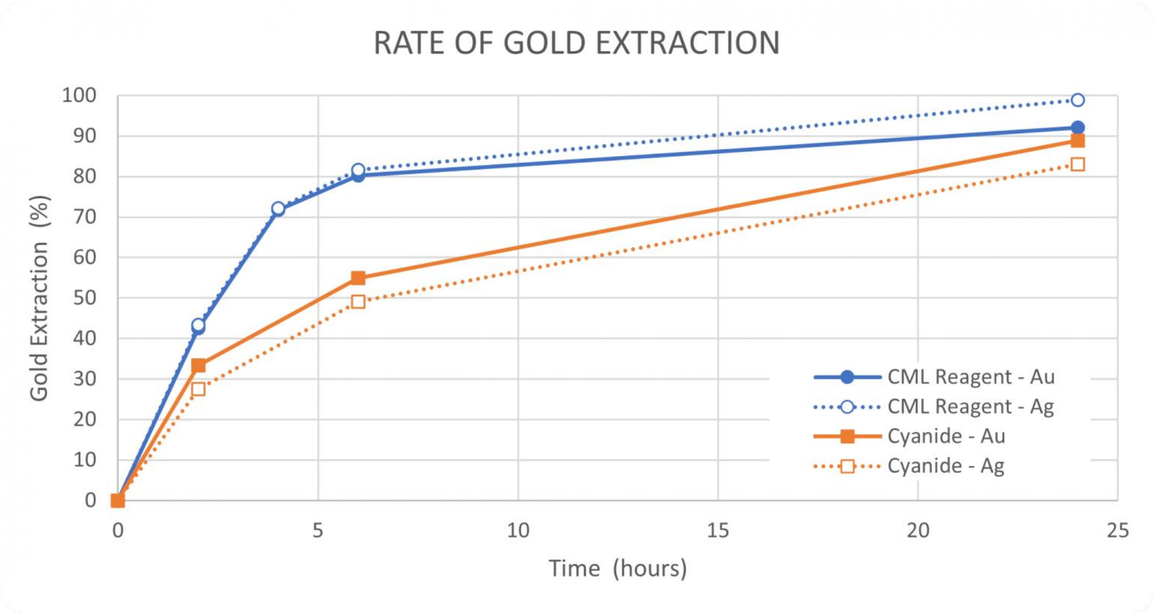
WESTERN AUSTRALIA – PHASE 2

Gold leaching and IX recovery conducted by five sequential elution cycles



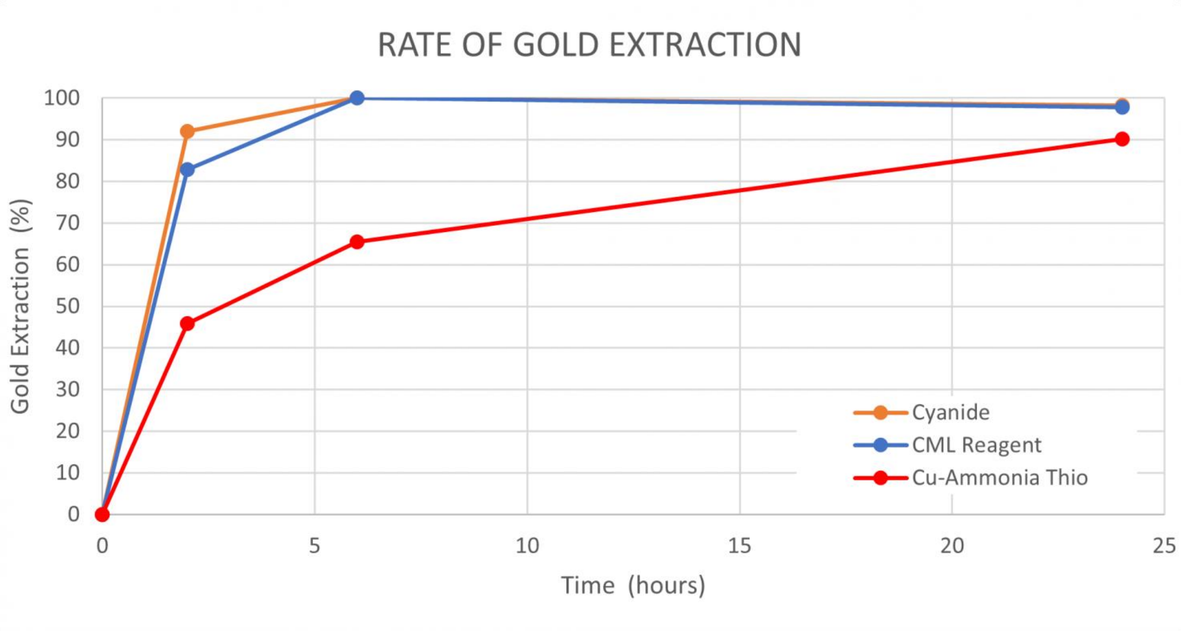
WESTERN AUSTRALIA – PHASE 1

- Sample Head Grade: 706g/t Au & 1020g/t Ag
- Ore Type: Concentrate



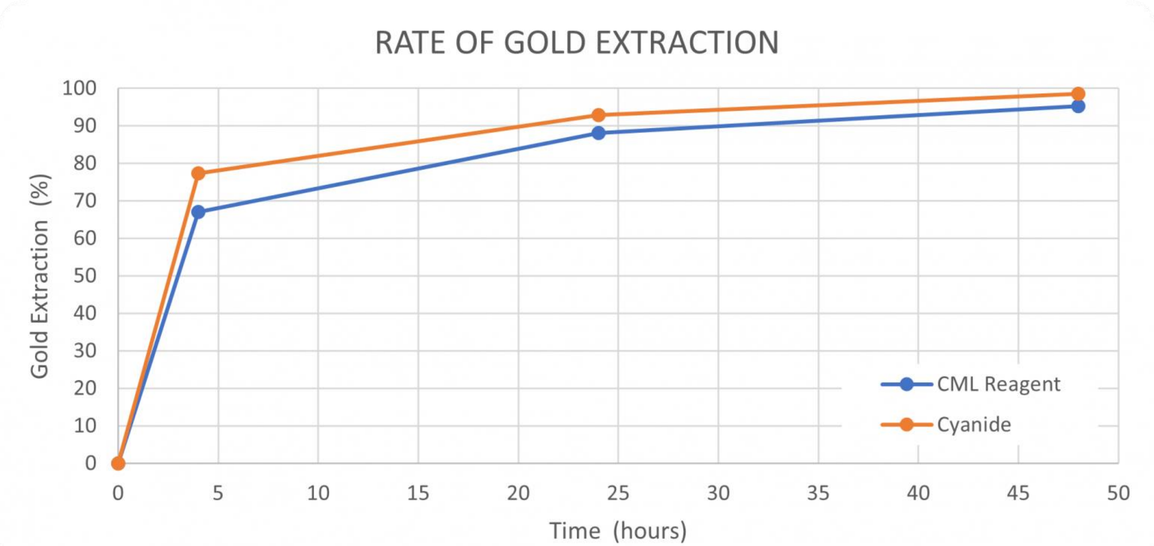
WESTERN AUSTRALIA – PHASE 1

- Sample Head Grade: 449g/t Au
- Ore Type: BIF (Banded Iron Formation)



