

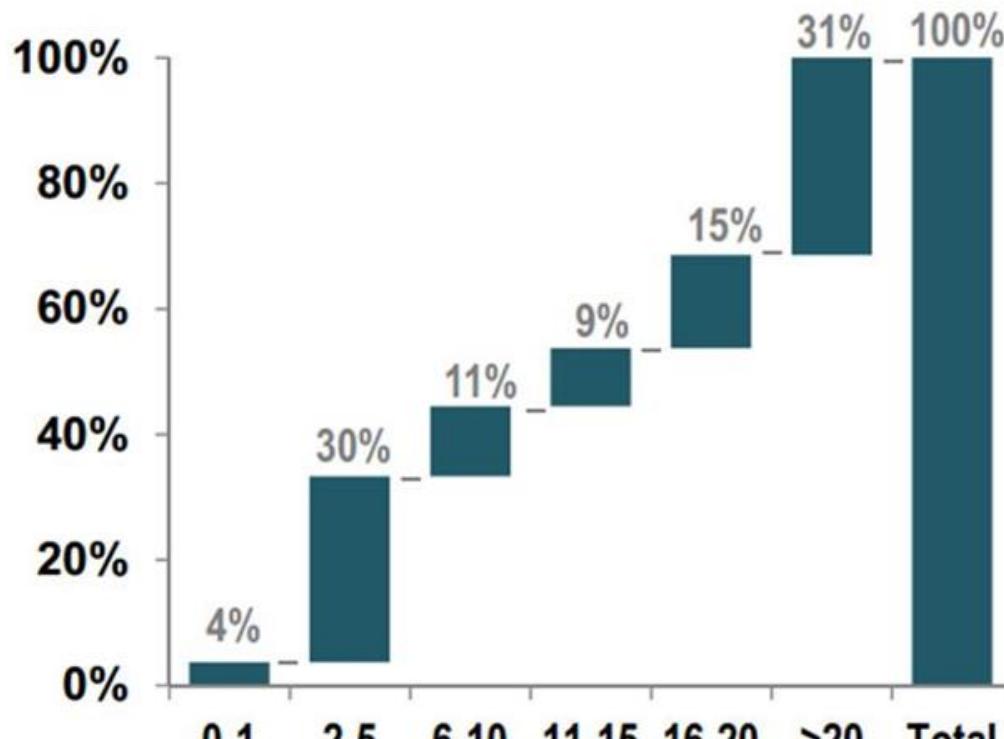


detectORE™ R&D overview

10 October 2019

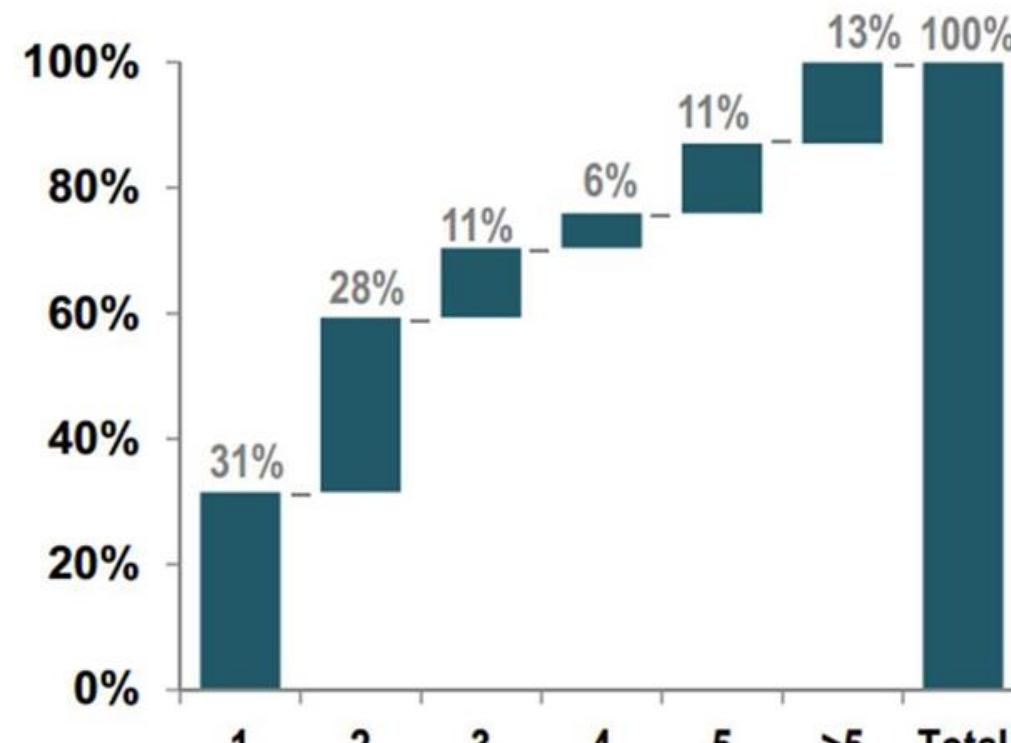
Gold exploration is very slow..

Average discovery time
is 19 years



Time spent (in years) exploring the property before the discovery was made

Average number companies exploring property before discovery is 2.8



Number of Companies who explored the property before the discovery was made

Battleships Game – similar to gold exploration?

My Ships

A							
B							
C							
D							
E							
F							
G							
H							
1	2	3	4	5	6	7	8



Aircraft Carrier **A A A A A**



Battleship **B B B B B**



Cruiser **C C C C C**



Destroyers **D D D D D**



Submarines **S S S S S**

Their Ships

A							
B							
C							
D							
E							
F							
G							
H							
1	2	3	4	5	6	7	8



Aircraft Carrier **A A A A A**



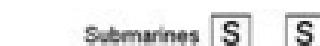
Battleship **B B B B B**



Cruiser **C C C C C**



Destroyers **D D D D D**



Submarines **S S S S S**

	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

What is detectORE™?

- detectORE™ is patented technology invented by the CSIRO, Australia
- Gold results to <10 ppb Au using pXRF, within 24 HOURS....GAME CHANGING
- Portable ppb Pty Ltd (Pppb) has exclusive global Licencing Rights
- Uses a consumable (“widget”) plus an App (cloud based software)
- Expected to work across all exploration samples
- Can be applied from a field / remote location using pXRF
- Should lead to continuous fast adaptive more effective gold exploration
- Will trim many months off normal timelines to discovery – saves \$\$
- Greatest impact in remote locations away from efficient laboratories
- Working towards full commercialisation by mid 2020
- Is disruptive technology with clear commercial benefits for users



The invention team



Dr Mel Lintern
CSIRO Team Lead
Inventor of
detectORE™

35 years geochemist
experience in gold



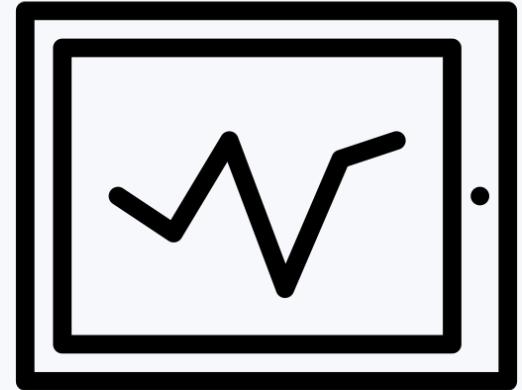
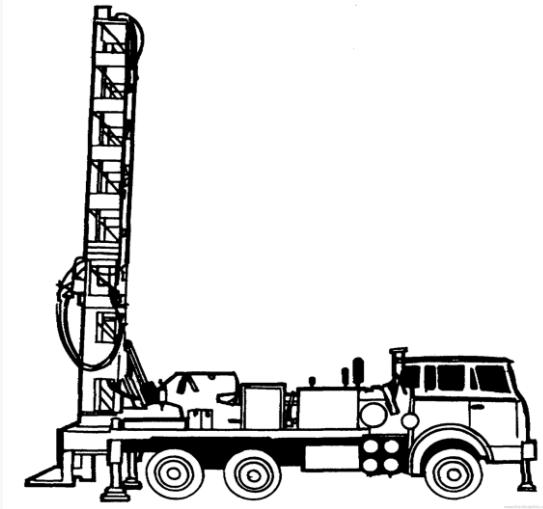
Mr Wayne Robertson
Business Developer
30 years in industry
Network of contacts



