



- LA SOCIETE TAL INSTRUMENTS PANTIN
- REPRESENTA LA SOCIETE AUSTIN INSTRUMENTS
- SAVOIR FAIRE POUR DU ONLINE MINERAI ET TRI ALLIAGE AUTOMATIQUE
- CONE PENETROMETER XRF CP-1000



AUSTIN AI

Automation & Instrumentation

8862 Hwy 290 W

Austin, Texas 78736 USA

www.austinaai.com

email: info@austinaai.com

tel: 512-837-9400

fax: 512-301-2512



Austin AI

Background

Power through Partnering and Licensing

Austin AI has an extensive network of colleagues and corporate partners

This virtual talent pool gives Austin AI unmatched capabilities to solve the toughest problems...or engineer new and creative solutions for the identification and/or processing material



Available Sensors Technology

Innovation through Sensor Technology

	[m]		Sensor/ Technology	Material Property	Segment
			RM (Radiometric)	Natural Gamma Radiation	Fuel, Precious Metals
Gamma-radiation	10^{-12}				
	10^{-11}				
X-ray	10^{-10}		X-ray (Transmission and Fluorescence)	Atomic Density and Material Chemistry. Visible Fluorescence under X-rays	Base and Precious Metals, Scrap Metals Industrial Minerals Fuel, Diamonds
	10^{-9}				
Ultraviolet (UV)	10^{-8}		LIBS (Laser Induced Breakdown Spect.)	Material Chemistry	Scrap Metals, Light Elements, PMI
	10^{-7}				
Visible light (VIS)	10^{-6}		COLOR (CCD Color Camera)	Reflection, Absorption, Transmission	Base and Precious Metals, Scrap Metals, Industrial Minerals, Diamonds
Near Infrared (NIR)	10^{-5}				
	10^{-4}				
Infrared (IR)	10^{-3}		PM (Photometric)	Monochromatic Reflection/Absorption	Industrial Minerals Diamonds
Microwaves	10^{-2}				
	10^{-1}		NIR (Near Infrared Spectrometry)	Reflection, Absorption	Base metals Industrial Minerals
	10^1				
Radio waves	10^2		IR (Infrared cam)	Heat conductivity, heat dissipation	Base Metals Industrial Minerals
	10^3				
Alter. current (AC)	10^4		EM (Electro-Magnetic sensor)	Conductivity, permeability	Base Metals

Austin AI

Part 1. Examples of Process/Systems Invented by AAI Innovation

Norilsk, Botswana - Ni Ore Probe

Rio Tinto, Australia - Blast Hole Analyzer

Proprietary - Mobile Core Scanner

Nautilus Minerals - Subsea Mineral Probe (in process)

Proprietary - Run of Mine Systems

Fugro Int'l, Germany - CPT/XRF





Austin AI



A Partial List of Clients Served



Austin AI

Success Stories

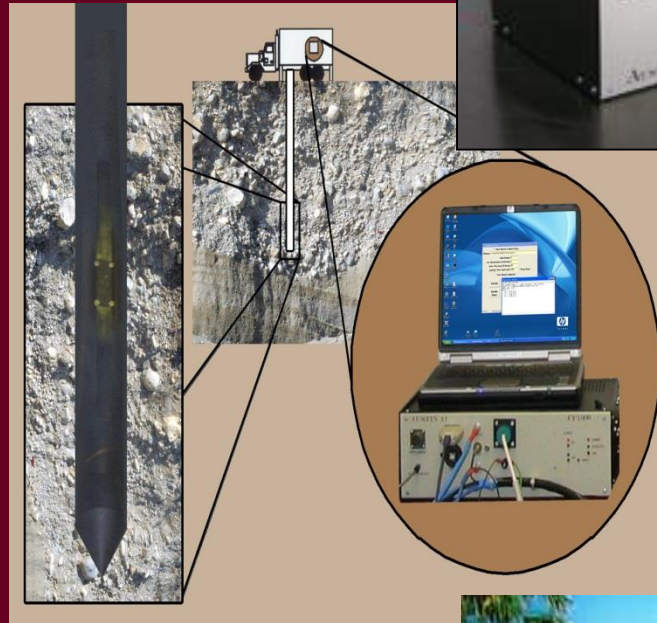
TECHNOLOGY LICENSED!

The Cone Penetrometer (CP)

The Austin AI CP-1000 is a one-of-a-kind energy dispersive X-ray fluorescence (EDXRF) analyzer in a push probe format that can perform in-field analysis of soil, sediment, sludge, tailings, and related material

All testing is done in a real-time, automated fashion. It is designed to seamlessly integrate with current hydraulic push probe systems and totally augment the existing devices now used for physical and organic measurements

The probe can be mounted in the specially designed lab stand for standards measurement or random grab sample data confirmation



Austin AI

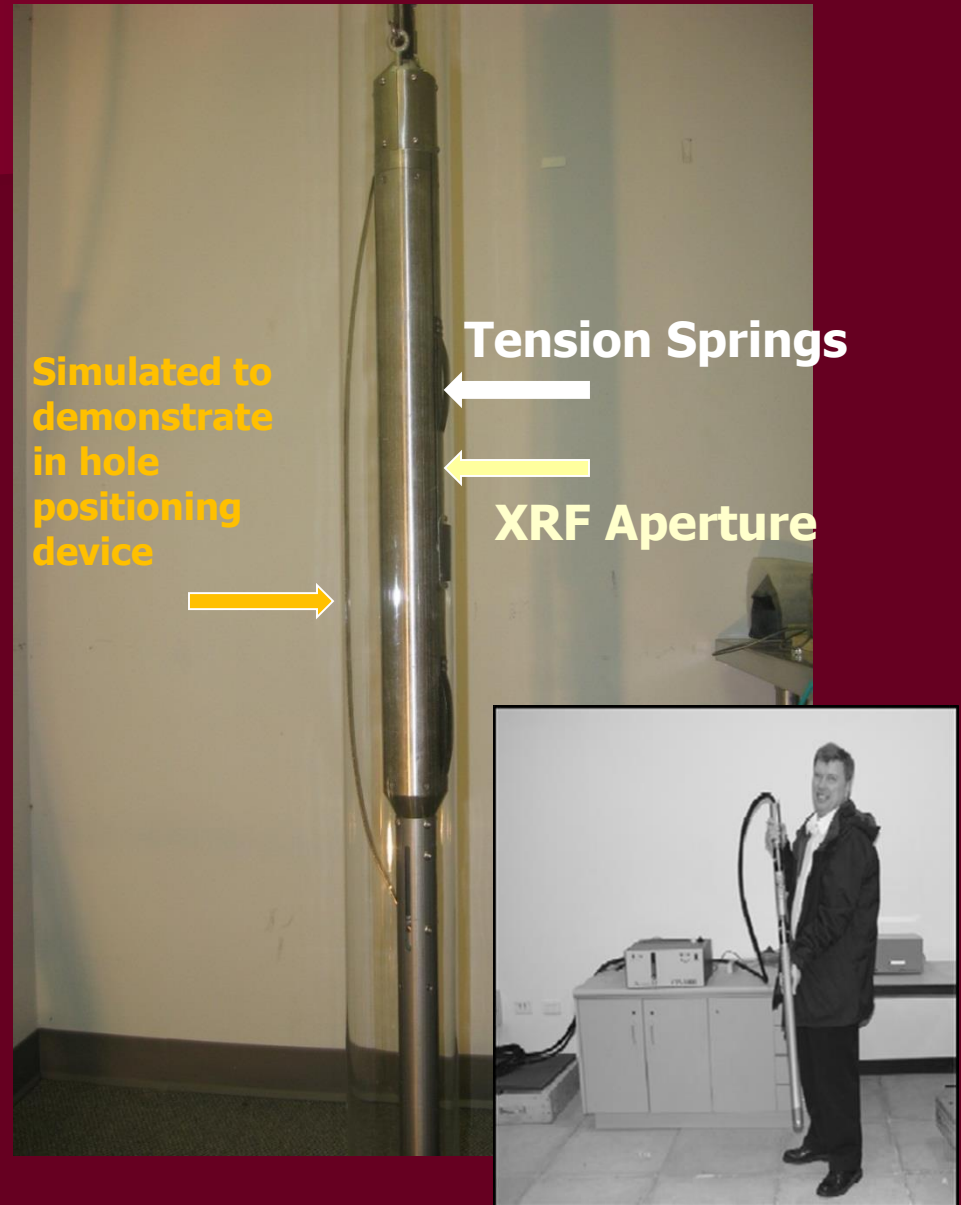
Success Stories

The Down-Hole Probe (DHP)

is a high performance device based on EDXRF spectrometry for the determination of minor and major concentrations of elements in bore holes, blast holes, ore seams, tailing piles, pipes, and other applications.

