

# **APPLICATION OF SPONTANEOUS POTENTIAL PROFILES IN THE EXPLORATION OF GOLD-RICH EPITHERMAL LOW SULPHIDATION VEINS IN A HUMID REGION**

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# CONTENTS

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1. Introduction
2. S.P. Profiling Technique
3. Geology of the Exploration Site
4. Exploration Procedure Overview
5. Exploration Procedure
  - Days 1 and 2
  - Days 2 and 4
  - Days 5 and 6
6. Conclusions

# INTRODUCTION-1

Results obtained during exploration  
of Au-rich quartz veins  
in low mountain, humid environments  
of the Colombian Andes, South America

soft slopes, ~2500mm rain/yr, black organic soil

Spontaneous Potential (S.P.) profiling  
used to evaluate strike-slip duplex structures  
and locate Au-rich veins  
in extensive zones of a vein system

# INTRODUCTION-2

Total field work = 6 days

- helped to model a deposit
- provided ideas on where to continue exploring with trenches

Similar exploration techniques may be applied to

- some epithermal base-metal deposits
- and greenstone belt-hosted mesothermal shear zones

# INTRODUCTION-3

Techniques known and used  
since early twentieth century

but commonly underestimated in modern  
exploration activities.

In author's experience,  
spontaneous potential profiling  
produces excellent results  
with small investment in  
equipment and personnell

# S.P. PROFILING-1

Oxidation of sulfides  
in sulfide-bearing veins or fractures  
generates small electric currents

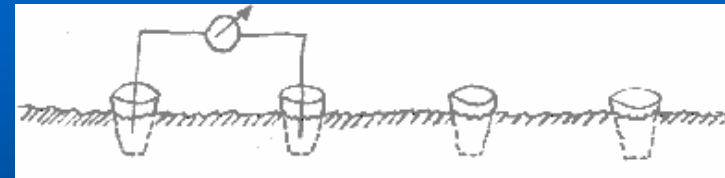
Sulfide-poor host rocks produce  
a significant potential contrast

Spontaneous potential methods take  
advantage of that contrast

## S.P. PROFILING-2

zones with higher concentration of sulfides in oxidation produce potential anomalies that stand out well below the local base level.

Measuring techniques have to be adapted to climate.

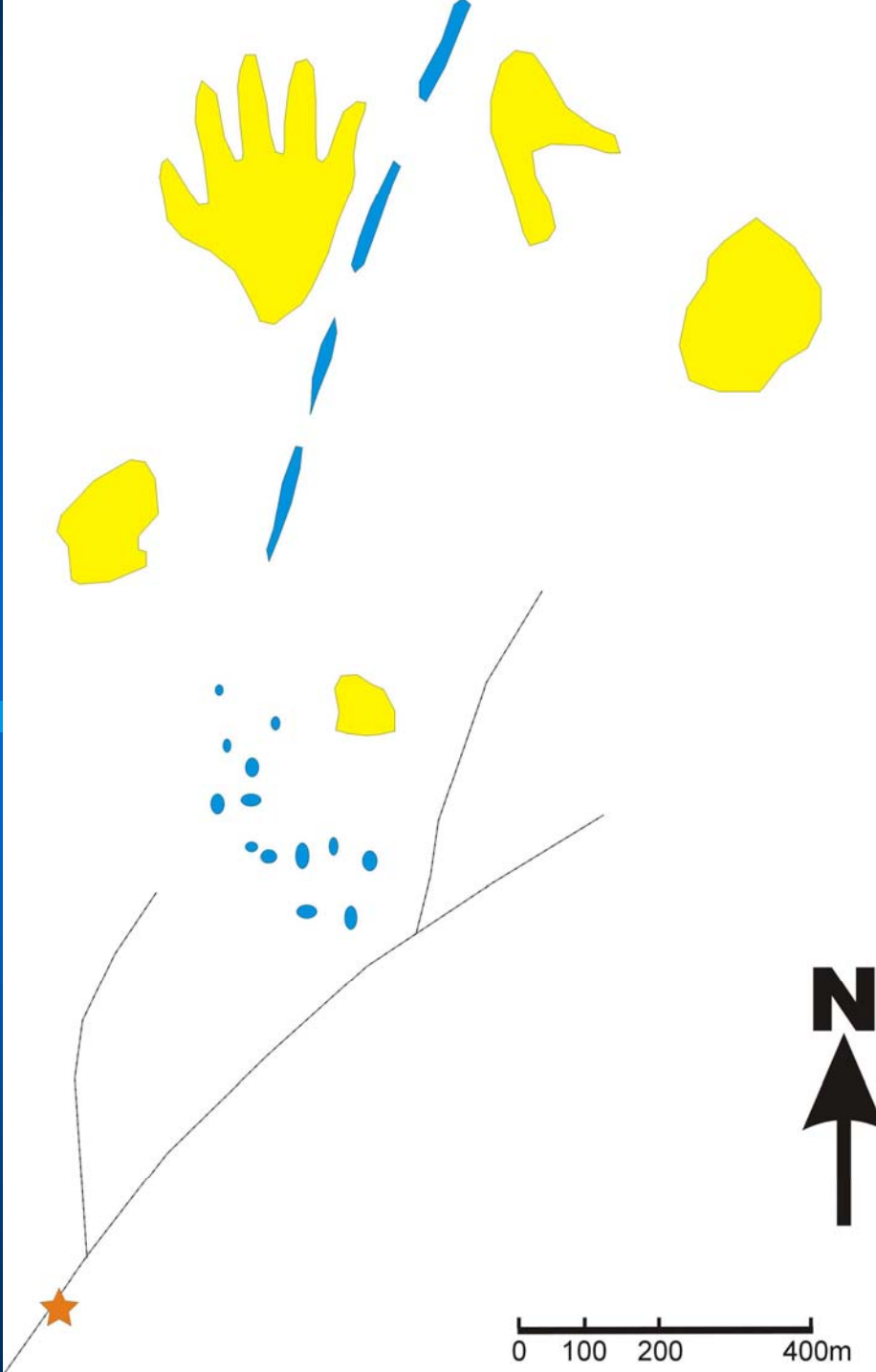


# KNOWN GEOLOGY

## PROSPECTIVE ZONE

- covered by soil + vegetation
- minor outcrops of pyroclastic rocks
- quartz ridges w/ features of epithermal metallic mineralization
- coarse quartz float

Old miner panned coarse Au from dry creek. That's only evidence of mineralization.



# EXPLORATION PROCEDURE OVERVIEW-1

Effective response to spontaneous potential profiling was first tested.