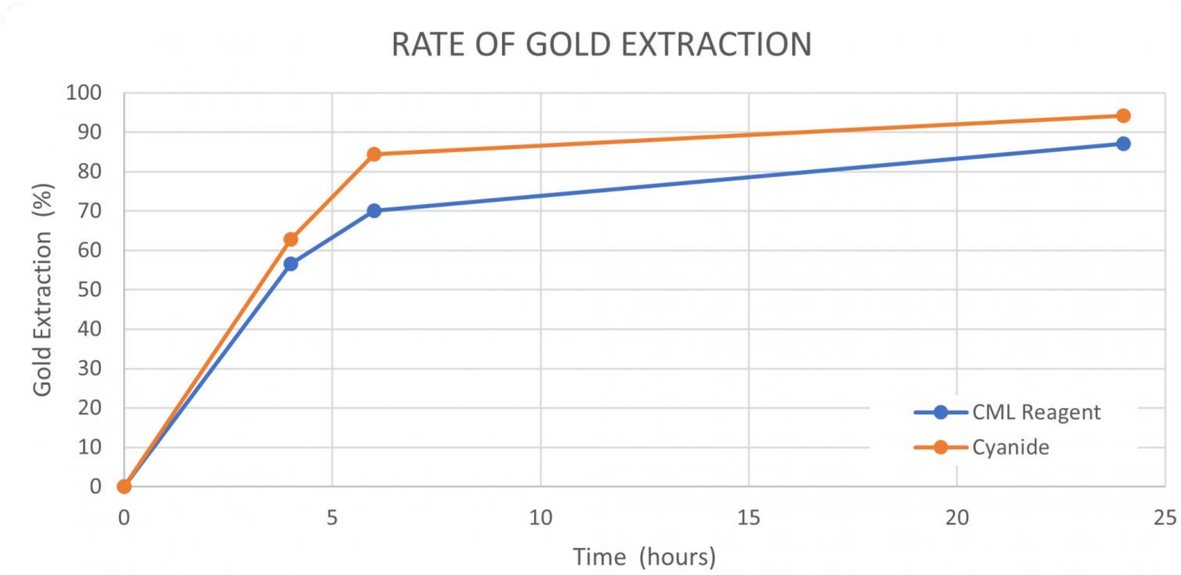
WESTERN AUSTRALIA – PHASE 1

- Sample Head Grade: 5.23g/t Au
- Ore Type: Oxide



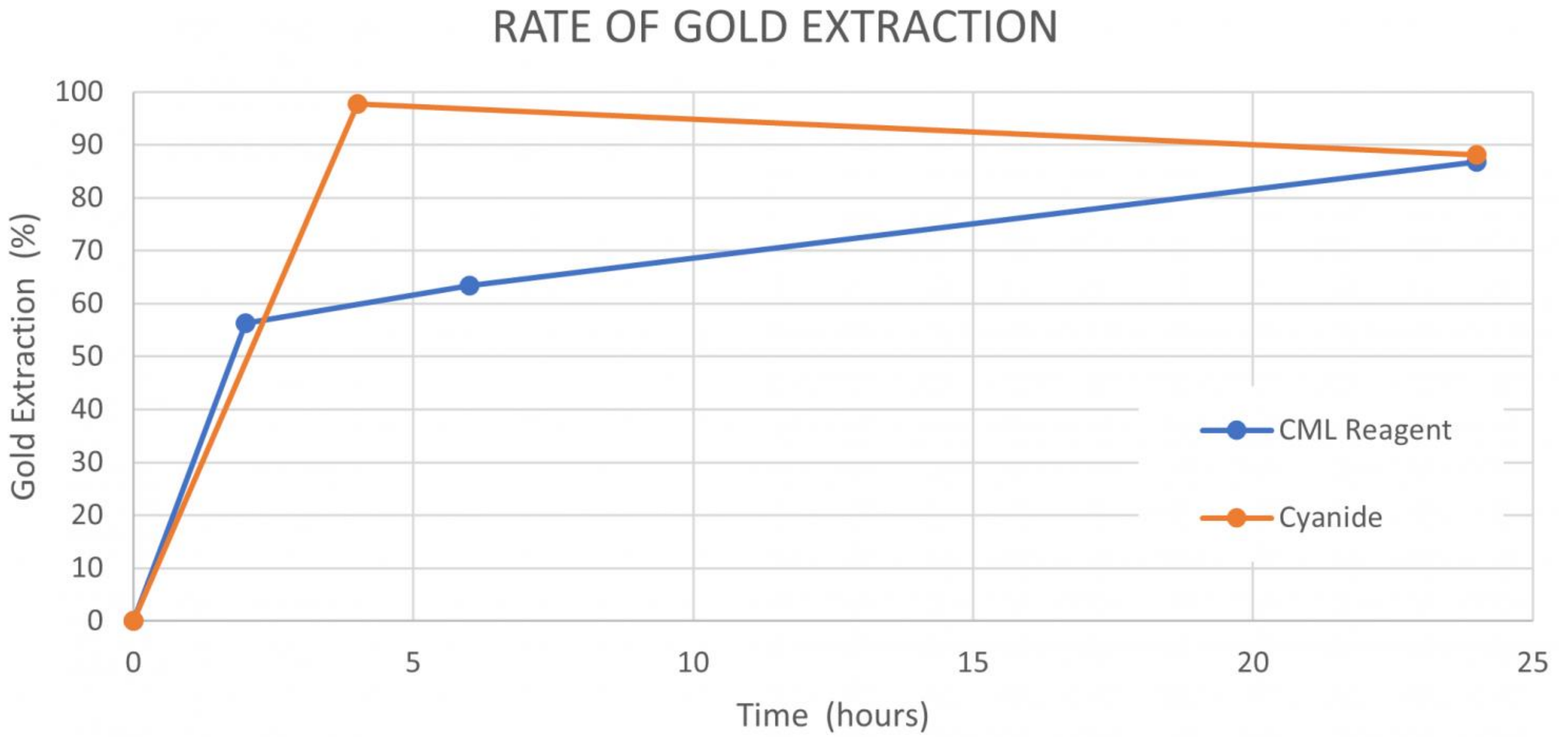
EASTERN AUSTRALIA – PHASE 1

- Sample Head Grade: 263g/t Au
- Ore Type: Concentrate Tail



WESTERN AUSTRALIA

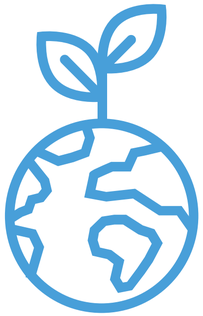
- Sample Head Grade: 5.23g/t Au
- Ore Type: Oxide



Clean Mining’s innovative ore processing technology represents an important scientific breakthrough that eliminates the use of cyanide and mercury in the extraction of gold from Artisanal to Large-Scale Mining. Aligned with the United Nations Sustainable Development Goals for 2030, the technology offers a potentially cheaper, cleaner and responsible processing option that is:

ETHICAL AND RESPONSIBLE

The safest and most sustainable gold processing reagent developed to date, with benefits for governments, mining companies, communities and workers worldwide.



SAFER AND SUSTAINABLE

Cyanide & Mercury-free, delivering a safer, more sustainable process without leaking, spillage or exposure to hazardous chemicals.

GREATER GOOD

Kinder to the environment in production, uses and disposal. Ensuring a cleaner, healthier planet for future generations.

THANK YOU

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Join the Clean Revolution

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