Dr Andrew Rodger
Software Developer
15 years in product
development
Software and app expert

Waiting for gold assays reduces discovery rates

Drainage
Soils
Auger
Drill samples



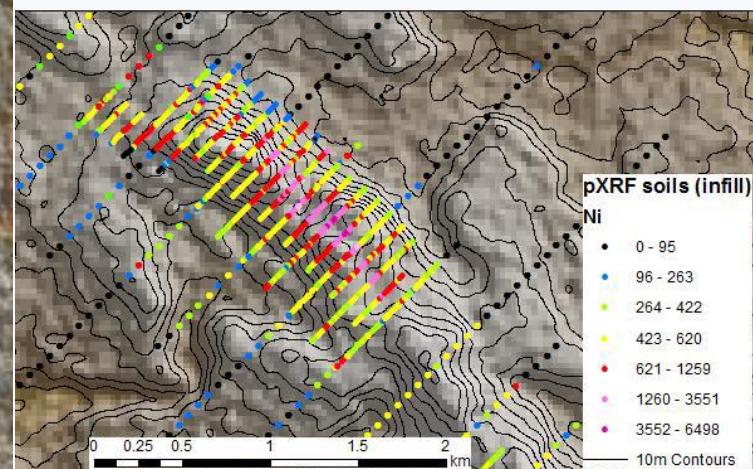
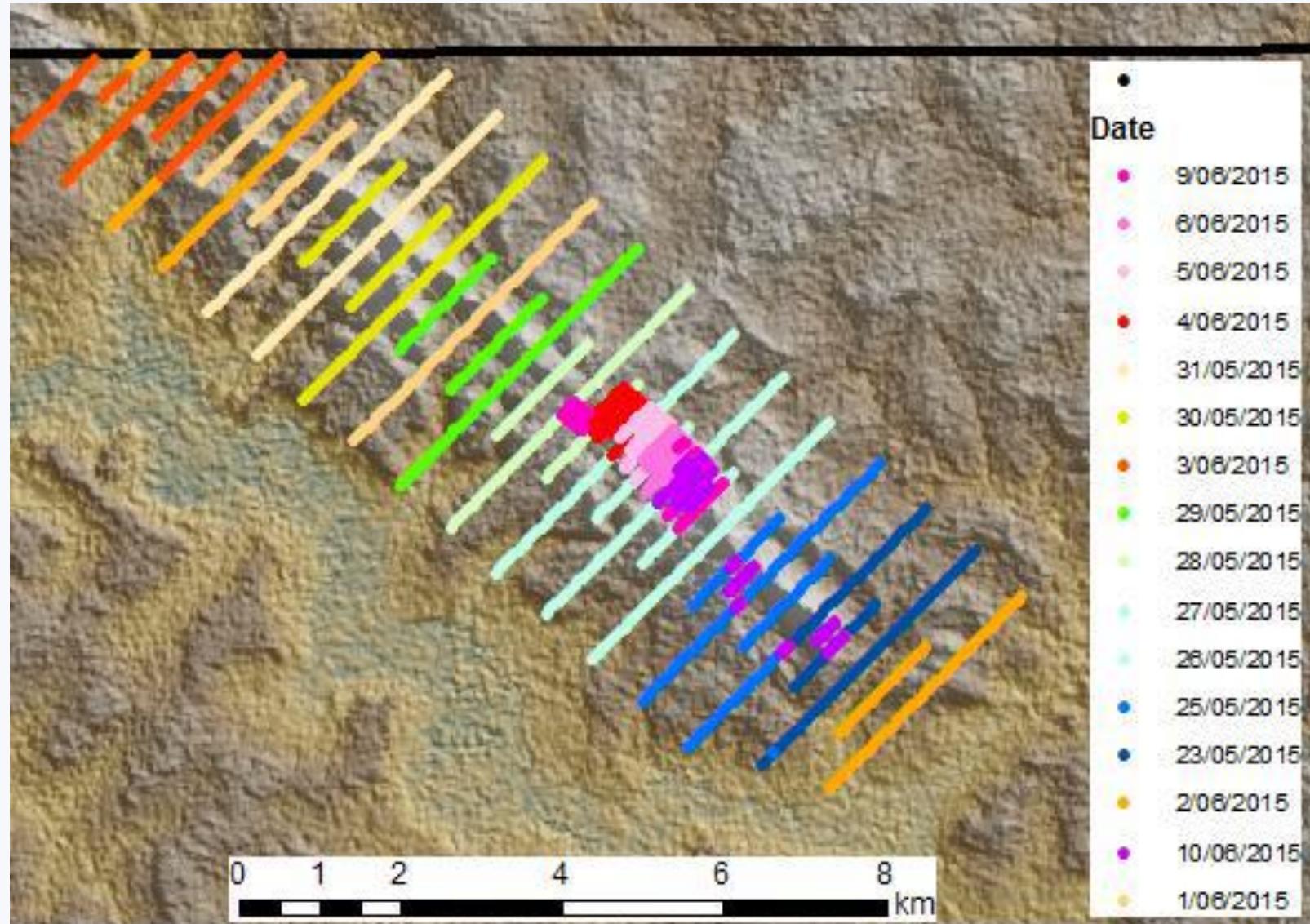
Weeks to
Months