*six field work days  
+ evening interpretation*

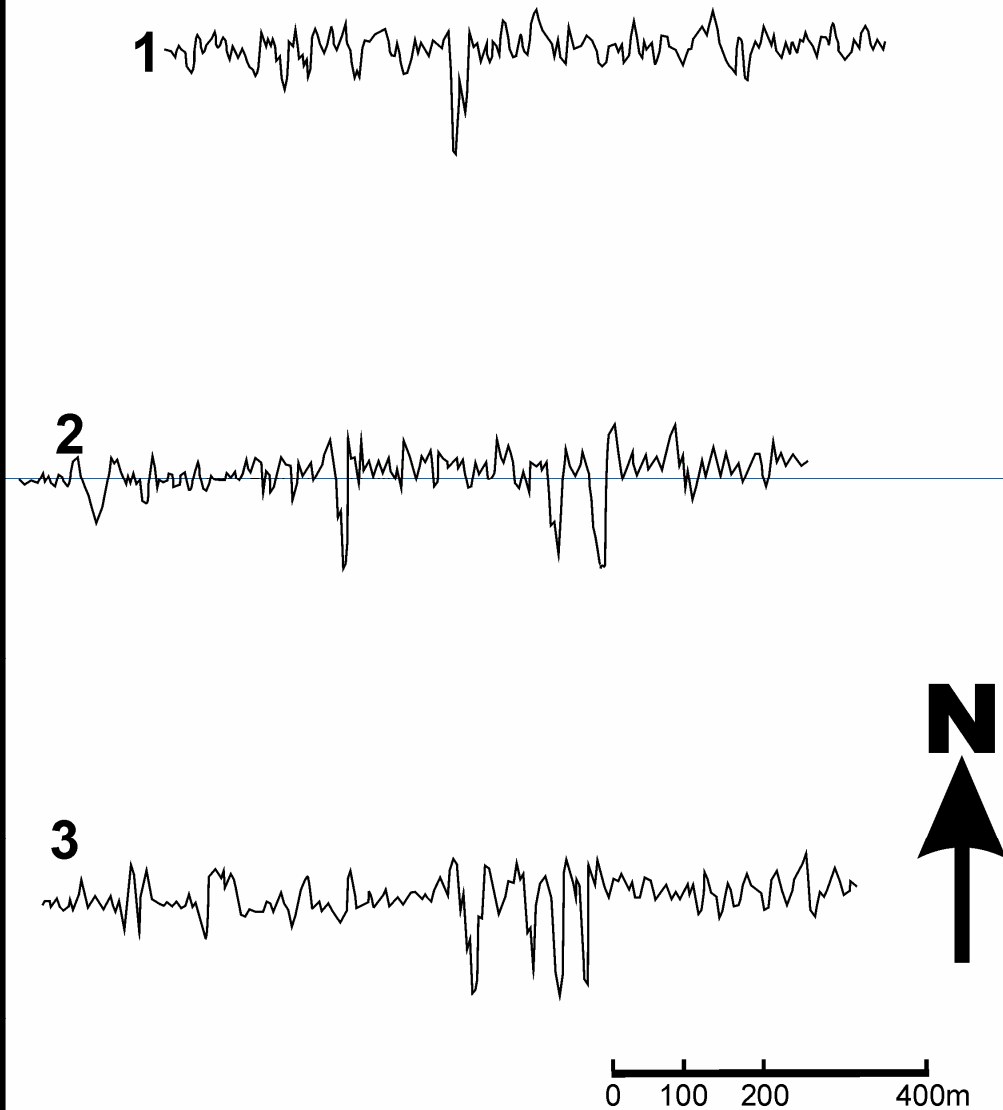
progressively provided information  
to define series of  
5 Au-mineralized qtz veins

# EXPLORATION PROCEDURE OVERVIEW-2

Mineralized veins were emplaced in  
distension zones around strike-slip  
duplexes

Spontaneous potential profiles  
helped to trace veins  
from outcrop  
into completely covered terrain