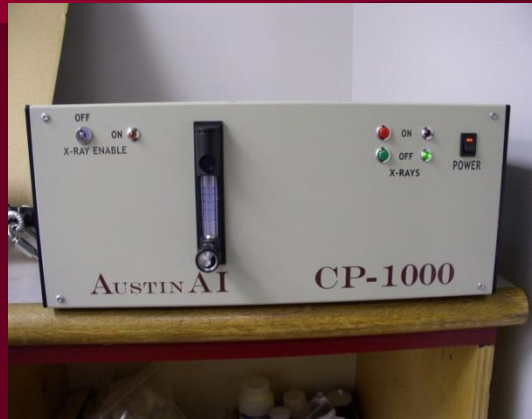
The Down Hole Probe revolutionizes in-situ characterization, providing real-time concentration data on the actual hole walls. No waiting on lab results. No errors from sample mixing.

It is possible to lower the DHP system down a pre-drilled hole up to 100's of meters. An optional specially engineered stand allows the operator to perform bench top-type XRF analysis while in the field.

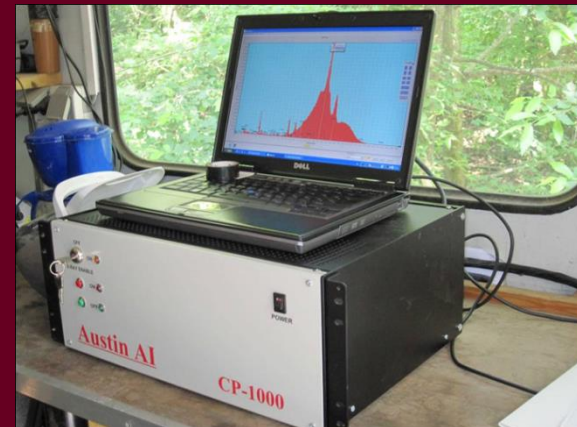


Austin AI

EDXRF Mining Probe - DHP



DHP Front
Panel, w/ He
option



Austin AI

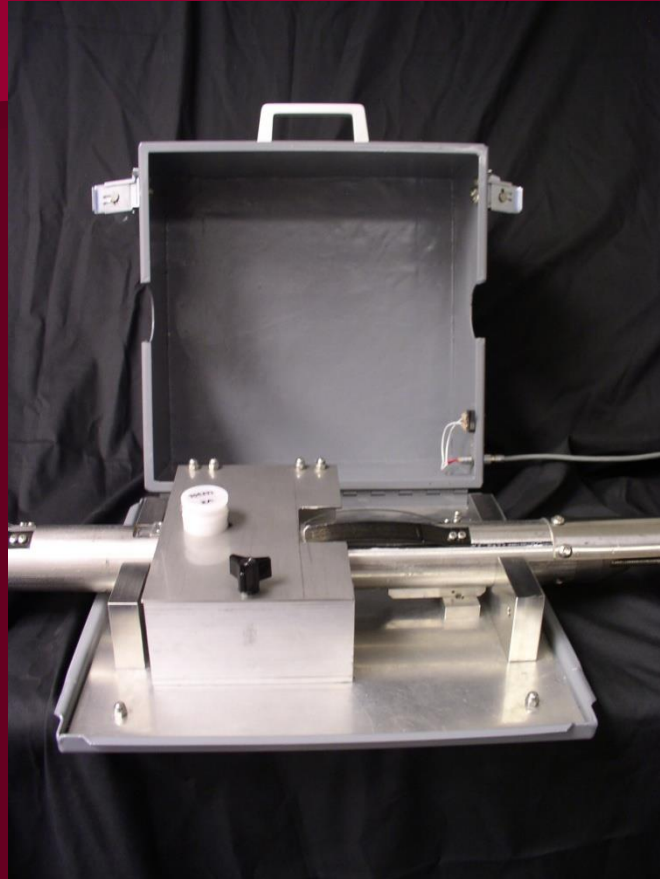
EDXRF Mining Probe - DHP



DHP Back Panel, w/ He option

Austin AI

EDXRF Mining Probe - DHP



DHP Lab Test Stand

Austin AI

EDXRF Mining Probe - DHP

DHP:
Window
w/Seal Pad



← Required for all LE analyses

Austin AI

EDXRF Mining Probe - DHP

File

Analysis | Probe Controls | Manual Controls

LOCK UNLOCK STOP

Aquisition Time (Sec): 30

Max Run Time (Sec): 300

TFR Filename: avc

Depth: 1234

Tube State: Off Slow count too low!

Slow Count: 0

Software:
Analytical
Parameters

Austin AI

EDXRF Mining Probe - DHP

Software:
Probe
Options

The screenshot displays the 'Probe Controls' tab of the Austin AI EDXRF Mining Probe - DHP software. The interface is organized into three main sections: Tube, Locking, and Helium.

Tube Section: This section contains two columns of controls. The first column, labeled 'Tube', has an 'ACTUAL' value of 0 and a 'SETTING' value of 10. The second column, labeled 'HV (kV)', has an 'ACTUAL' value of 0 and a 'SETTING' value of 50. Both columns feature vertical sliders and numeric input fields.

Locking Section: This section is titled 'Locking' and contains a 'Run Until' field set to 1 sec. Below this, there is an 'OR' option for 'Analog Value'. The 'Set' field is 2180 and the 'Current' field is 2049. There is also an 'OR' option for 'Max' with a value of 0. A 'Digital' button is located at the bottom of this section.

Helium Section: This section is titled 'Helium' and contains a 'Purge Delay' field set to 30 sec. Below this, there is an 'OR' option for 'Analog Value'. The 'Set' field is 3000 and the 'Current' field is 0. There is also an 'OR' option for 'Digital'. At the bottom, there is a 'Helium time' field set to 30 minutes and a 'He count down' field set to 0.

Austin AI

EDXRF Mining Probe - DHP

Software:
Supervisor
Set Up

XRS-FP

File Acquire Setup Calibrate Process Help

Acquire ☒ Set kV/uA kV: 10 (10>40) uA: 50 (5>200) Preset: 100 Time: 100 %DT: 0.0 X: 0 Y: 0 Z: 0

Specimen Component Table:

#	Component	Type	Conc.	Error	Units	Mole%	Error
1	Cr	Calc	0.125	0.098	wt.%	0.151	0.119
2	CaO	Calc	0.460	0.397	wt.%	0.515	0.445
3	MnO	Calc	0.241	0.157	wt.%	0.214	0.139
4	Fe2O3	Calc	1.317	0.422	wt.%	0.518	0.166
5	Ni	Calc	1.510	0.225	wt.%	1.615	0.241
6	Cu	Calc	0.131	0.121	wt.%	0.129	0.120
7	Al2O3	Calc	7.096	0.840	wt.%	4.070	0.222

Thickness Information:

Layer						Normalize
Thick.	Type	Error	Units	Density	Fixed	OK Total
0.000	Bulk	0.000	mg/cm2	0.000	<input checked="" type="checkbox"/>	100.00