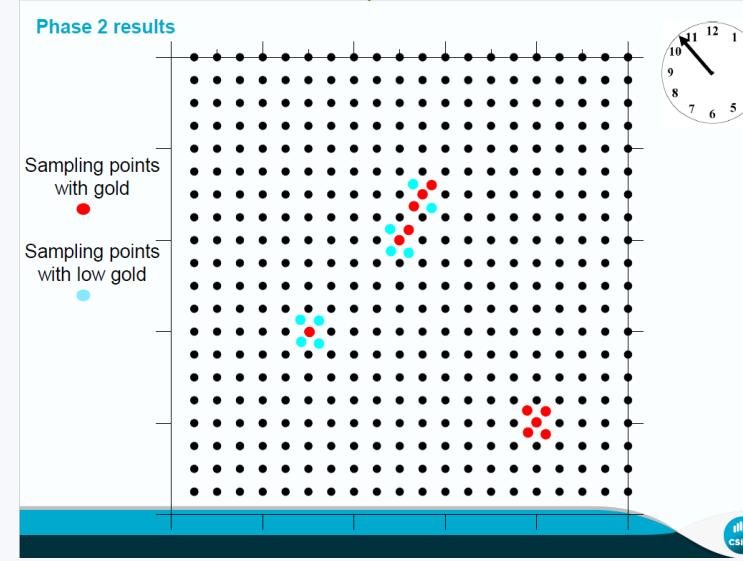
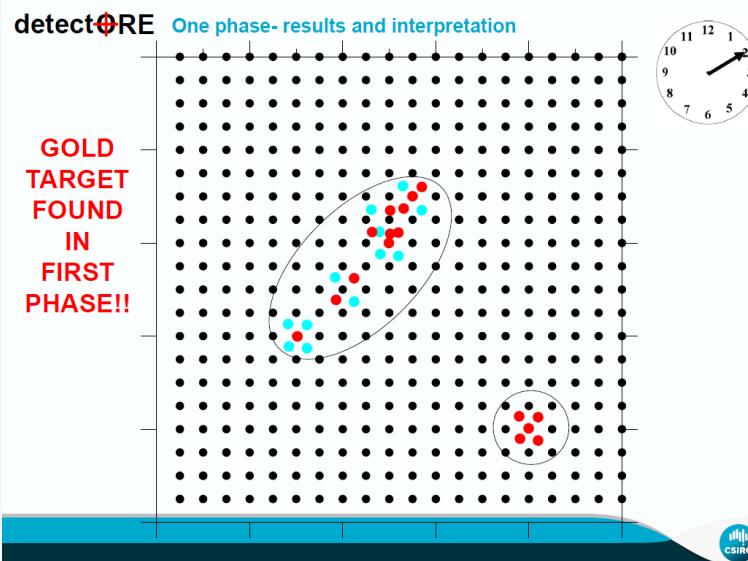
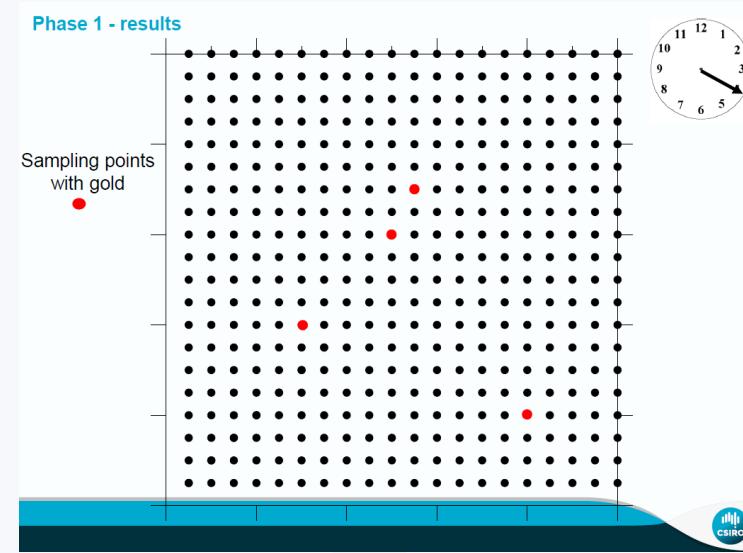
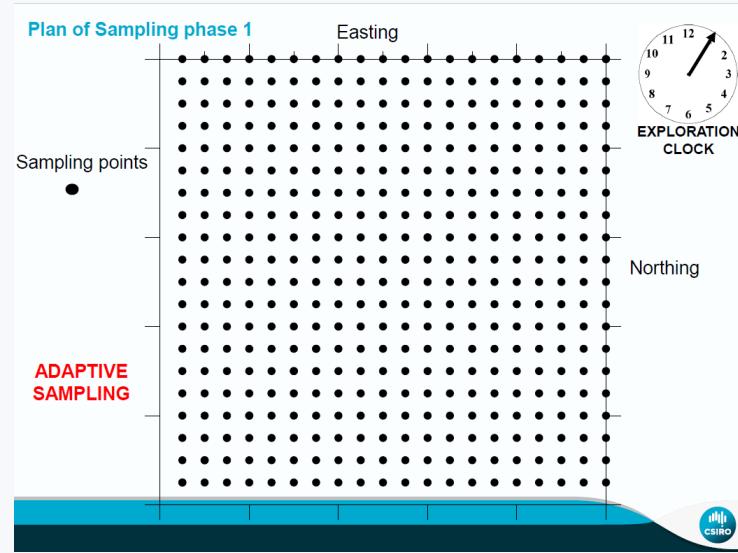
Fast, field based, adaptive sampling

>>> increase effectiveness, increased probability of discovery

Reactive sampling – reduces discovery timelines



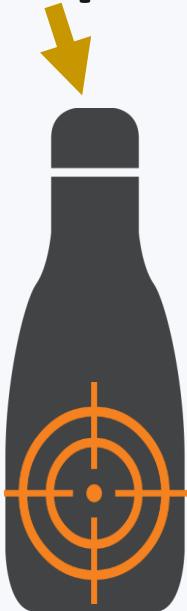
Reactive sampling – Theoretical (After ML – CSIRO)





detectORE™

Sample



Any pXRF!



App / Cloud based
software



Decide



Collect

Test

Bottle with “widget”



Many gold companies use pXRF, but CANNOT for gold analysis!

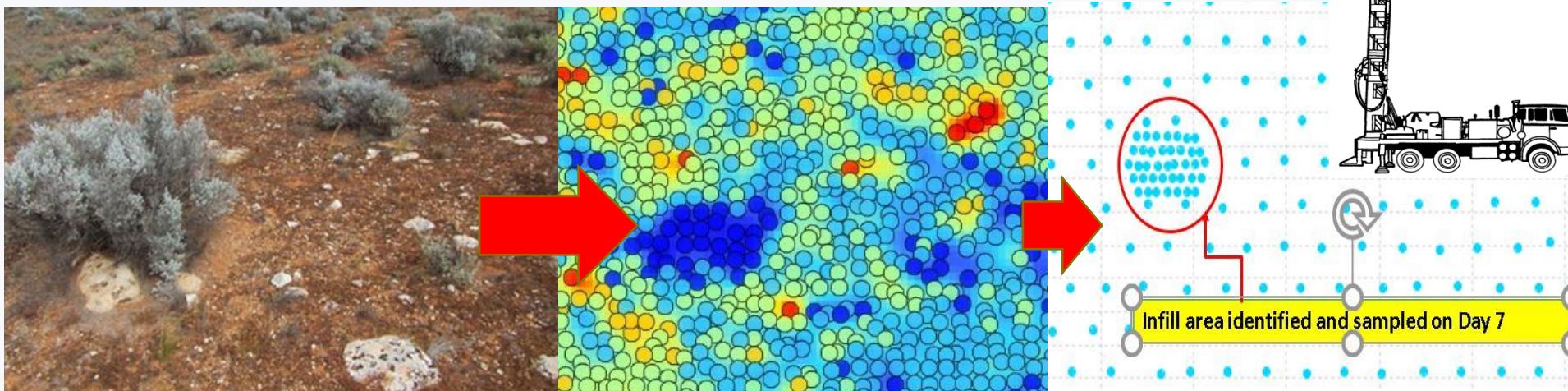
CSIRO set out to resolve the problem

- Invented the patented detectORE™ technique
- Limited but highly encouraging field trials and test work completed to date
 - Many known unknowns with respect to what can affect the technique
 - Many pXRF models / brands – further challenge
 - pXRF always requires rigorous QA/QC; critical component of detectORE development