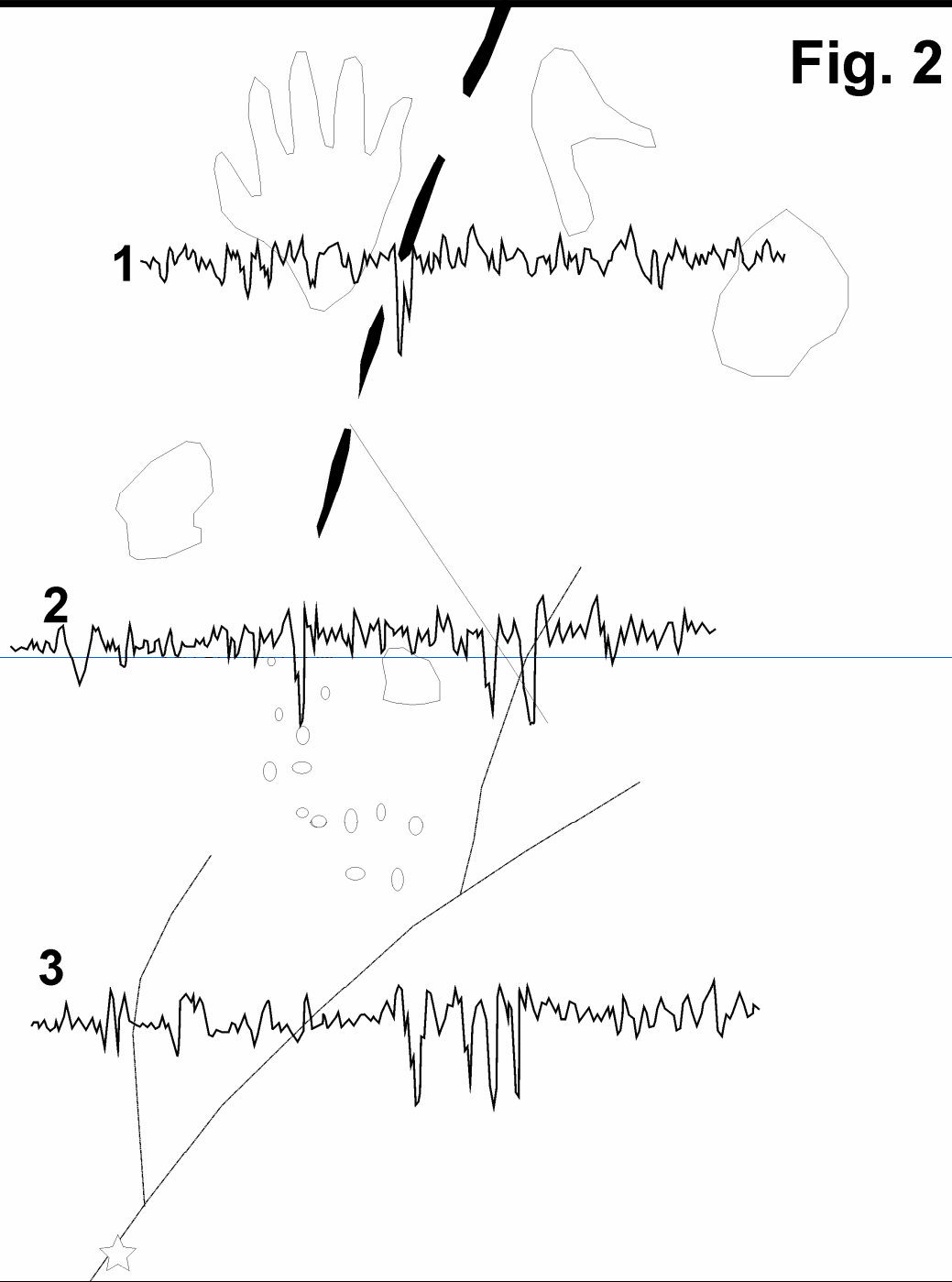
**Fig. 2**



# EXPLORATION PROCEDURE-1

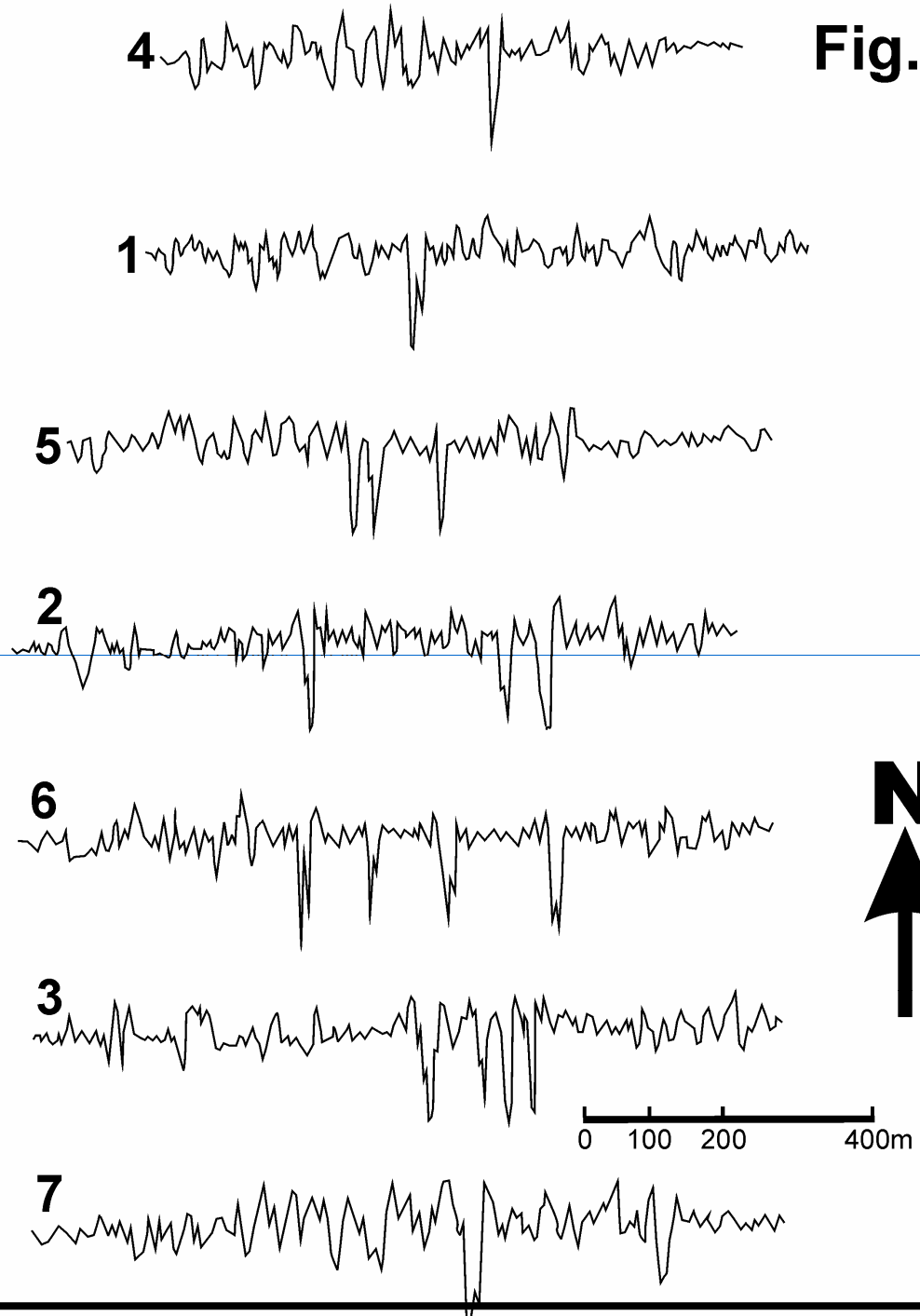
Profiles 1,2,3  
obtained during the  
first two days