Global Threshold Settings

n-sigma: 2.000 Clear Conc Method ☐

Element Table: ☒ Normal ☐ Coefficients

#	Element	Cond	Measurement							Threshold Value	Conc	Intensity	Ratio	ROI (keV)		Chi2	Quant	Calibration	
			Elmt	Line	Code	Intensity	Error	Backgr.	Conc.					Error	MDL				Atom%
1	O	Ka	0	0.00	0.00	0.00	51.192	0.000	0.0000	65.586	0.000	<input checked="" type="checkbox"/>	Gaussian	None	0.000	0.000	0.00	None	0.00
2	Al	Ka	1	24.49	1.64	21.49	4.194	0.286	0.1231	3.186	0.000	<input checked="" type="checkbox"/>	Gaussian	None	1.342	1.631	0.58	FP	1000.00
3	Si	Ka	1	175.16	3.01	25.45	40.774	0.756	0.1326	29.759	0.000	<input checked="" type="checkbox"/>	Gaussian	None	1.594	1.885	0.23	FP	1000.00
4	Ar	Ka	1	9.16	2.23	57.79	0.000	0.000	0.0000	0.000	0.000	<input checked="" type="checkbox"/>	Gaussian	None	2.806	3.107	1.11	FP	1000.00
5	Ca	Ka	1	107.55	3.23	76.61	0.329	0.284	0.2112	0.168	0.000	<input checked="" type="checkbox"/>	Gaussian	None	3.537	3.843	0.27	FP	1000.00
6	Ti	Ka	1	54.78	3.12	94.66	0.639	0.307	0.2239	0.274	0.000	<input checked="" type="checkbox"/>	Gaussian	None	4.351	4.665	8.03	FP	1000.00

Measurement & Processing Conditions: ☒ Measurement ☐ Processing Active Condition Code: 1

Code	X-Ray Source				Detector			Chamber	Time (secs)		Monitor	
	Target	Filter	Thick(um)	kV	uA	Type	Filter		Thick(um)	Atmos		Preset
1	W	None	0.00	10.0	50.0	Si pin	None	0.00	He	100.0	100.0	0.0
2	W	Al	2000.00	40.0	30.0	Si pin	None	0.00	Air	200.0	200.0	0.0

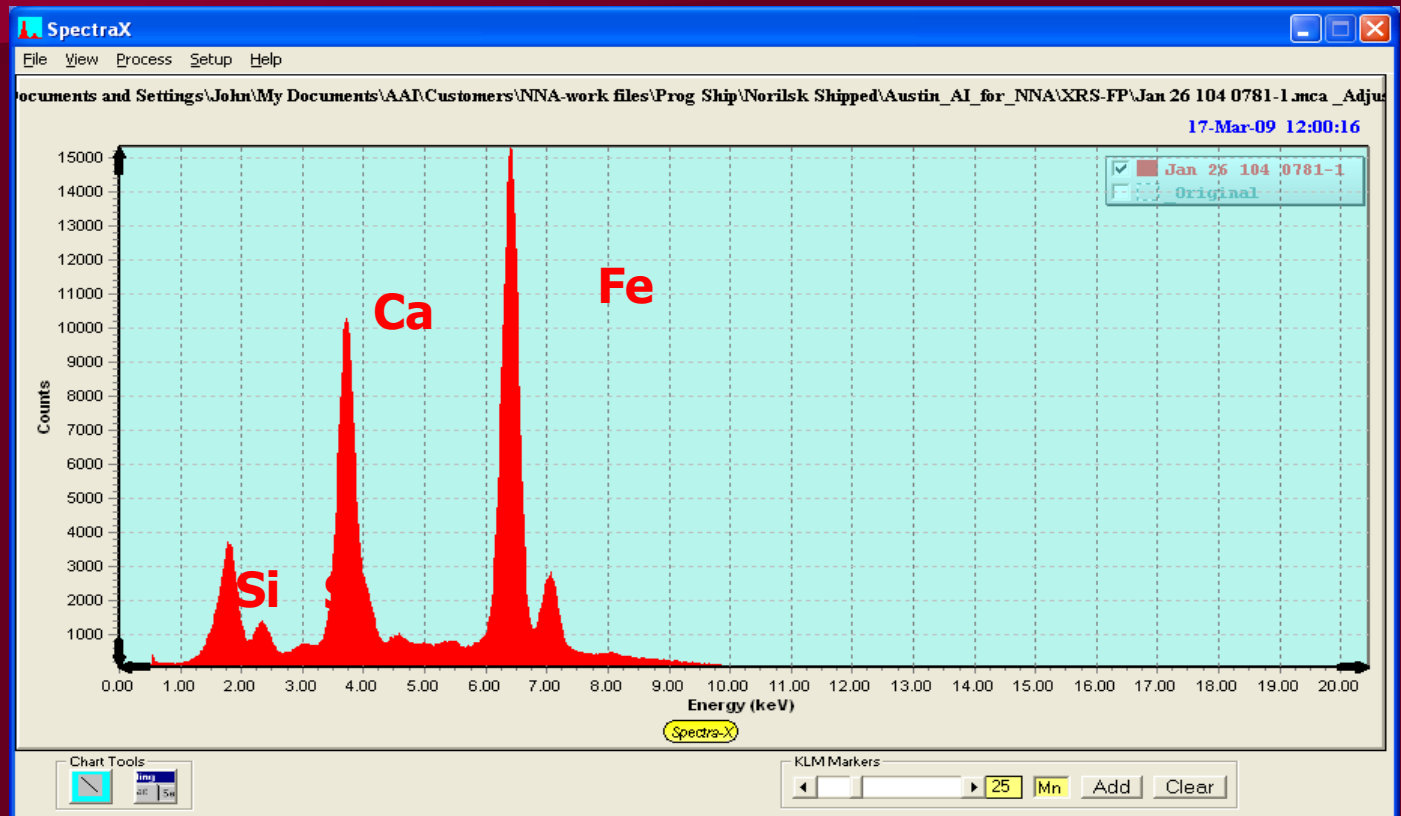
Status: C:\Documents and Settings\John\My Documents\AAI\Customers\NNA-work files\Prog Ship\Norilsk Shipped\Austin_AI_1 2 On 1024 20 34 No

Comment: Comment String

Austin AI

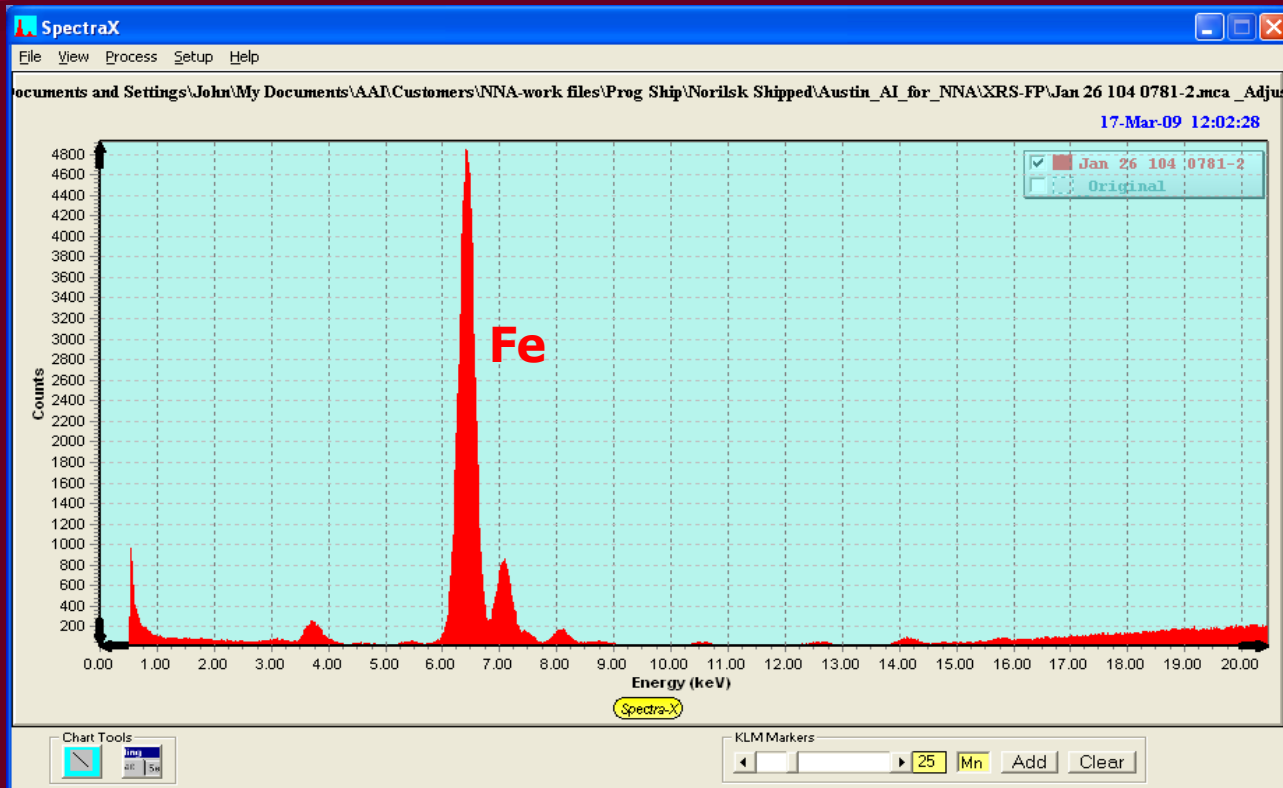
EDXRF Mining Probe - DHP

DHP:
10 keV
excitation



Austin AI

EDXRF Mining Probe - DHP



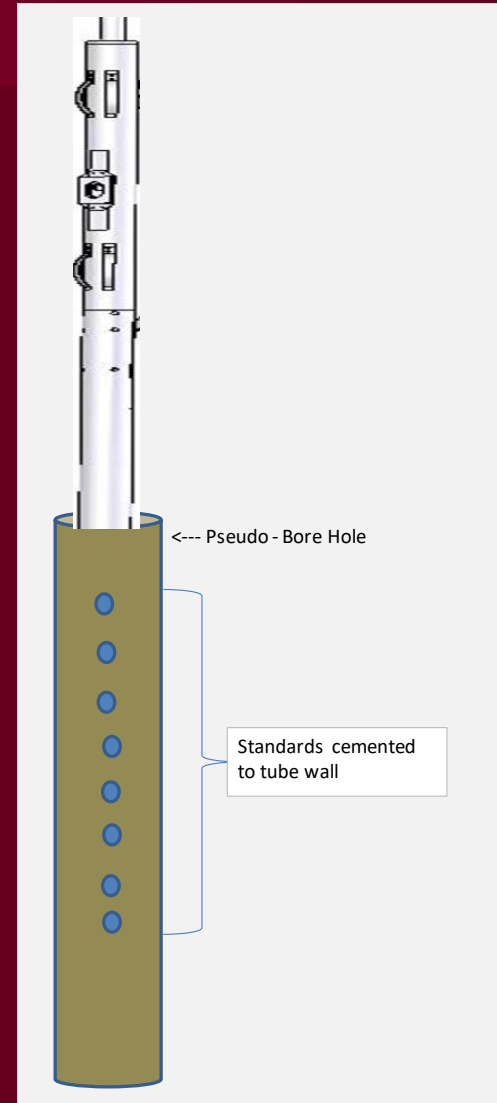
DHP:
40 keV
excitation

Austin AI

EDXRF Mining Probe - DHP

Test Conditions for DHP Performance in Various Ore Samples

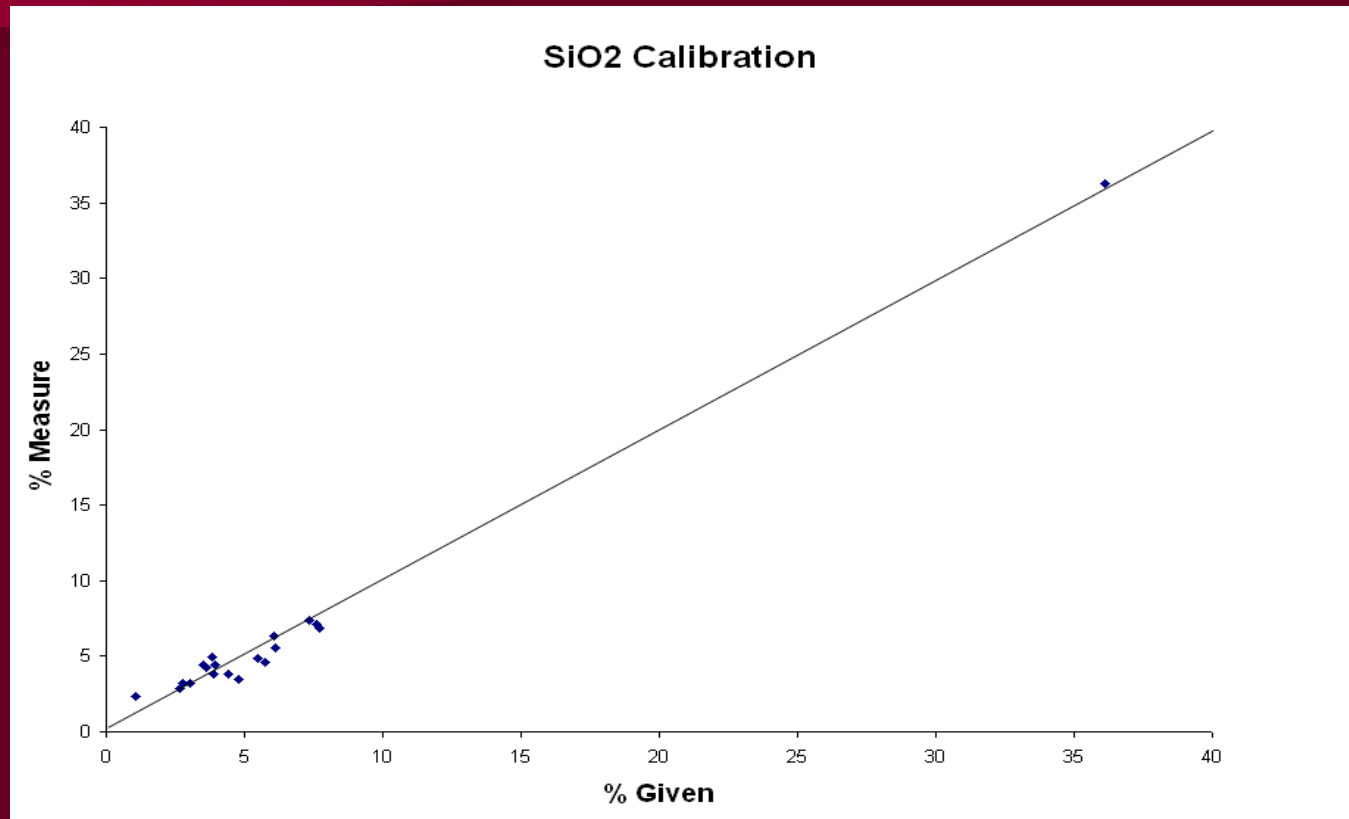
Simulation provides
excellent proof of
performance in real world
scenarios such as bore
holes or blast holes



Austin AI

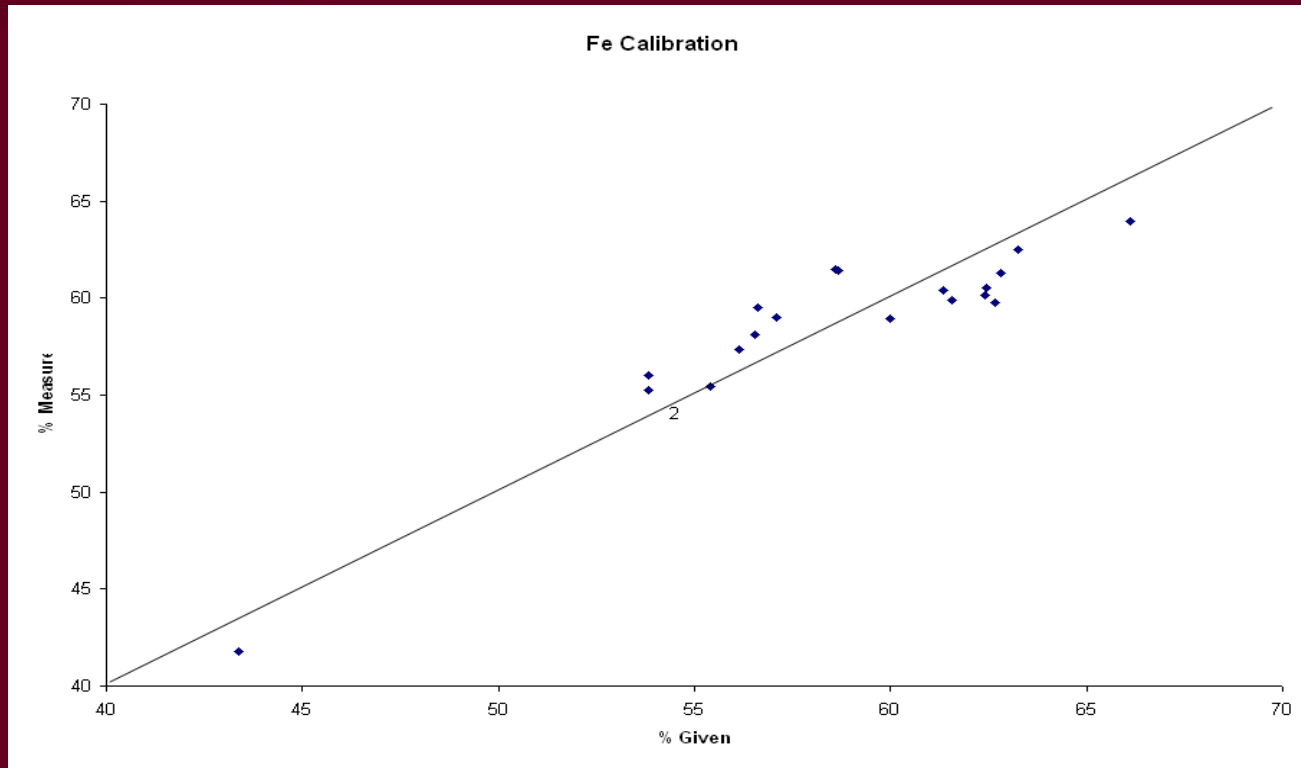
EDXRF Mining Probe - DHP

DHP
Fe ore:
 SiO_2



Austin AI

EDXRF Mining Probe - DHP

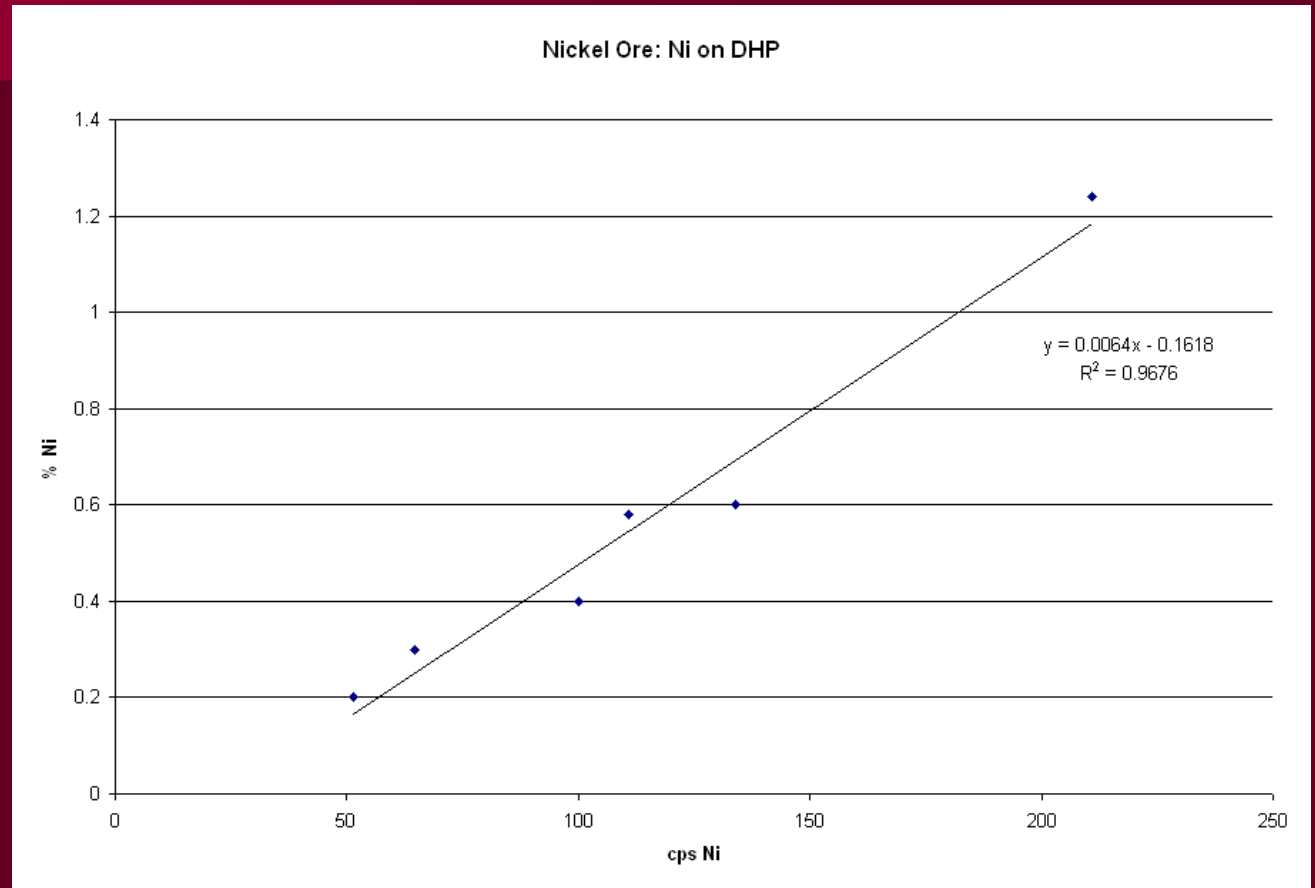


DHP
Fe ore:
 Fe_2O_3

Austin AI

EDXRF Mining Probe - DHP

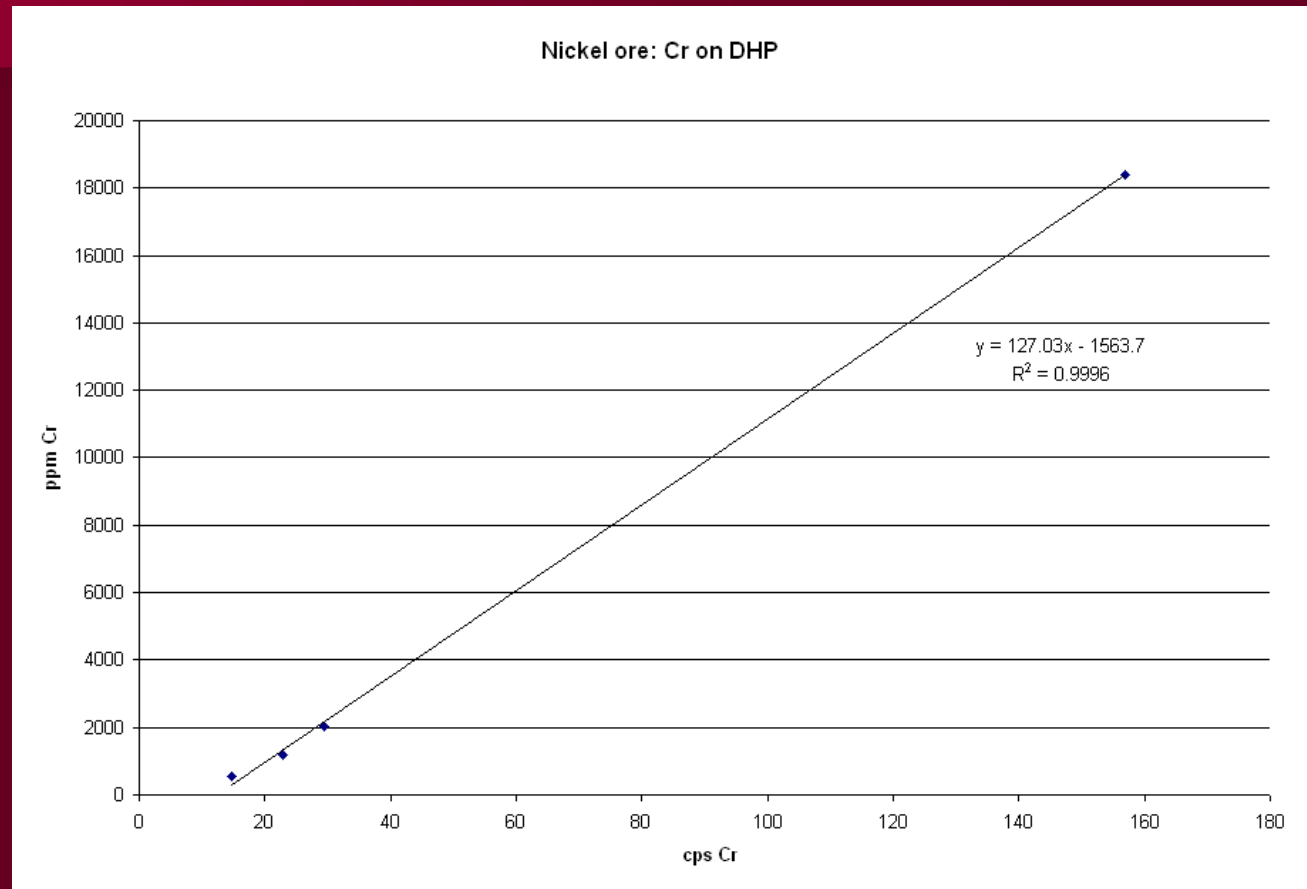
DHP
Ni ore:
Ni



Austin AI

EDXRF Mining Probe - DHP

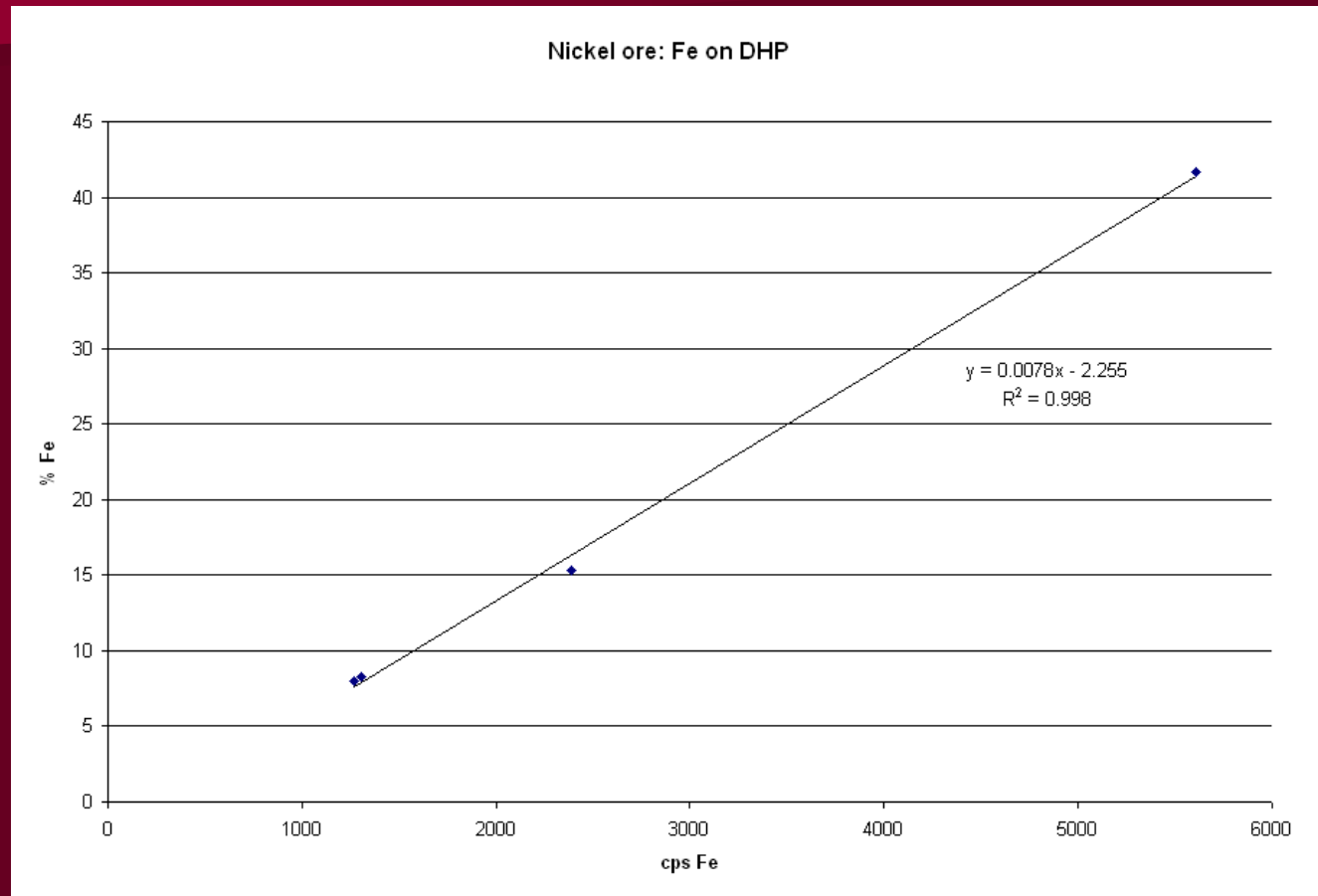
DHP
Ni ore:
Cr



Austin AI

EDXRF Mining Probe - DHP

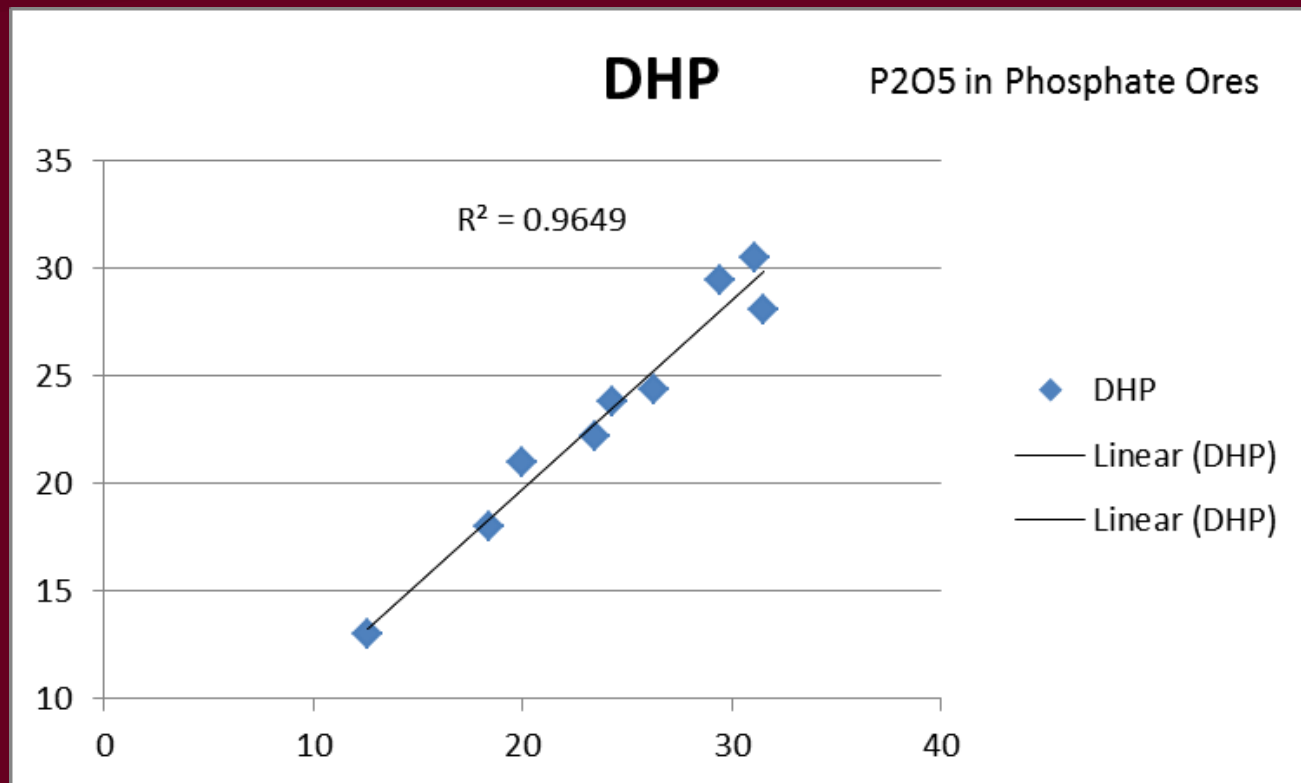
DHP
Ni ore:
 Fe_2O_3



Austin AI

EDXRF Mining Probe - DHP

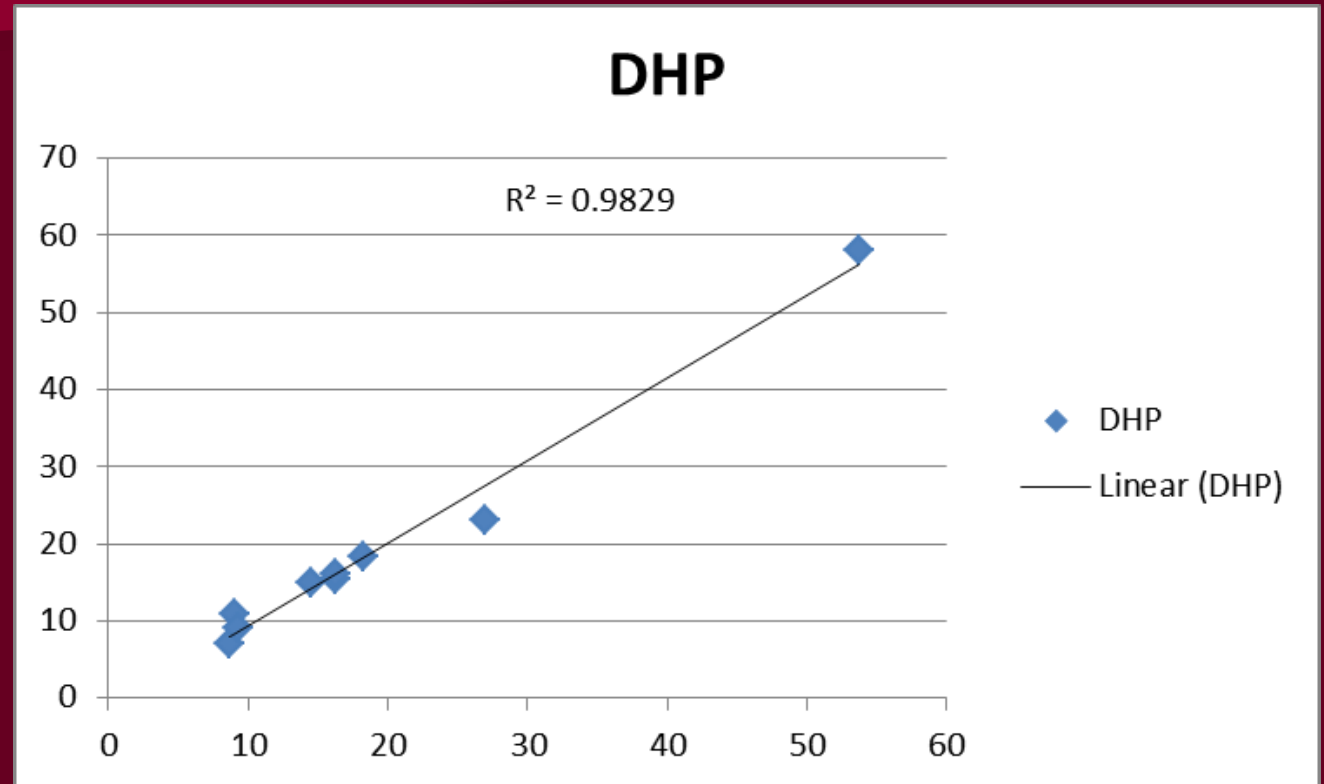
DHP
Phosphate
ore: P_2O_5



Austin AI

EDXRF Mining Probe - DHP

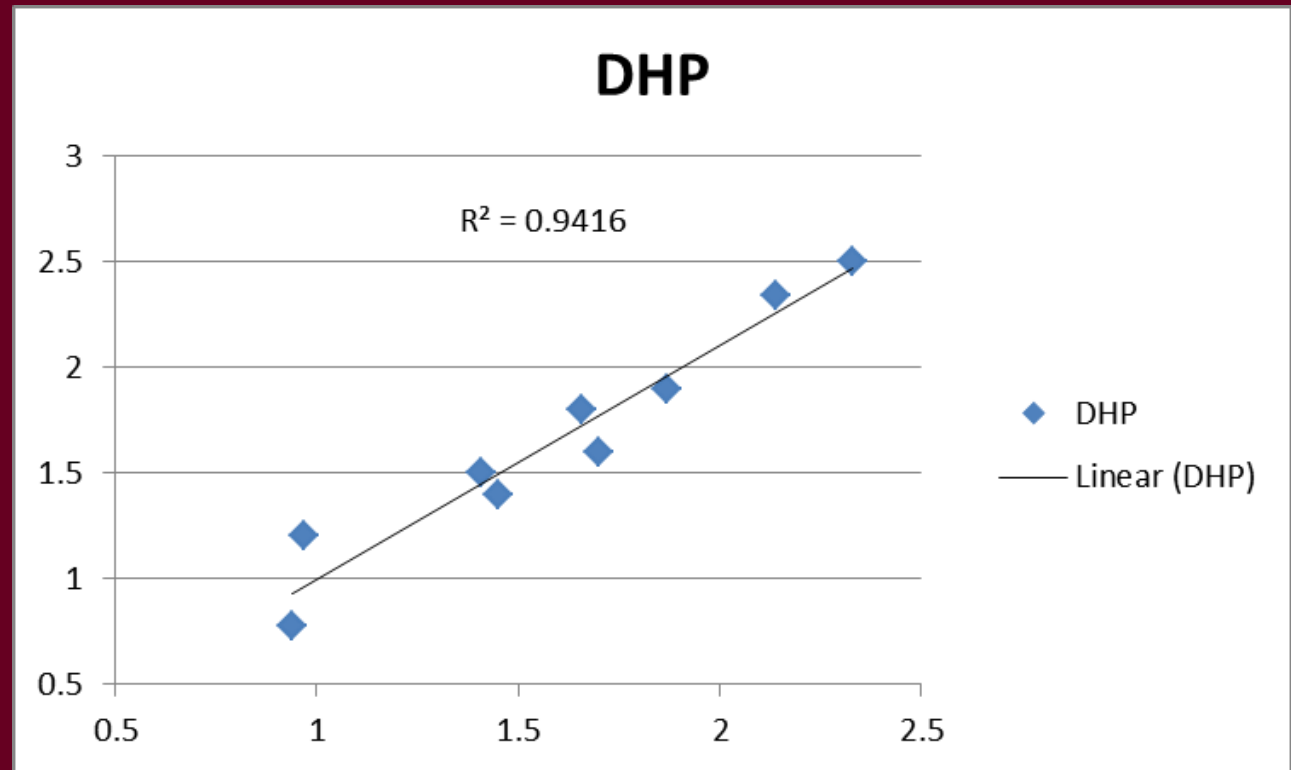
DHP
Phosphate
ore: SiO_2



Austin AI

EDXRF Mining Probe - DHP

DHP
Phosphate
ore: Fe_2O_3



DHP Detection Limits, ppm

100 sec, SiO₂ matrix

Some examples of actual Lab data

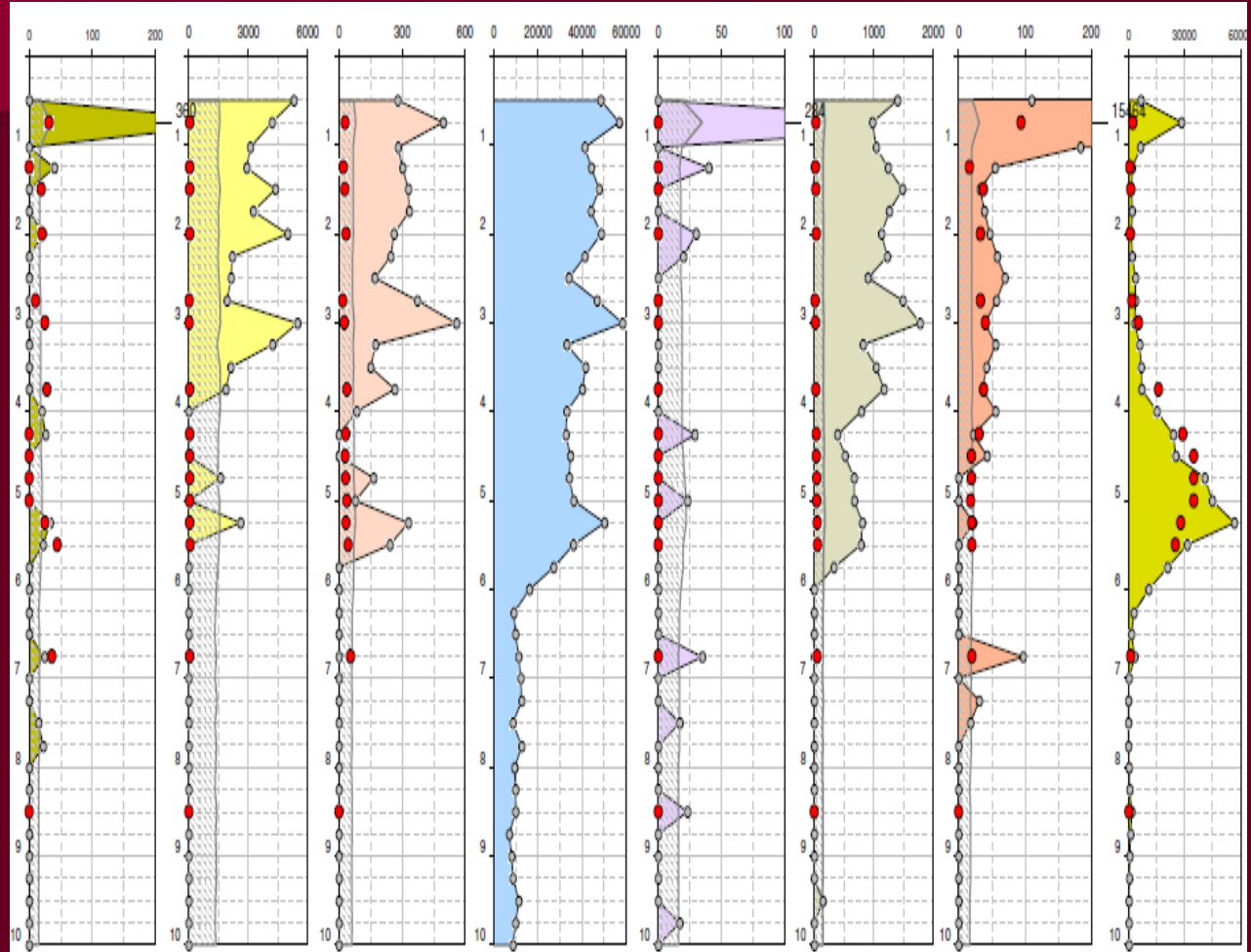
The DHP can “see” all elements between Al and U

Fe, Ni, Cu, Zn, Hg, Pb	~10 ppm
Cr, Mn, Co	~20 ppm
As, Se	~10 ppm
Ag, PMG	~50 ppm
Cd, Ba	~25 ppm
S, P	~0.01%
Al	~0.2%



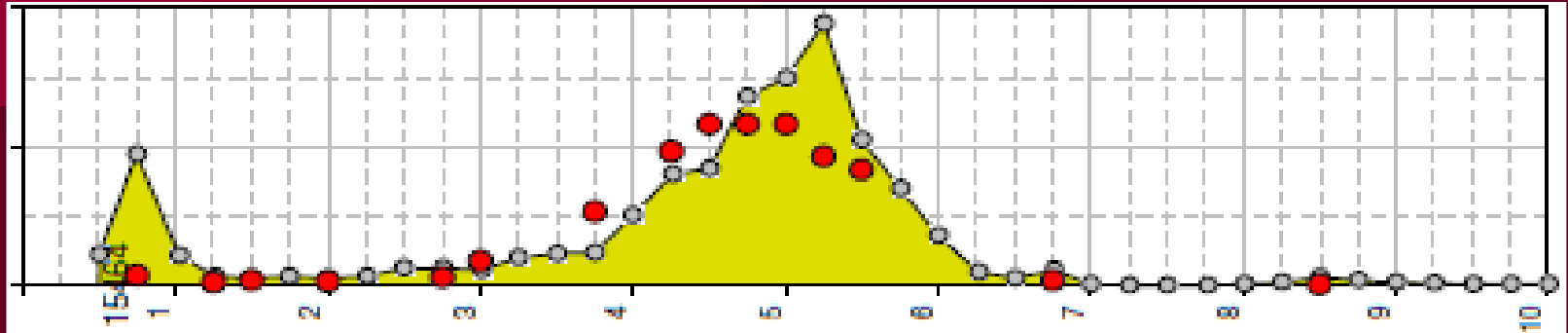
DHP Field Data Reports

**Chart of
Conc v.
Depth for
a pre-set
array of
EOI's**

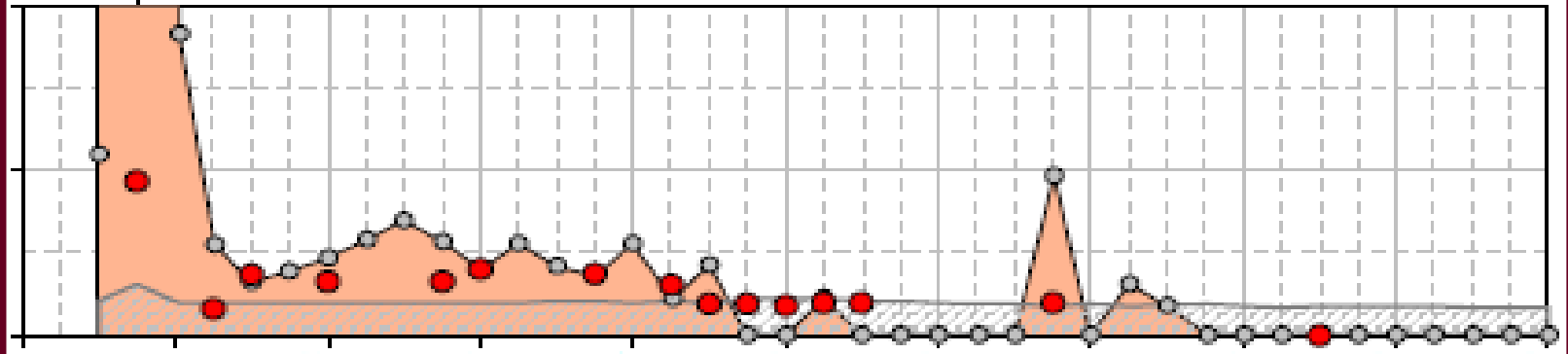


DHP Field Data Reports

P_2O_5



SiO_2



Austin AI

Consultants in Sensor - Based Sorting/Process Solutions

Summary -- Austin AI are highly qualified to provide the most cost-effective consultation services for mining and milling because:

1) Experience

- a) We have been advancing the state of the art in sensor sorting systems and processes for many years
- b) We have worked for clients, contractors, and vendors—therefore we have seen all perspectives
- c) We guarantee our products and services

2) Expertise

- a) We have developed many new processing technologies
- b) We are creative. We use or develop the best solutions—not previously used ones
- c) We have a large network of colleagues and subcontractors

3) Motive

- a) We are not focused on selling equipment—we are focused on our client's needs
- b) We listen to the client's needs and desires

4) Scope

- a) We understand the economics AND the technology of processing
- b) We cover all process streams, automated processing lines, and systems