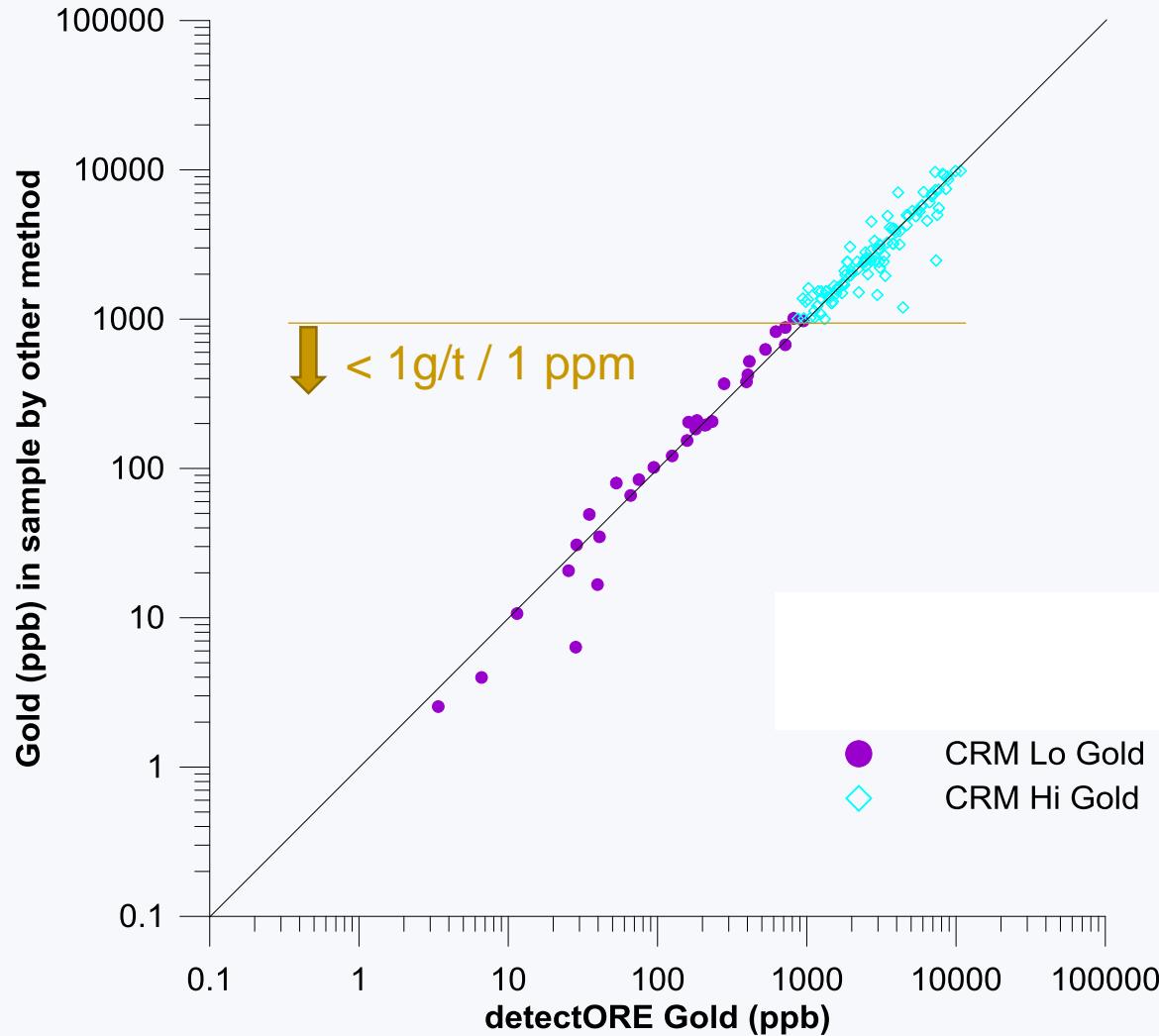


CSIRO completed an EOI process with Portable PPB (PPPB) selected to continue the R&D

- <500 samples evaluated by CSIRO
- Mel left CSIRO in 2018 to join PPPB as CTO to continue work on his invention
- PPPB management has over 100 years of industry experience



detectORE vs. total gold CRMs (1-10,000 ppb) – 2018 data



139 certified reference materials (CRMs) run through the detectORE process

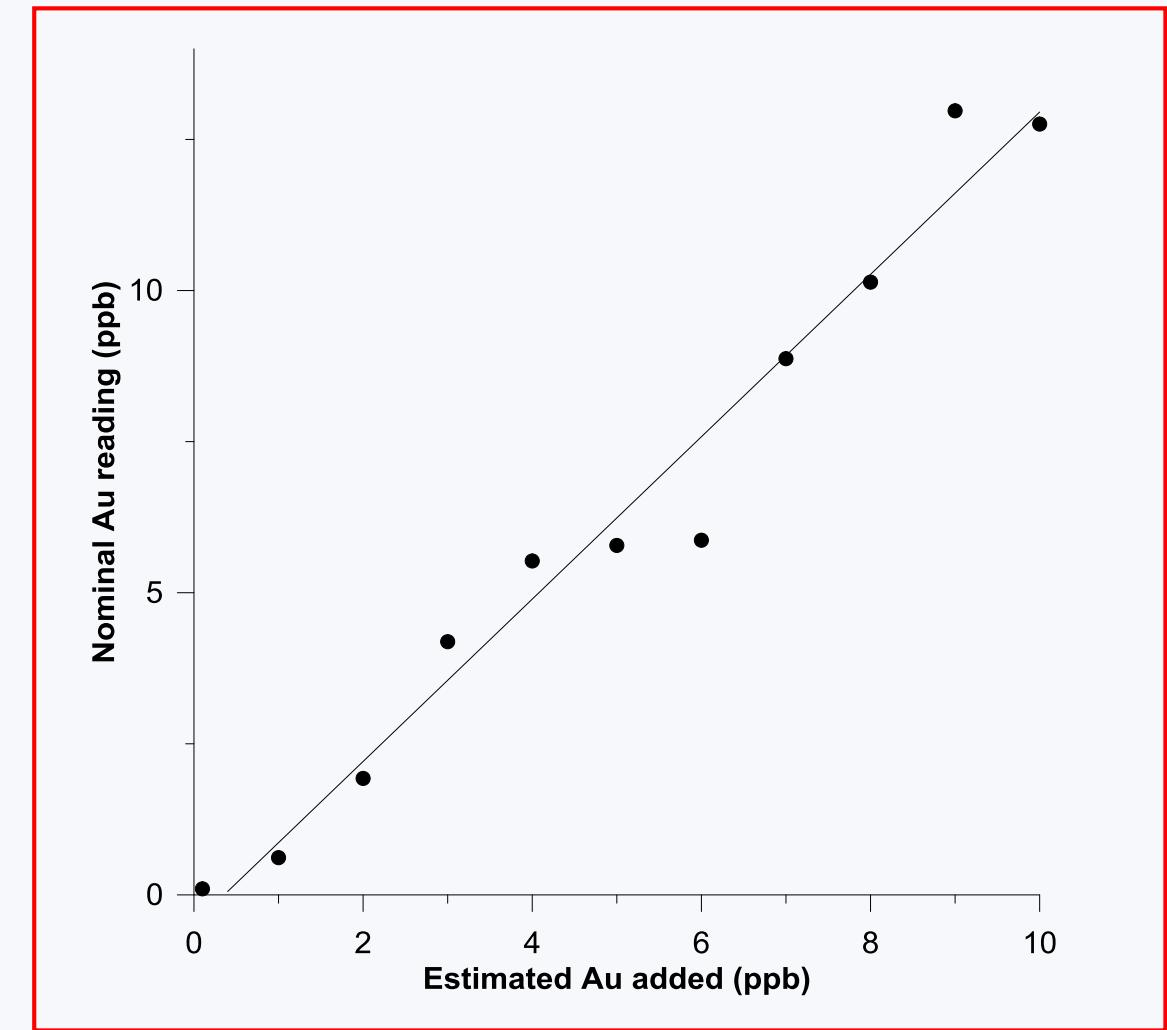
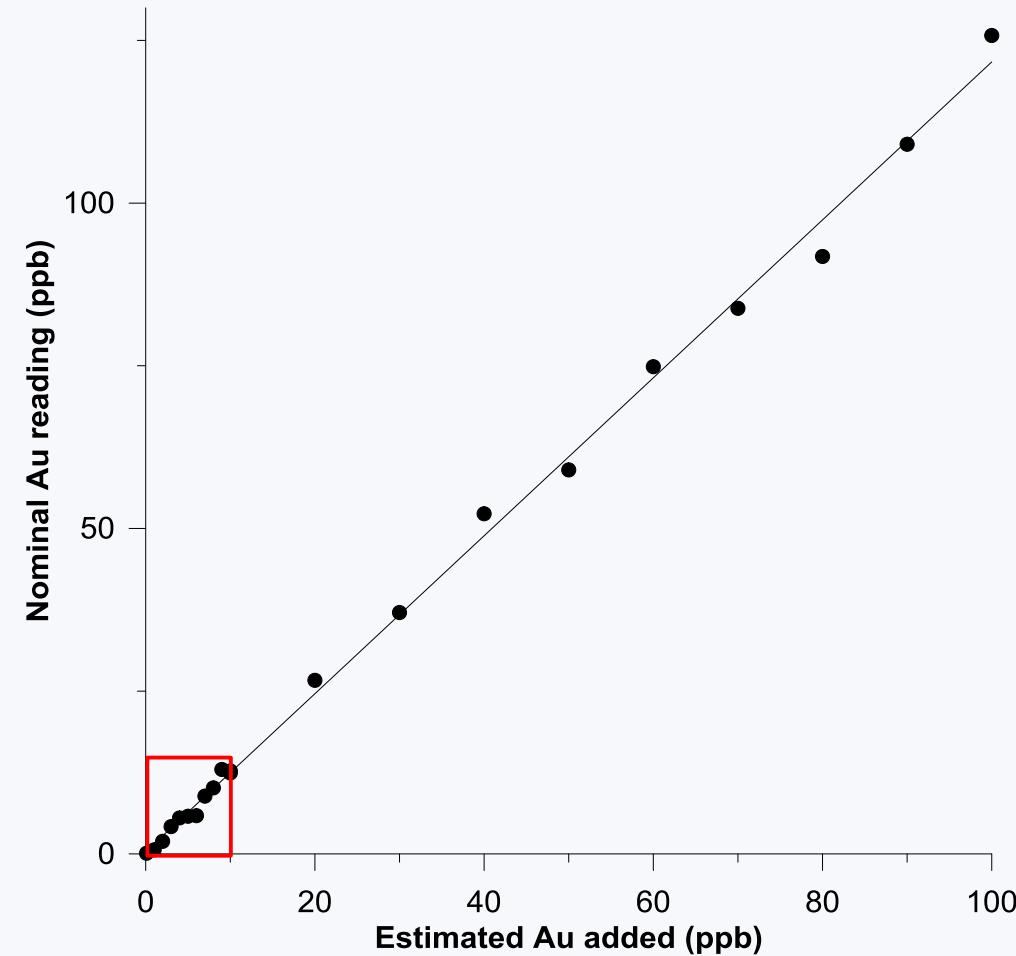
Cover a range from ppb to ppm gold