**Fig. 2**



**SP PROFILES  
ON TOP OF  
GEOLOGY**

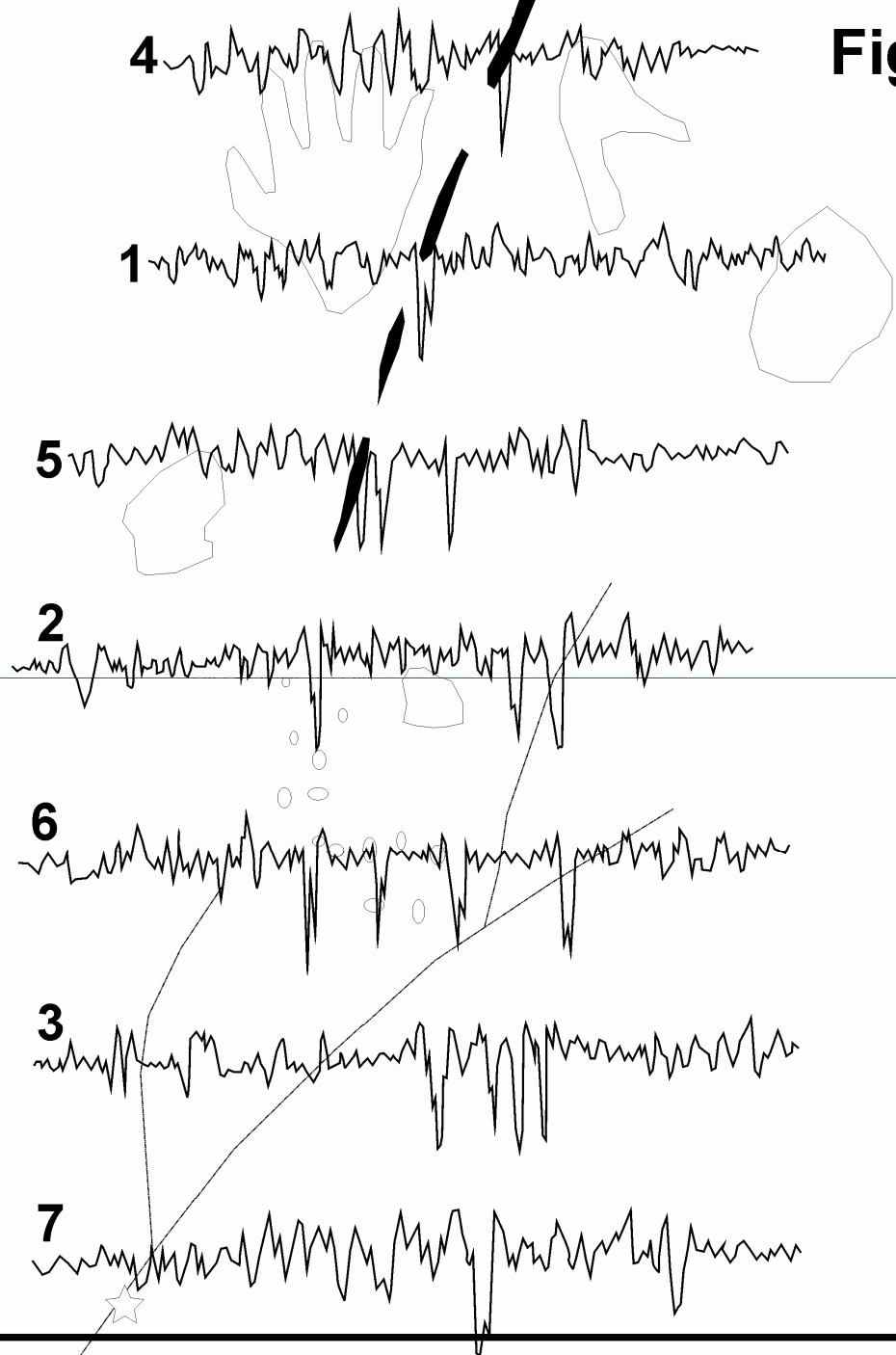
**Fig. 3**



# EXPLORATION PROCEDURE-2

Two more field  
days produced  
profiles 4,5,6,7

**Fig. 3**



**SP PROFILES  
ON TOP OF  
GEOLOGY**

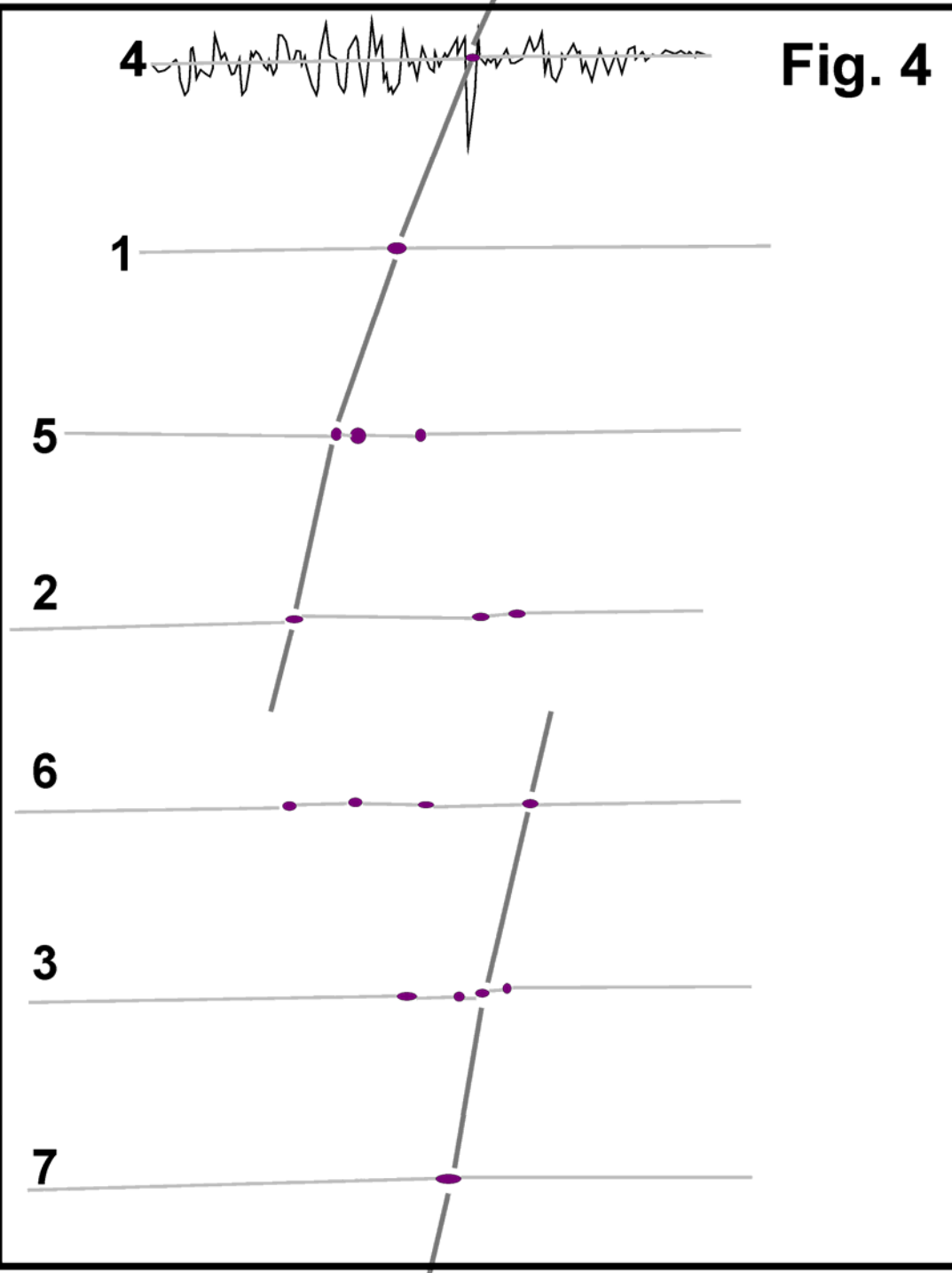


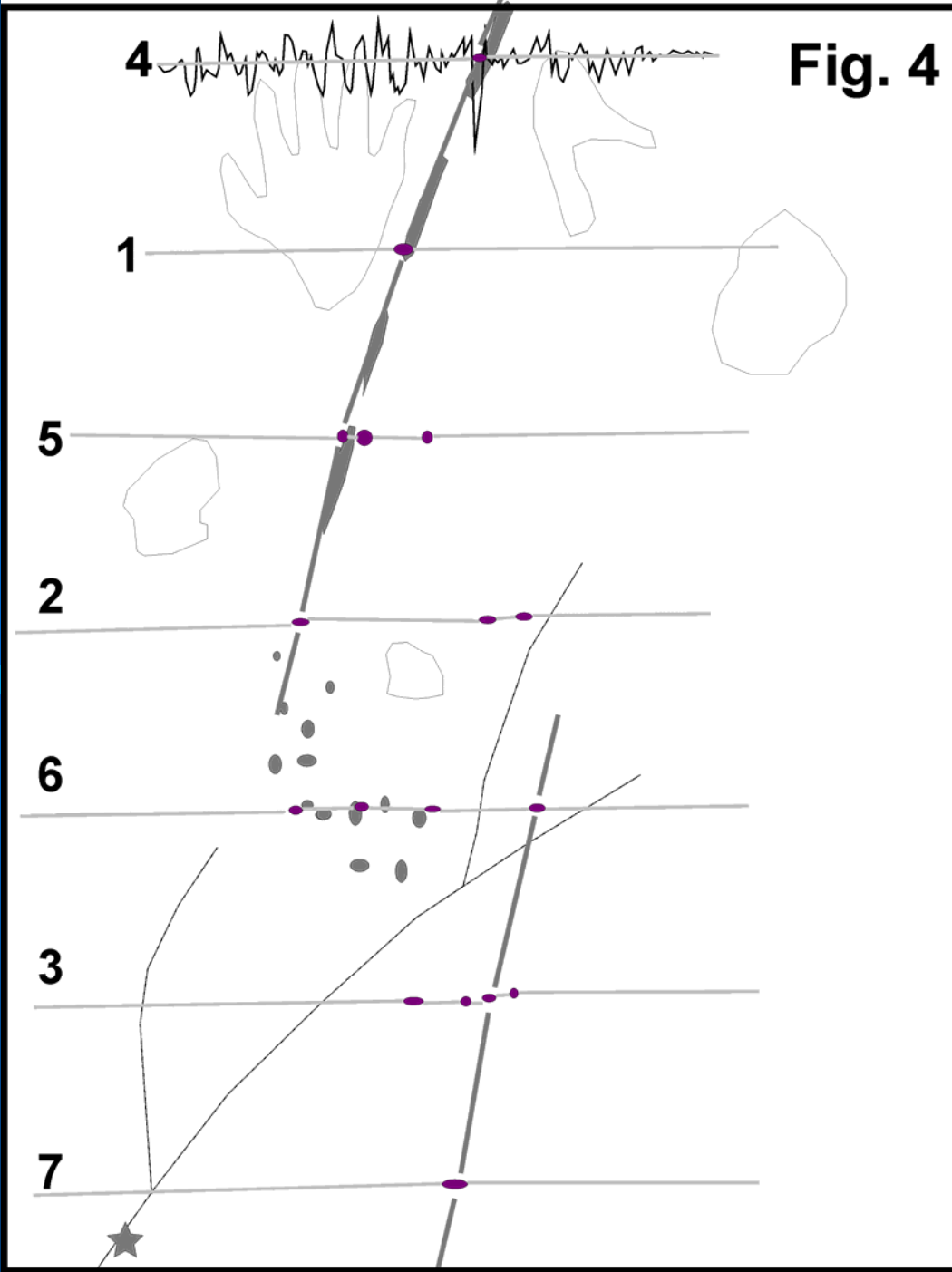
Fig. 4

**COLOR CODING**  
to interpret  
anomalies  
and non-anoma-  
lous ground

red dots =  
detected anomalies

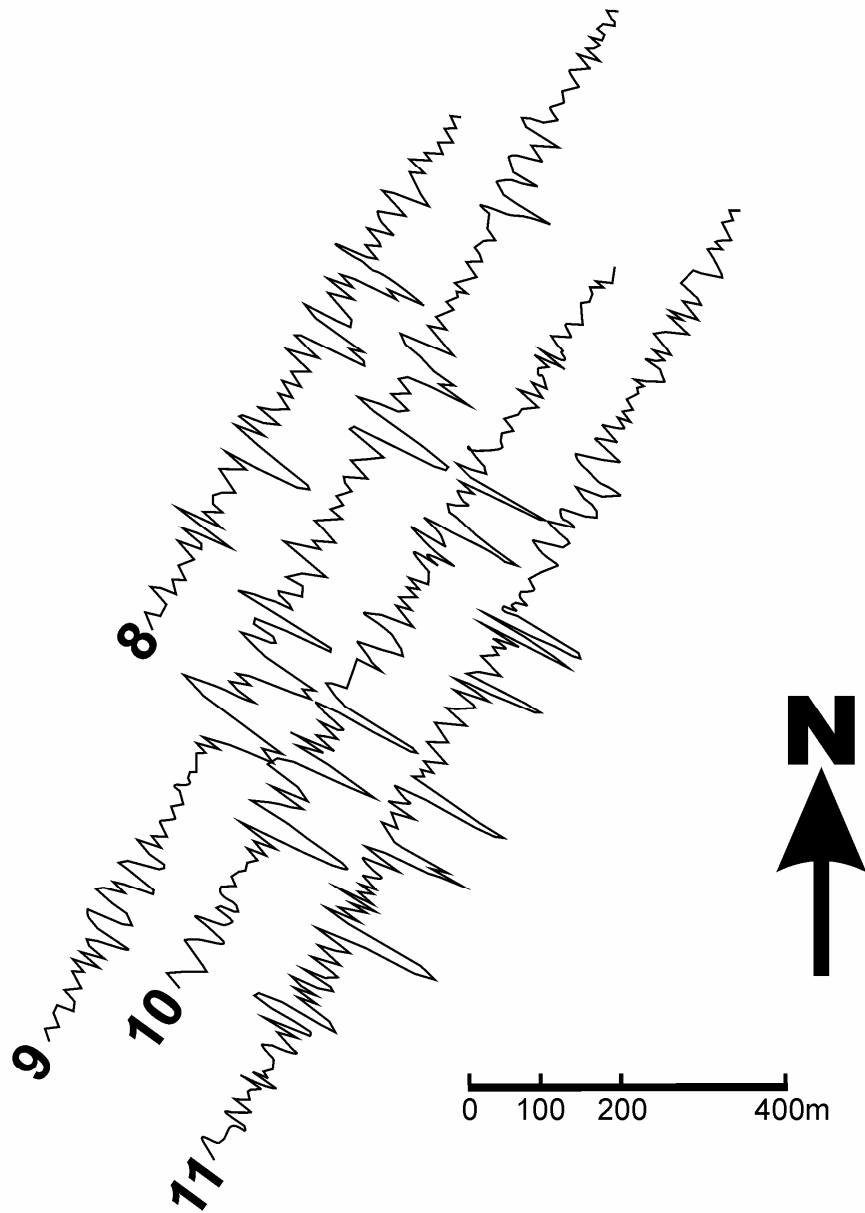
gray lines =  
zones w/o  
anomalies

thick lines join  
known anomalies



SP PROFILES  
ON TOP OF  
GEOLOGY

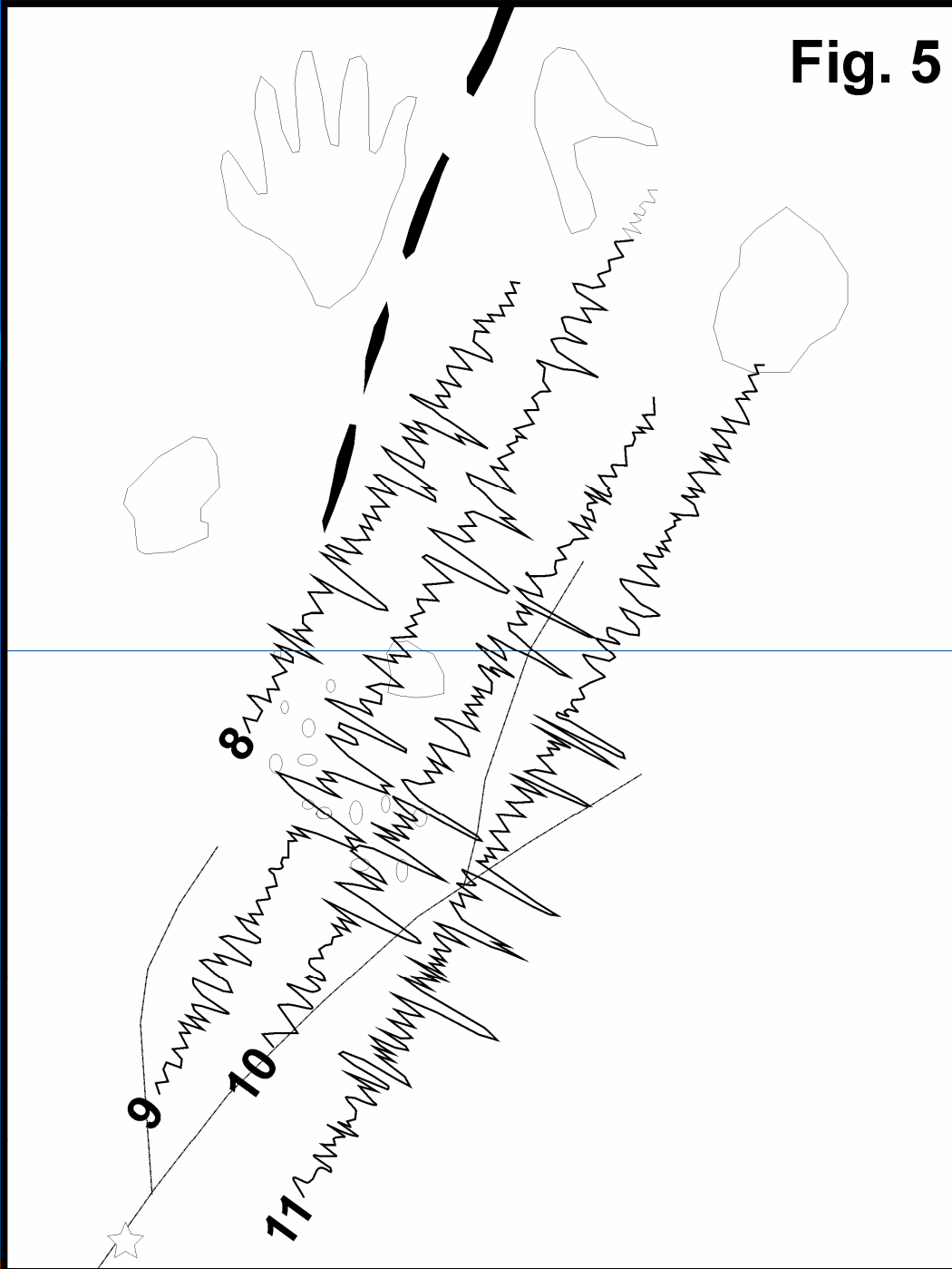
**Fig. 5**



## **EXPLORATION PROCEDURE-3**

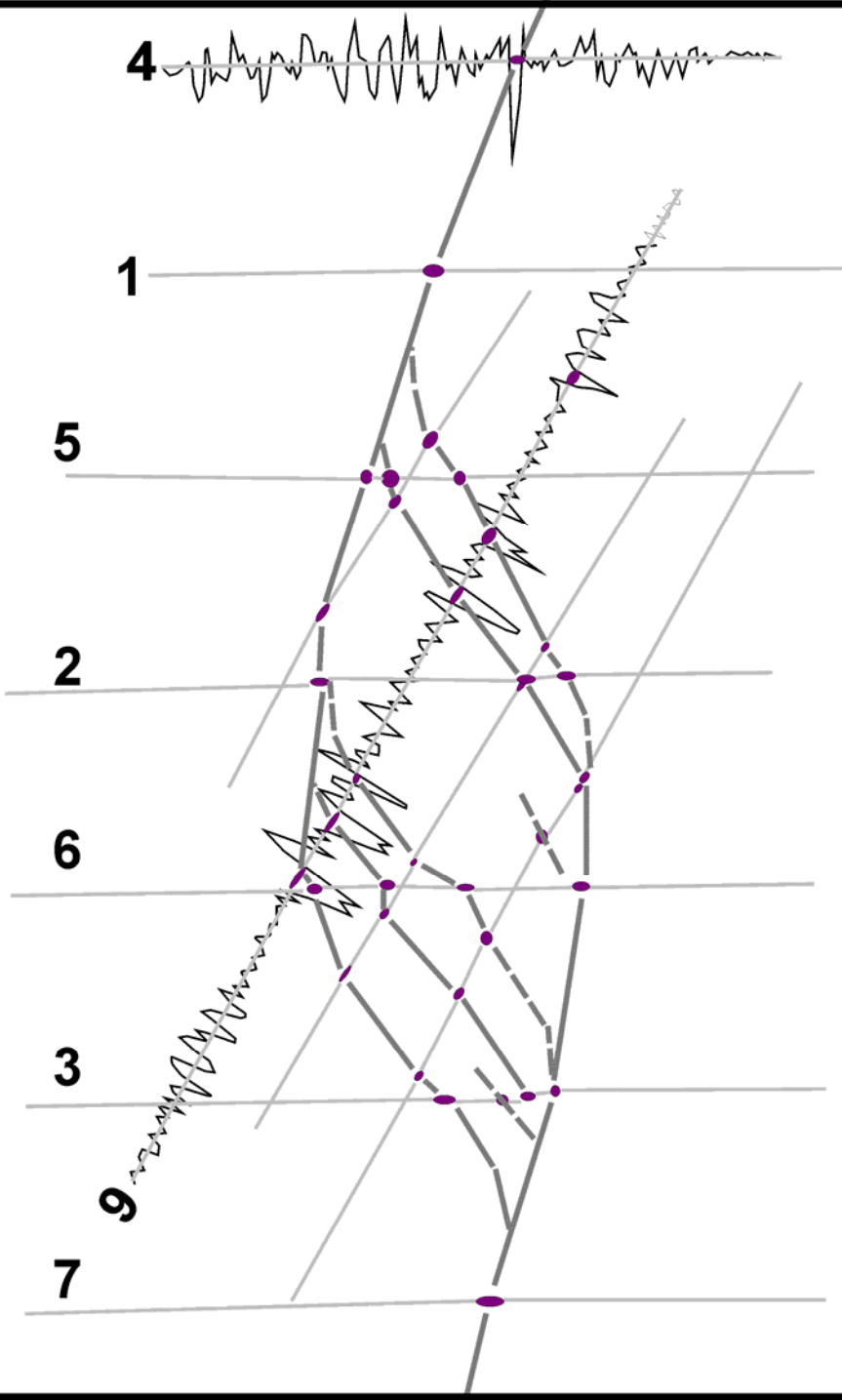
Two additional days  
produced profiles  
8, 9, 10, 11