Results highly encouraging

Note that many CRMs certified for Fire Assay and may include deleterious metals

More work required to determine what affects gold determinations using the detectORE process

Calibration curves 1-100 ppb gold standards read with pXRF (using detectORE procedure) – 2018 data



Field trial by CSIRO – Western Australia – 2018 data



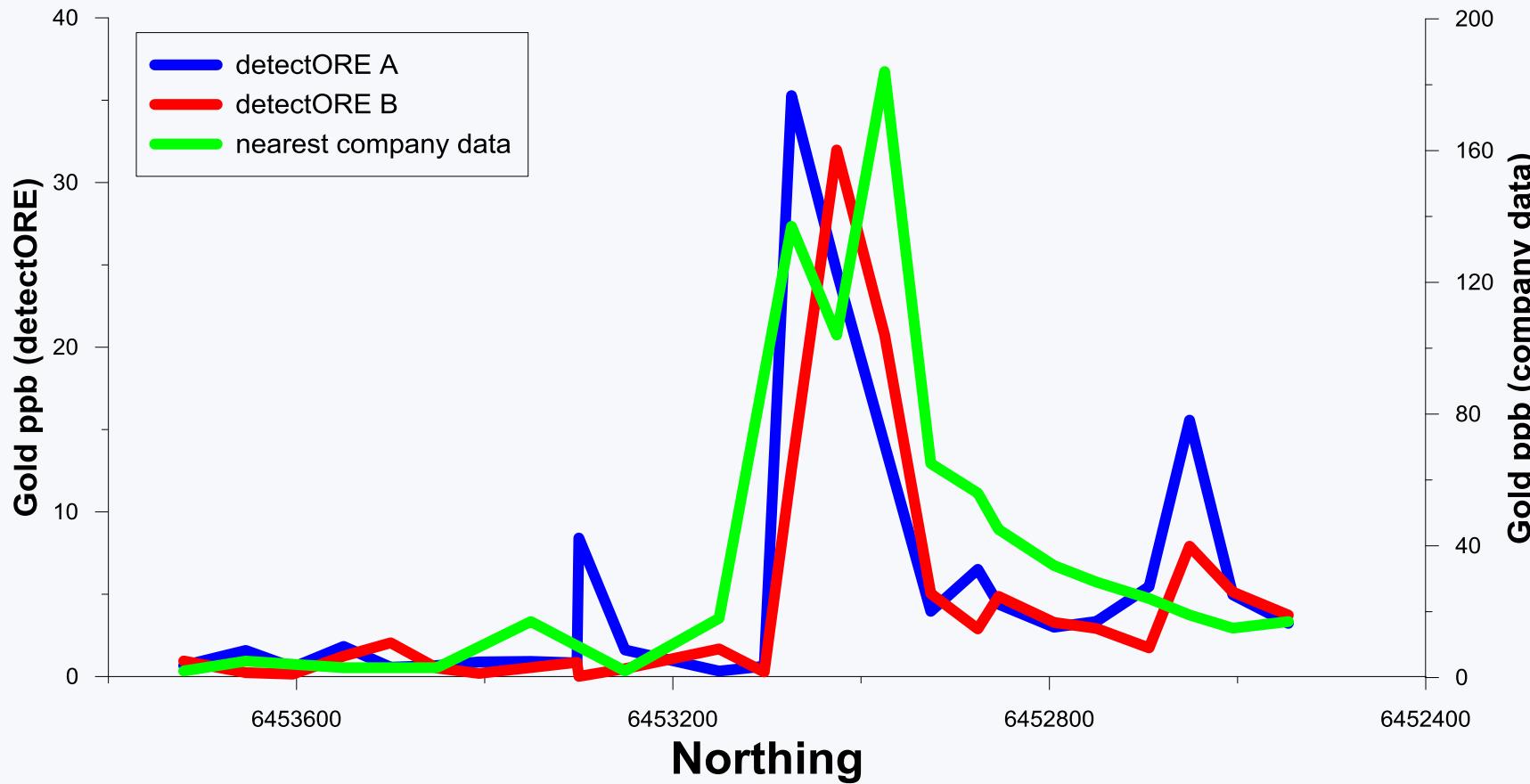
Soil sampling directly over auger GOLD anomaly and out into background to collect high level to back ground suite of samples.
Soils sieved in field to <2mm



detectORE bottles with “widgets” loaded in the field for on-site gold concentration determinations with pXRF within 24 hours



Field Trial Results – 2018 data



Green = auger

Red & blue = detectORE soil

Green – transport samples & possibly wait weeks, sometimes months, for results

Red / blue – results
achieved within 24hrs from
field camp using pXRF
(operating detectORE
process)

Done



Patented
MVP

On-going

Global Test Work

Traction

Validation

Engagement

Advancing



Productisation/SOP
GLOBAL Scaling up

Continuing Research ahead of Commercialisation

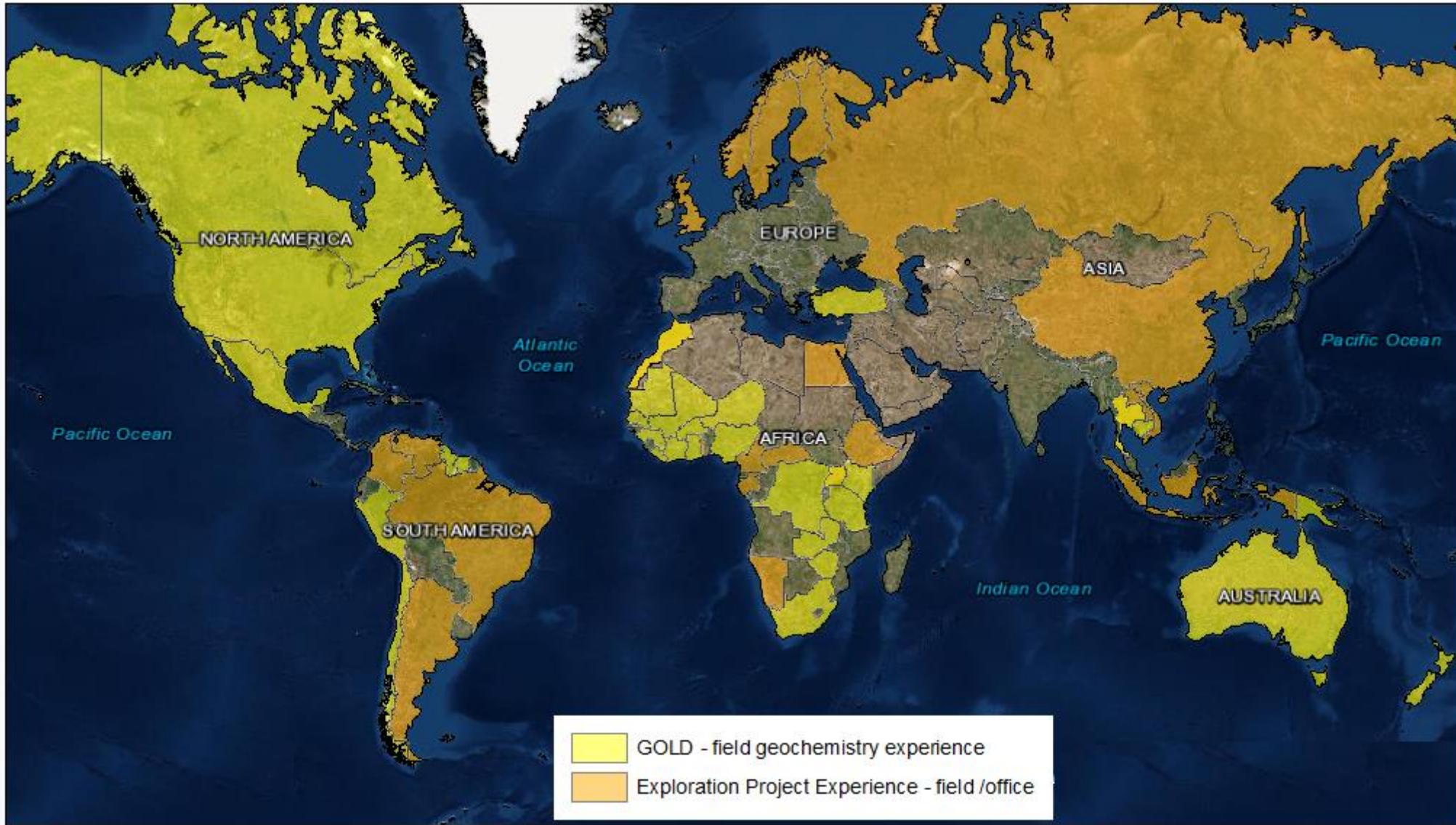
- Principles of Ppb have:
 - Extensive global gold industry experience
 - History of successful commercial developments (ERMapper, Intierra, HiSeis)
- Ppb to further develop and take out to the global gold industry
 - Field orientation trials to take place covering the full range of
 - Sample media (drainage, soils, trench, drill samples)
 - Mineralisation styles
 - Regolith terrain types globally
- Signed up a limited number of Industry partners through tiered sponsorship in return for a range of immediate and longer term benefits
- Companies include: Barrick / Gold Fields / Newcrest / Centerra / Kirkland Lake / Gold Road / Perseus / Bellevue Gold....with more about to join

Experienced Management Team

Management Team	Experience
<p>Peter Williams Chairman <i>B.Sc (Hons), M.Sc</i> <i>AICD, SGA, AIG,</i> <i>AusIMM</i></p> 	<ul style="list-style-type: none"> ▪ Over 30 years executive experience in major and mid tier companies and successful junior company start-ups ▪ Co-founder of the technology companies, HiSeis (3d Seismic), Intierra (Internet financial/minerals) and EMIT (electromagnetic imaging) ▪ Founding partner in companies currently worth \$2.7b and significant role founding companies that later sold for >\$1b
<p>Simon Bolster Managing Director <i>B.Sc (Hons)</i></p> 	<ul style="list-style-type: none"> • Over 30 years experience in the gold exploration industry, specializing in regolith geochemistry and remote sensing ▪ Former Consulting Geochemist – Newmont (Global role), regolith specialist Normandy Exploration and Anglo American (Africa) ▪ Worked in 30 countries – 5 continents ▪ Founded and operated successful regolith geochemistry consulting company ▪ Undertaken numerous geochemical orientation surveys and lead regolith geochemistry training seminars / courses ▪ Former Head of Exploration (Gryphon Minerals, West Africa)
<p>Dr Mel Lintern Chief Technical Officer <i>Geochemist, PhD</i></p> 	<ul style="list-style-type: none"> • Inventor of detectORE ▪ > 35 year career with CSIRO focused on exploration / regolith geochemistry ▪ Principal researcher resulting in industry adoption of calcrete sampling for gold exploration ▪ Lead research resulting in significant advances in biogeochemical sampling for gold explorers ▪ Long history of experimenting with field portable techniques for the analysis of gold in remote locations



Management Team has global exploration experience



Track record in commercialisation, mission critical know how.

- Research lead by CSIRO veteran supported by highly experienced gold industry explorers
- Former company geochemistry specialist fully aware of the uptake resistors and what will likely remove these
- In depth QA/QC knowledge - field and laboratory
- Exploration management experience - understand operational pressures, pricing and exploration challenges
- Disruptive technology – passionate about getting this out to industry