**Fig. 5**

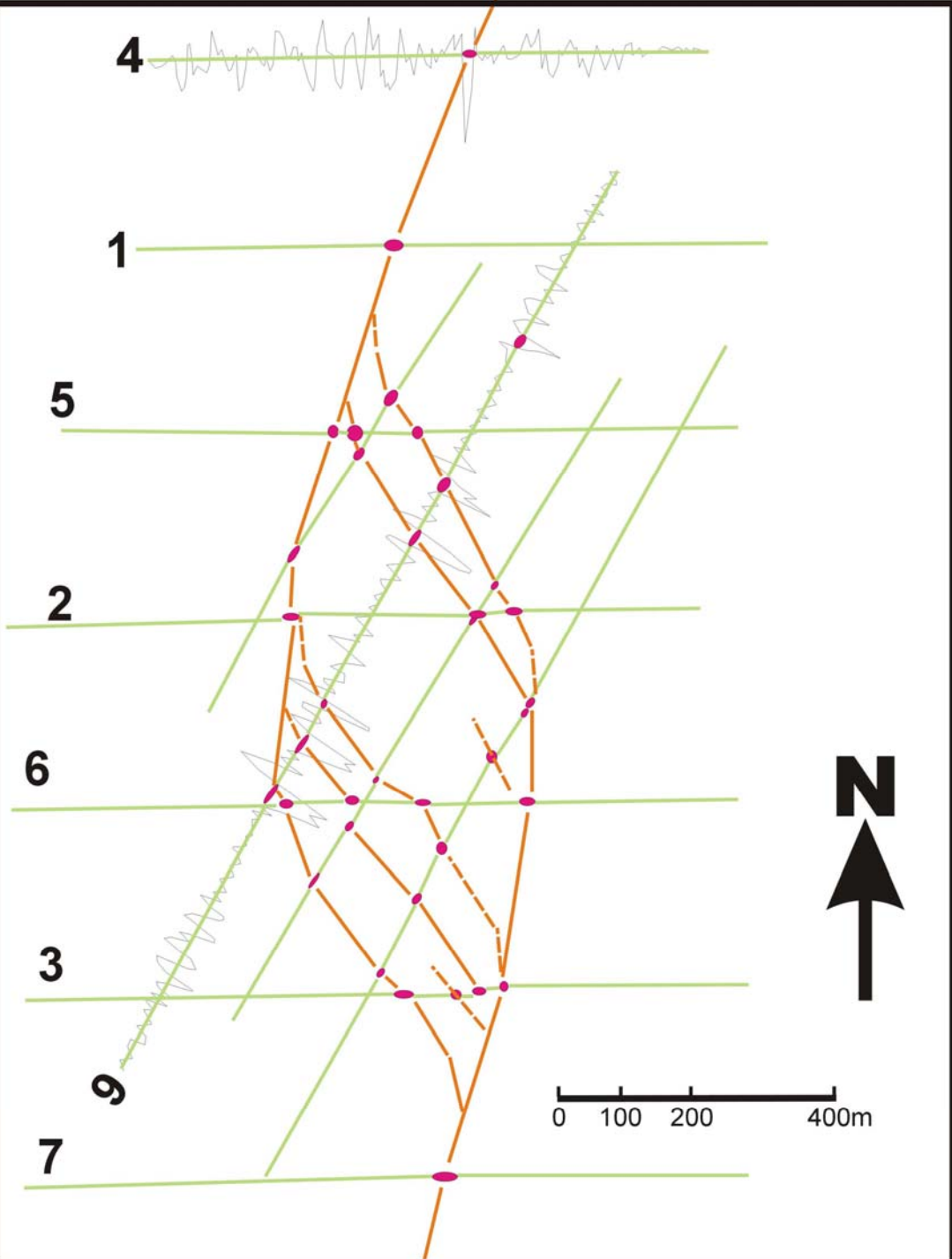


**SP PROFILES  
ON TOP OF  
GEOLOGY**

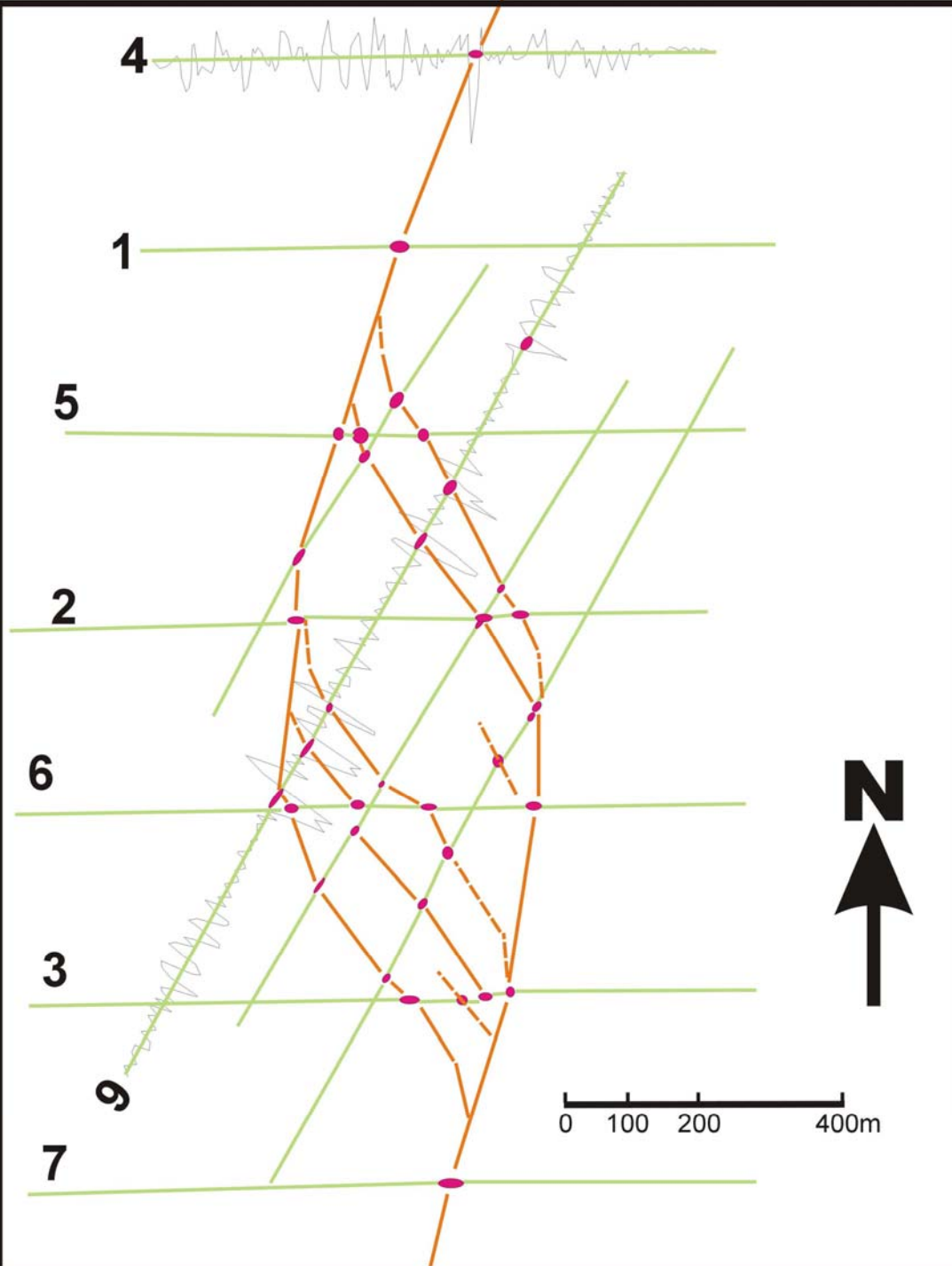
**Fig. 6**



**INTERPRETED  
S.P.  
ANOMALIES**



**INTERPRETED  
S.P.  
ANOMALIES**



## Color coding

to interpret  
anomalies  
and non-anoma-  
lous ground

red dots =  
detected anomalies

green lines =  
zones w/o  
anomalies

orange lines join  
known anomalies

# EXPLORATION PROCEDURE-5

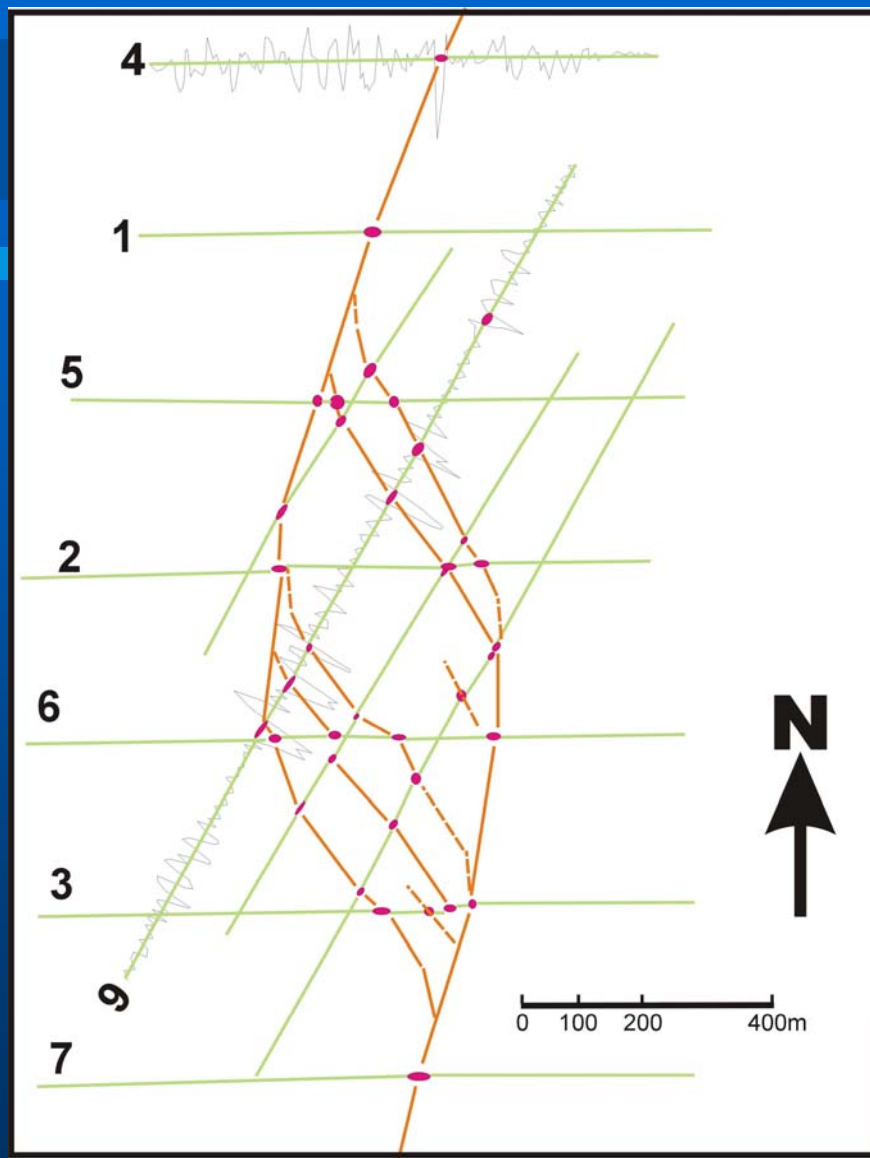
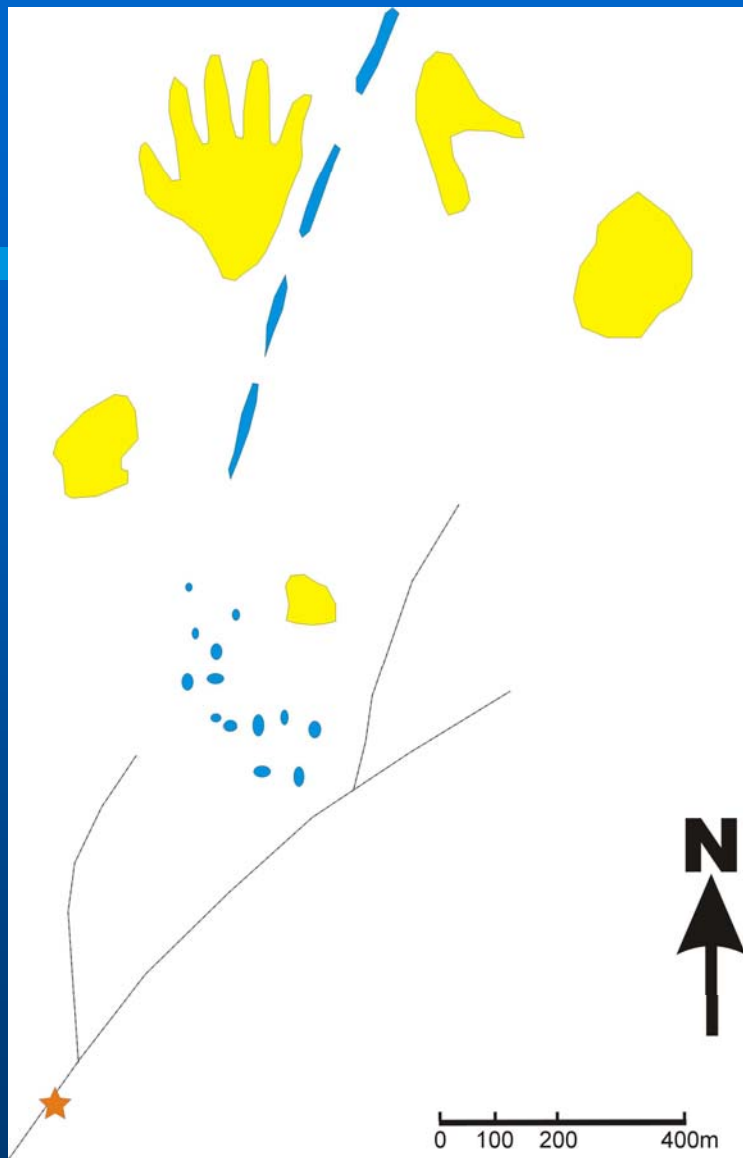
Information  
from the  
green lines = valuable

defined zones w/o anomalies  
delimited bodies w/o oxidizing sulfides

# EXPLORATION PROCEDURE-6

Profile orientation was important

better results obtained when profiles intersect potentially-mineralized structures at right angles



# CONCLUSIONS-1

The structure defined by trenching was very similar to that delineated with S.P. profiling.

5 mineralized veins, each 400 meters long were discovered.

NW-SE mineralized structures proved to be Au bearing (7gAu/ton average grade).

## CONCLUSIONS-2

Other structures did not carry economic quantities of gold.

Rich ore shoots occur at intersection of duplex corners (grades over 50 gAu/ton).

Project currently under evaluation.

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