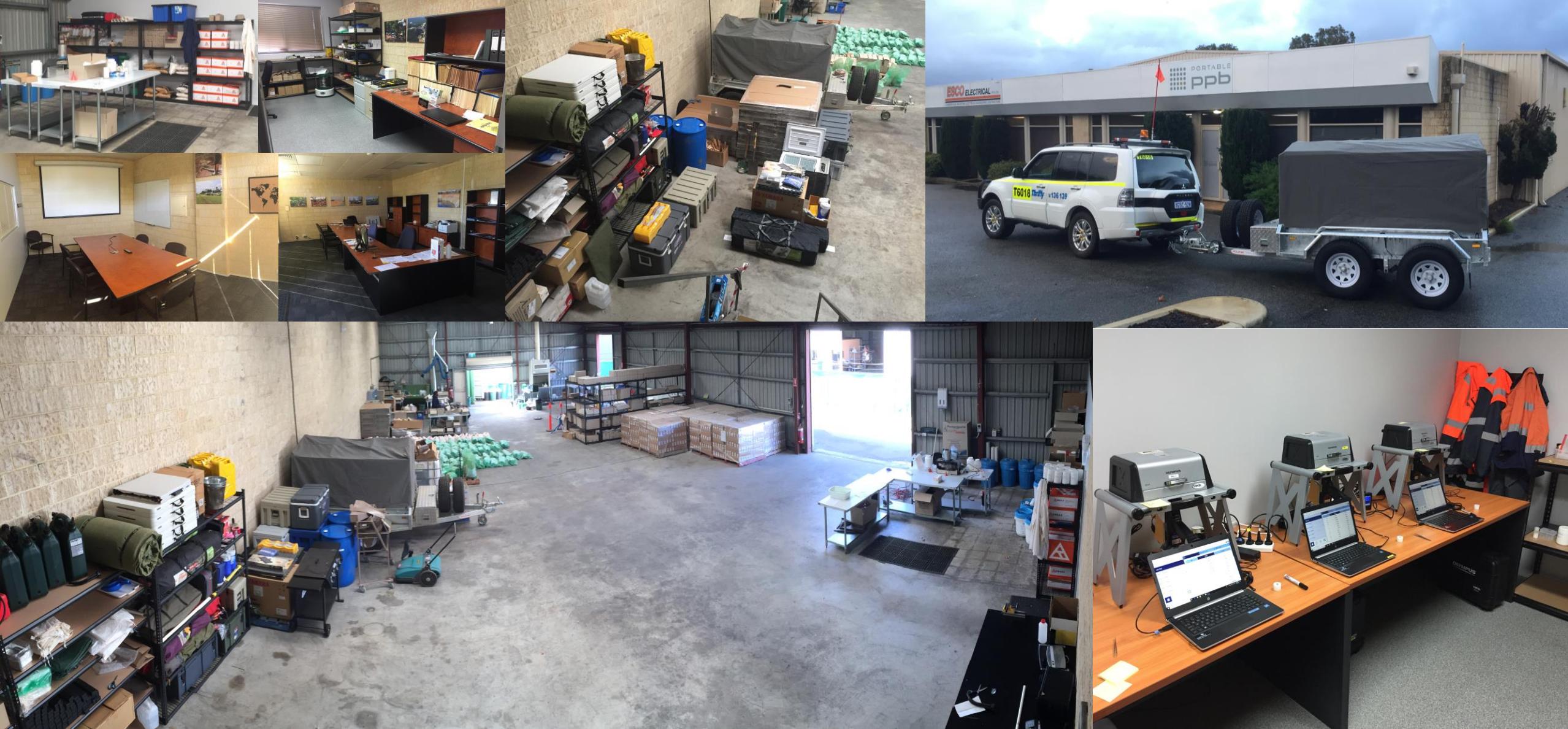


R&D plan involves:

- SMART Testing in mission critical areas, of the technique – including field and laboratory trials
- Simultaneously work on scaling up supplies and systems ahead of release – The “D” part – including cloud based processing and QA/QC
- Staged roll-out – R&D partners to receive priority access
- On-going R&D / improvements
 - Reduced pXRF detection limits for other commodity & pathfinder elements
 - Alternative “widgets”
 - Development of other complimentary applications



Established R&D capacity – lab and field



Some detectORE known unknowns...

What is precision like for various sample media?

- If this needs to be improved, how is this achieved?

How accurate is the technique for different sample media?

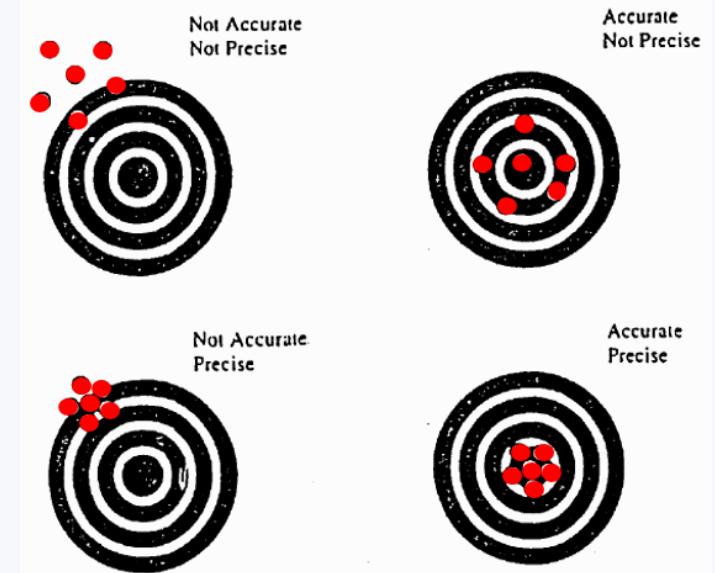
- If this needs to be improved, how is this achieved?

What are the absolute lower detection limits?

The “widget” currently stays in the bottle for 24 hours

- What is the optimal period for different sample media?
- Can we speed this up, if so, when to and how?

Which pXRF instruments are best suited / less well suitable



R&D focused on 4 key aspects....

4

1

Sample

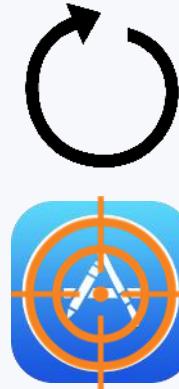


2



pXRF

3



software



Decide



Test

Collect

"widget" in container

R&D is testing a variety of sample media...

Extensive work on various sample media

- Rock & Drill samples – **RC** / RAB / **AC** / **AUGER** (+/- DD)
 - Sample processing requirements for detectORE – developing pragmatic field methods
 - Weathered and fresh bedrock + overburden
 - Orogenic / Porphyry / Epithermal / **Carlin** / IOCG / IRG style deposits
- Surficial regolith: **Soil** / **Laterite** / Lag / **Calcrete**
- Transported regolith: **Drainage**, Lacustrine, Till

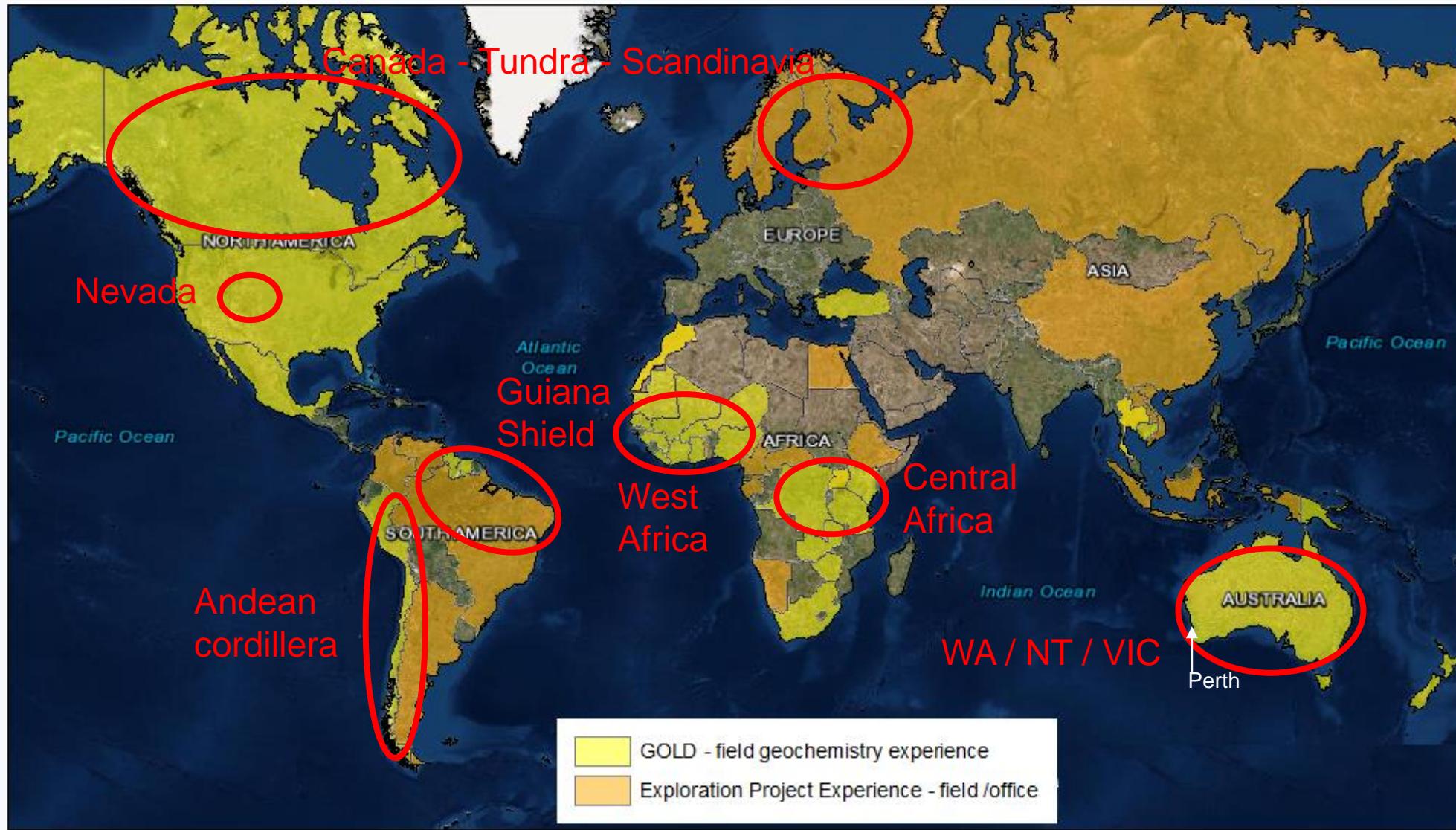


Cross checking detectORE values with traditional laboratory assays

Green text = samples obtained / currently undergoing test work



Global trial areas



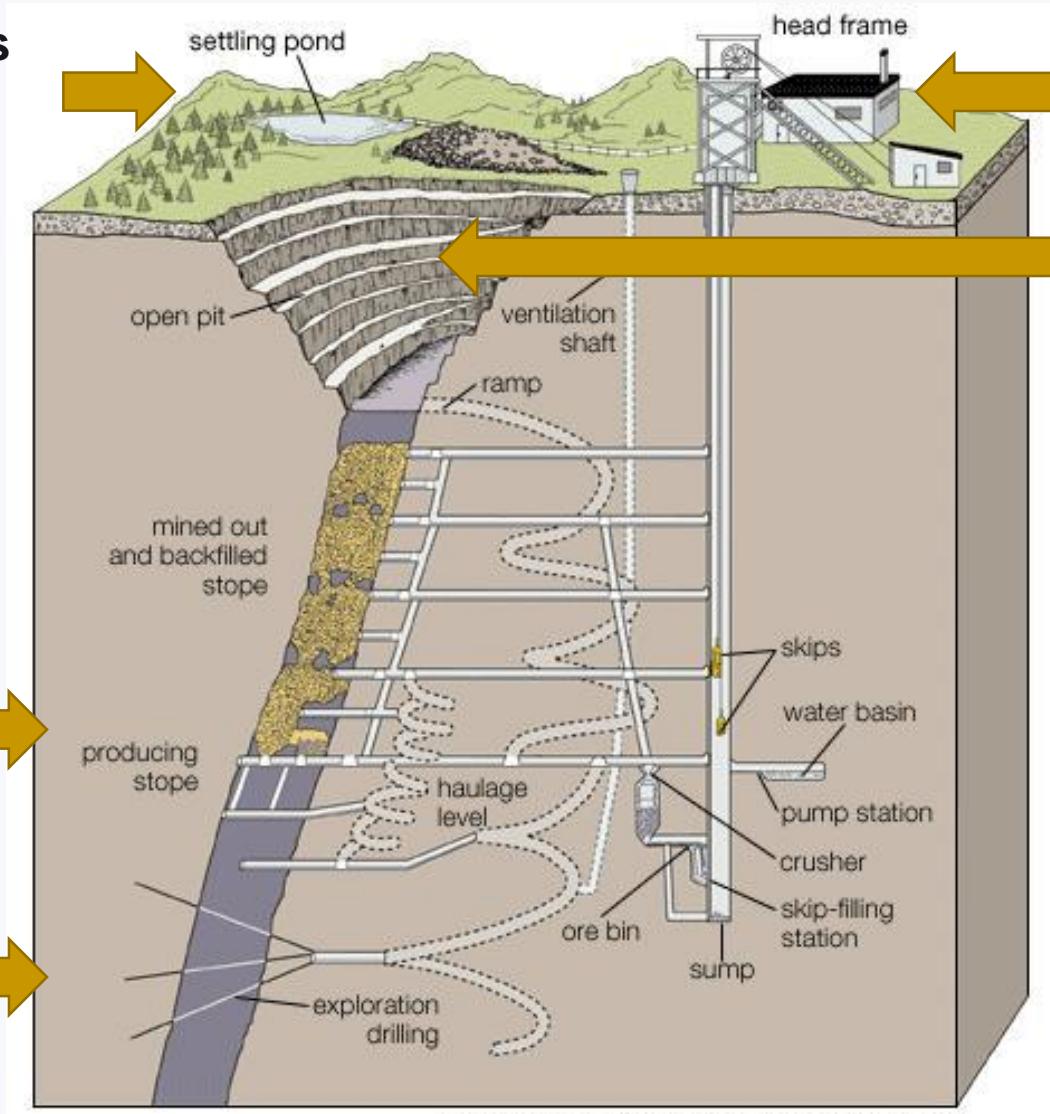
Brownfields & greenfields

Exploration

- Drainage
- Soils
- Trench
- Drill samples

UG grade control

UG drilling



© 2007 Encyclopaedia Britannica, Inc. Source: H. Hamrin, *Guide to Underground Mining Methods and Applications* (Stockholm: Atlas Copco, 1997)

Process plant monitoring

- CIL Au grade?
- Tailings grade?

Grade control drilling

detectORE benefits, compared with conventional gold analyses:

- ***Low capital and operating costs*** compared with traditional assay methods
 - Fire Assays require very skilled staff and has high running costs
 - ICPMS uses expensive equipment & skilled operators
- ***Larger sample*** (250g) – more representative
- ***Easier to scale up*** and be run by technicians than traditional Au analyses



detectORE R&D Sponsor program – what is it?

- Opportunity for companies to work with us to accelerate the test work
- Sponsors receive immediate and longer term benefits for doing this
- Limited number of companies can get involved
- Rewarding those who get on-board and support us from the start
- Possibility to upgrade sponsor status by contributing more, provided that there is an opening at the higher level
- Four sponsor levels
 - Bronze – \$30,000 (limited to 6)
 - Silver – \$50,000 (limited to 8)
 - Gold – \$100,000 (limited to 5)
 - Exclusive – case by case negotiations



Summary

- pXRF low level gold, in the field, near real time, now possible
- Many known unknowns so R&D still required before it can be adopted by explorers and enhancements being considered
- detectORE expected to be of greatest benefit to explorers in remote areas with poor access to labs, or where field seasons are short
- Expected to transform the way gold explorers go about their business once released
- PPPB working with Industry Sponsors will lead the industry change increasing efficiency and effectiveness of gold exploration
- R&D Sponsor Scheme to deliver win-win opportunity for those who can see the future and want to be exploration leaders

For more details contact...

18 Sorbonne Crescent, Canning Vale, WA 6155 Australia

T – +61 437 912 538

E – simon.bolster@portableppb.com.au

www.portableppb.com (in construction)

Proudly supported by:

