

# *From Small scale miners to Discovery: the Nassau Project and the Discovery of the Merian Mine*



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**11th Inter Guiana Geological  
Conference: The Tectonics &  
Resource Potential of NE  
South America  
February 19, 2019**

# Thanks to Suralco and their team.



**Charlie Soh in Alcoa**



**Especially Anton Brandon  
and Herman Alendy in  
Suralco**

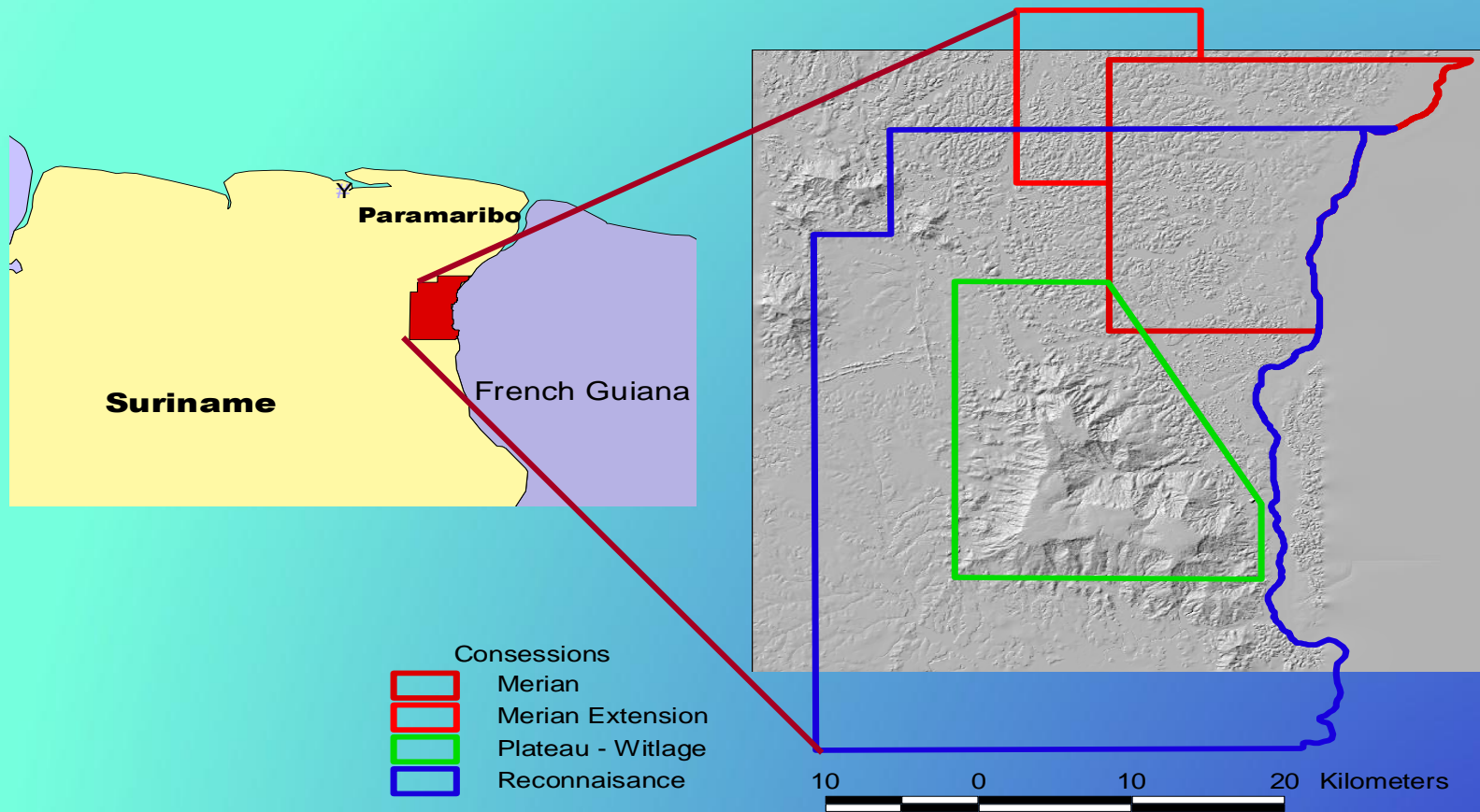
# Mandate from Suralco

- Find a Gold Mine to support funding for infrastructure to develop bauxite resource on Nassau Plateau
- Train and develop a Suriname team of geologists and technicians with minimal expat support
- Drill: converted 140,000 hectares from reconnaissance to exploration concessions in order to drill.
- Maintain good relations with local community
- **Merian (Nassau) Is a Greenfields Gold Discovery made as a *TEAM* of Suriname Geologists and support of Suralco**
- Program started 2000. Discovery holes September 2002

# Community Relations: Visit by Granman in September 2003



# How to Evaluate Large Area with Minimal Data?



# Data Sources

- NO KNOWN PRIOR EXPLORATION OR REGIONAL SURVEYS
- Greenstone belt within country geologic map
- Porkknocker mining of alluvial gravels and access
- Landsat Satellite and Radar images (no Google Earth!)
- Topographic maps on local grids with significant errors and issues converting to WGS 84 Zone 21N
- GPS in jungle difficult (2000-2003)

# MERIAN CREEK SMALL SCALE MINING 2000

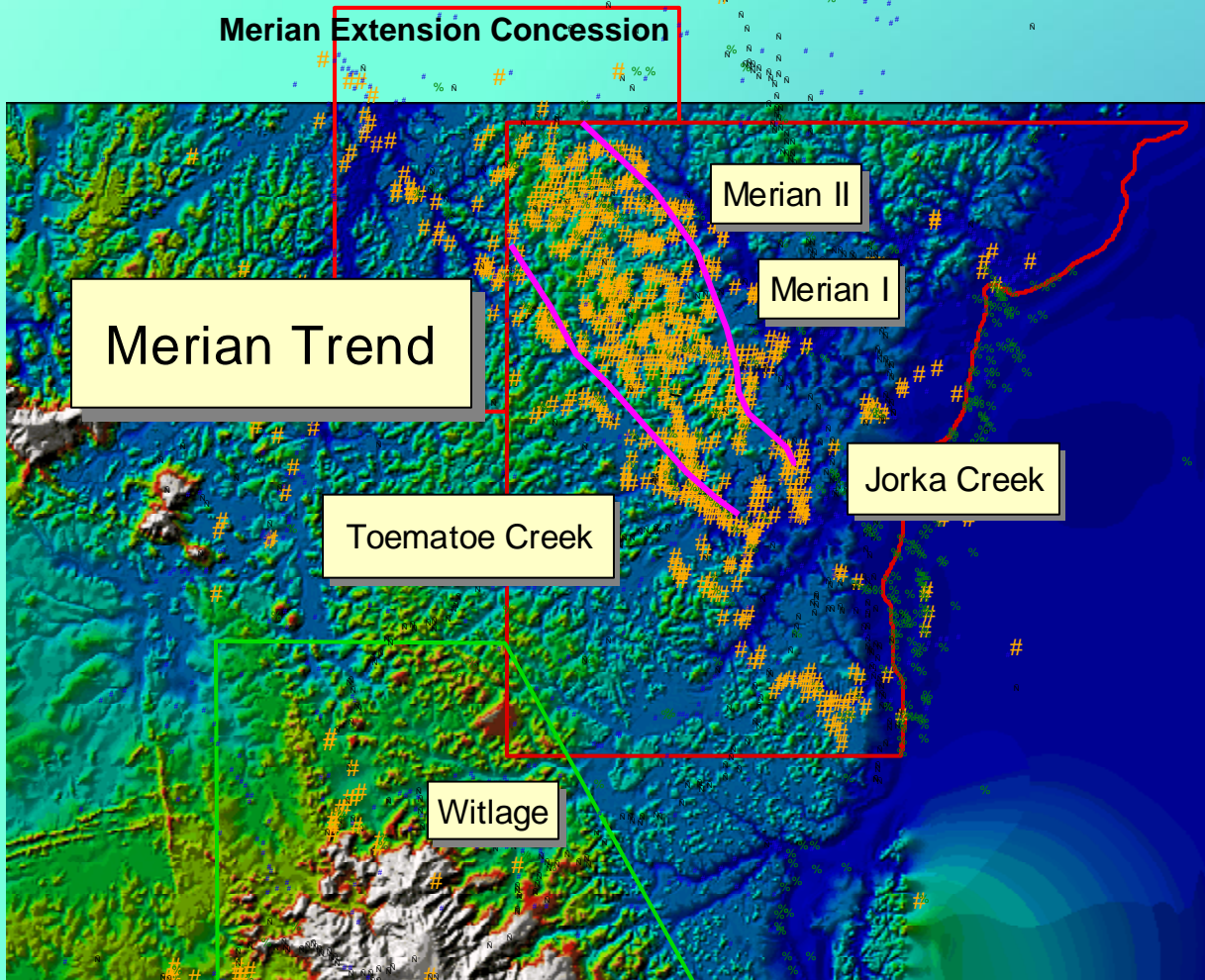


# Porkknockers





# SMALL SCALE MINING ACTIVITY NASSAU 2000



Merian Extension Concession

Merian Trend

Merian II

Merian I

Toematoe Creek

Jorka Creek

Witlage

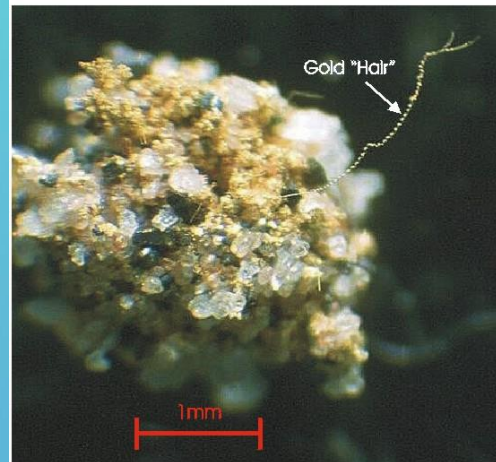
-  Merian trend.shp
- Tralainemag.txt
-  Roads
-  Streams and rivers
-  Placered drainages
-  fields and clearings
-  I
- Concessions\_30mar03.shp
-  Merian
-  Merian Extension (applied)
-  Plateau - Witlage
-  Reconnaissance



# Gold locally produced by bacterial action in streams



Closeup view of delicate gold crystals. From sample below near base of gold "hair".



Mass of delicate gold crystals intergrown with both angular and rounded sand grains. Note extremely delicate gold "hair" extending from mass.



Same sample as above and left.

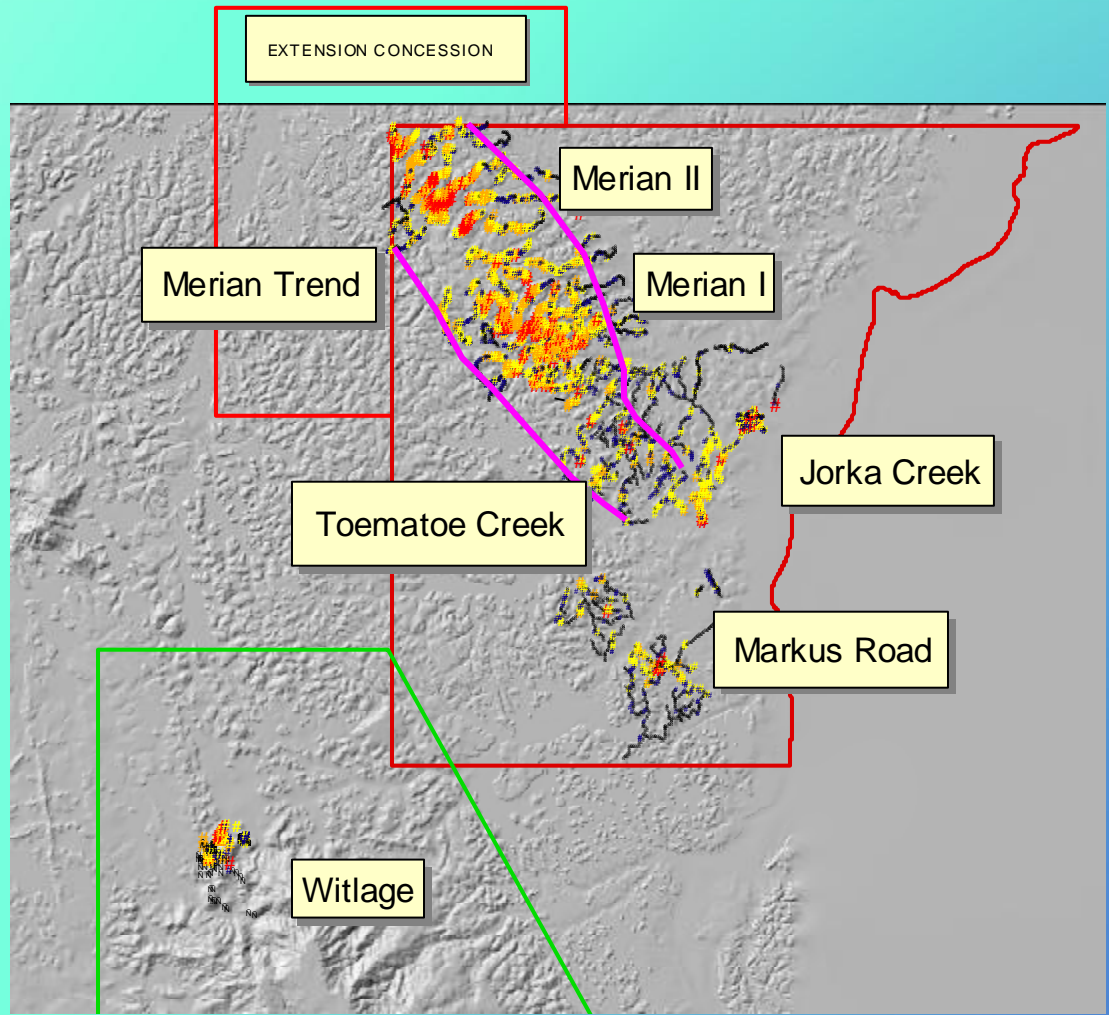
# Exploration Tools

- Remote sensing and airborne geophysics
- Porkknocker pits and access they provided
- Panning and heavy mineral analysis
- Ridgecrest auger sampling (2 meters): gold and multielement
- Mapping and sampling of lines and porkknocker pits
- Trenching
- Deep Auger grids on Merian Gold trend
- Hollow stem auger core drilling.
- Diamond core drilling
- Team of US based geologists for interpretation of Merian in February to July, 2003
- First resource estimate July 2003

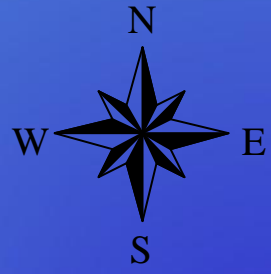
# Auger Sampling along Ridgecrests



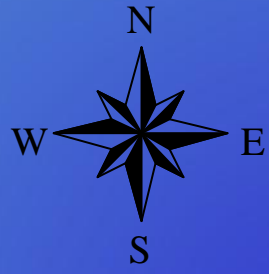
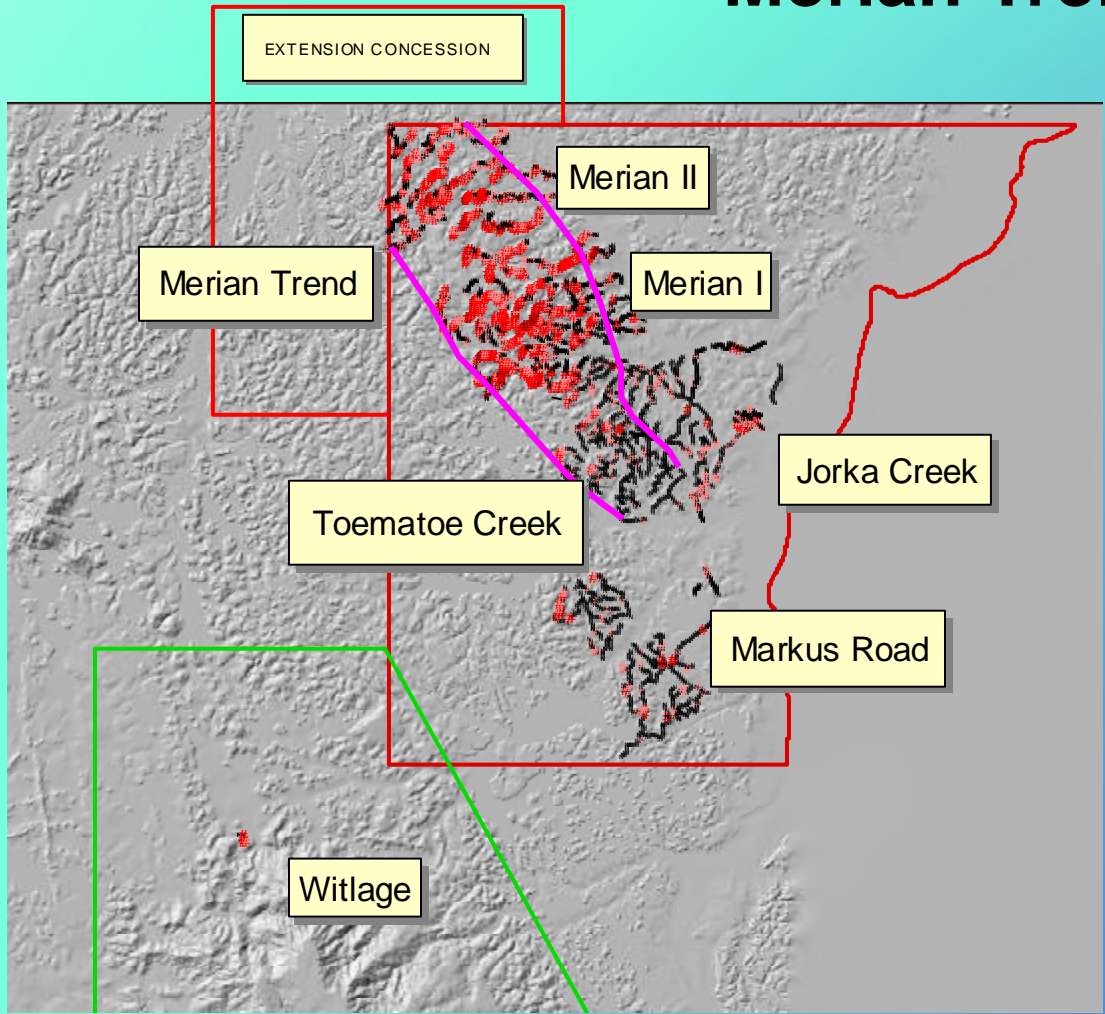
# Ridgecrest Soil Samples to Locate Targets



- Merian trend.shp
- Allsoilfeb2003.txt
  - 0 - 10 ppb gold
  - 10 - 20 ppb gold
  - 20 - 100 ppb gold
  - 100 - 500 ppb gold
  - 500 - 30890 ppb gold
- Allwitlfeb2003.txt
  - 0 - 10 ppb gold
  - 10 - 20 ppb gold
  - 20 - 100 ppb gold
  - 100 - 500 ppb gold
  - 500 - 30890 ppb gold
- Concessions\_30mar03.shp
  - Merian
  - Merian Extension (applied)
  - Plateau - Witlage
  - Reconnaissance

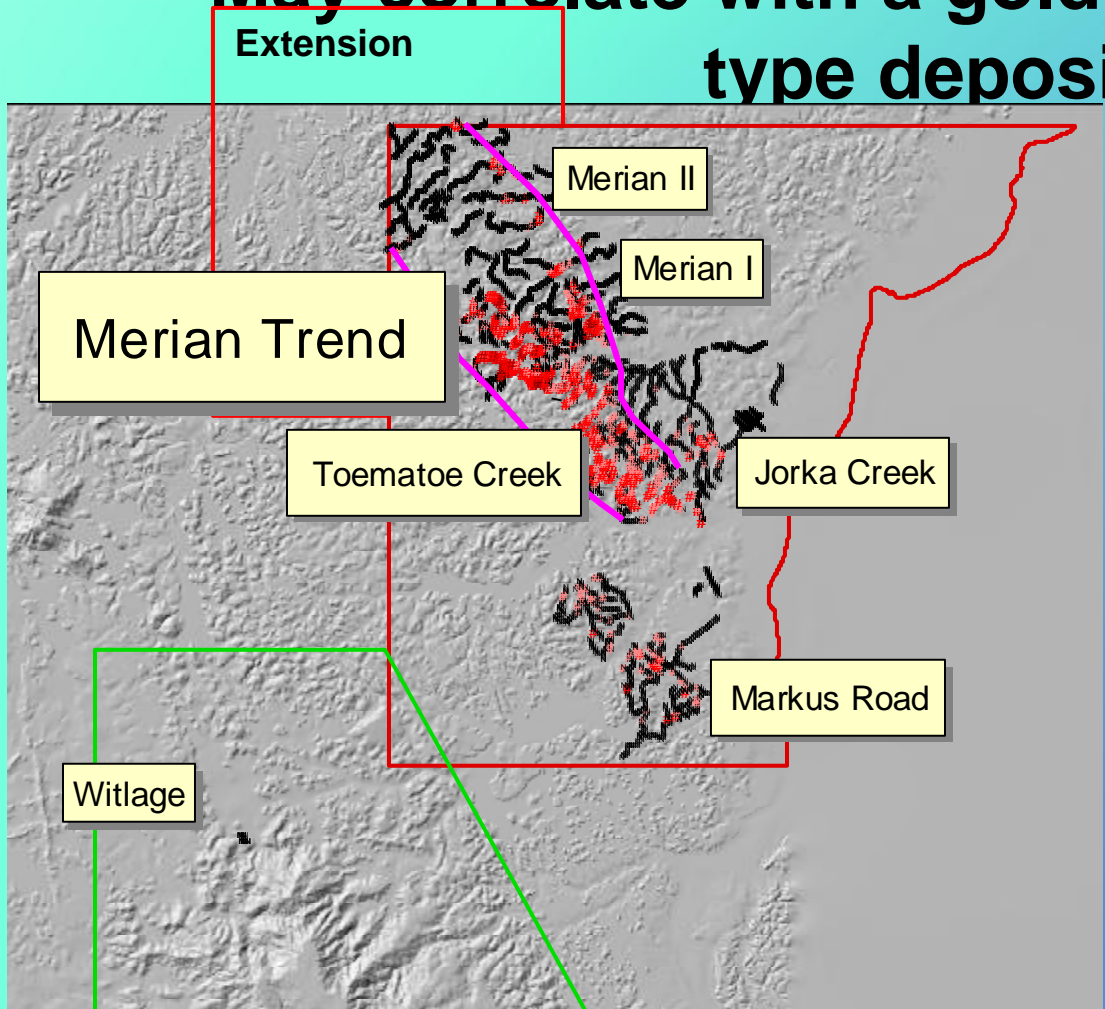


# High mercury values correlate with gold on Merian Trend

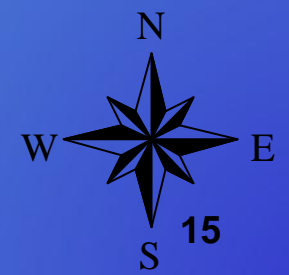


# Arsenic anomalies Merian Trend

## May correlate with a gold-arsenic-quartz type deposit

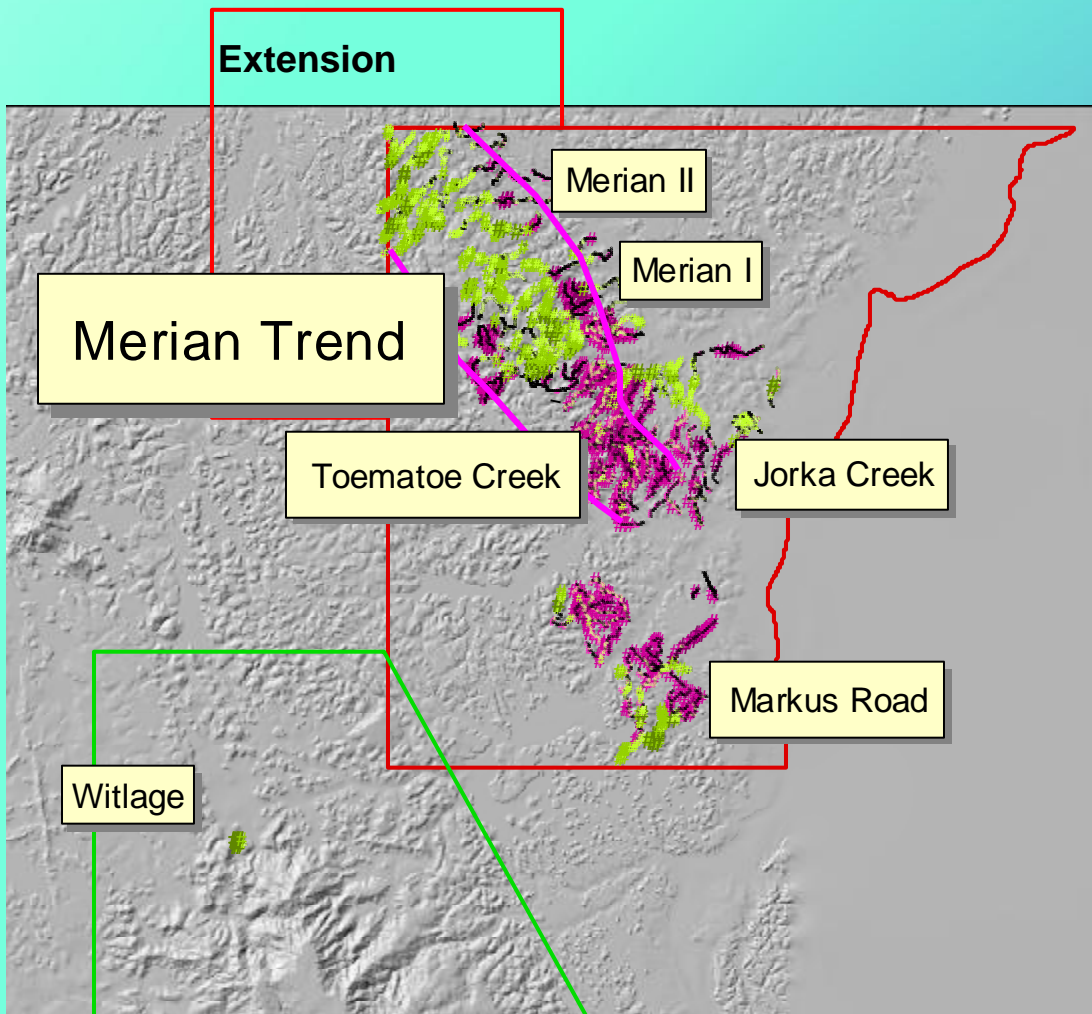


-  Merian trend.shp
- Allsoilfeb2003.txt
  - N 0 - 100 ppm As
  - 100 - 200
  - # 200 - 500
  - # 500 - 1000
  - # 1000 - 2115
- Consessions\_30mar03.shp
  -  Merian
  -  Merian Extension (applied)
  -  Plateau - Witlage
  -  Reconnaissance

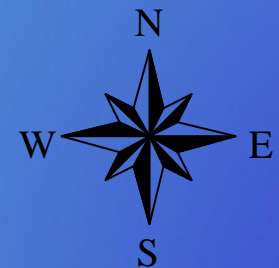


10 0 10 20 Kilometers

# Gold associated with higher sodium values

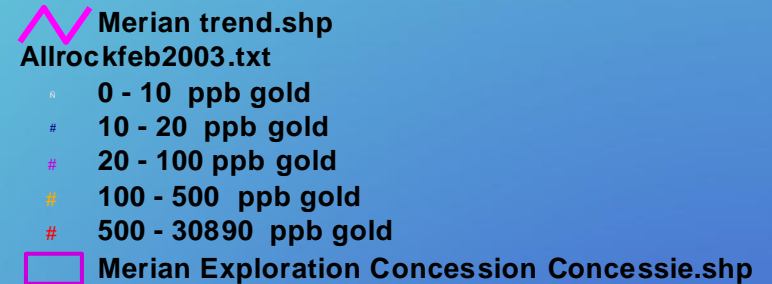
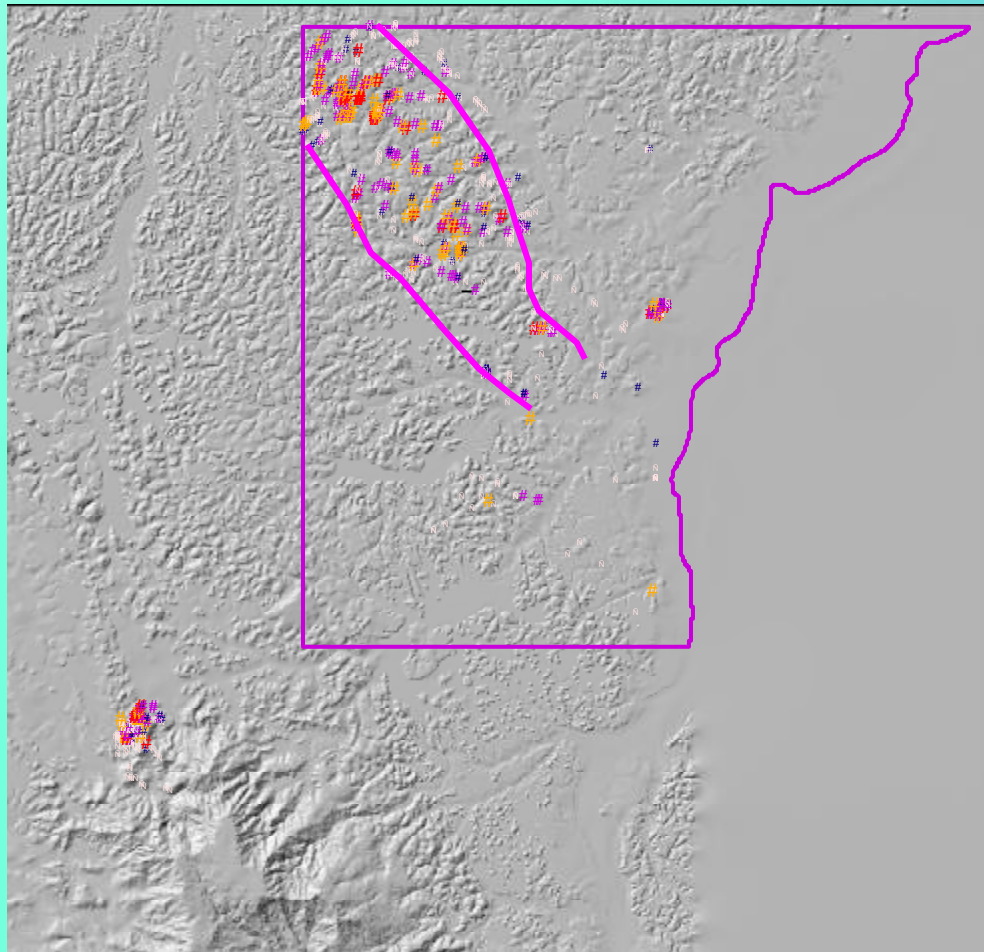


- Merian trend.shp
- Allsoilfeb2003.txt
  - 0 - 0.18 % Na
  - 0.18 - 0.39
  - 0.39 - 0.69
  - # 0.69 - 1.15
  - # 1.15 - 2.76
- Allsoilfeb2003.txt
  - 0 - 0.09 % Mg
  - 0.09 - 0.16
  - 0.16 - 0.25
  - # 0.25 - 0.36
  - # 0.36 - 1
- Consessions\_30mar03.shp
  - Merian
  - Merian Extension (applied)
  - Plateau - Witlage
  - Reconnaissance

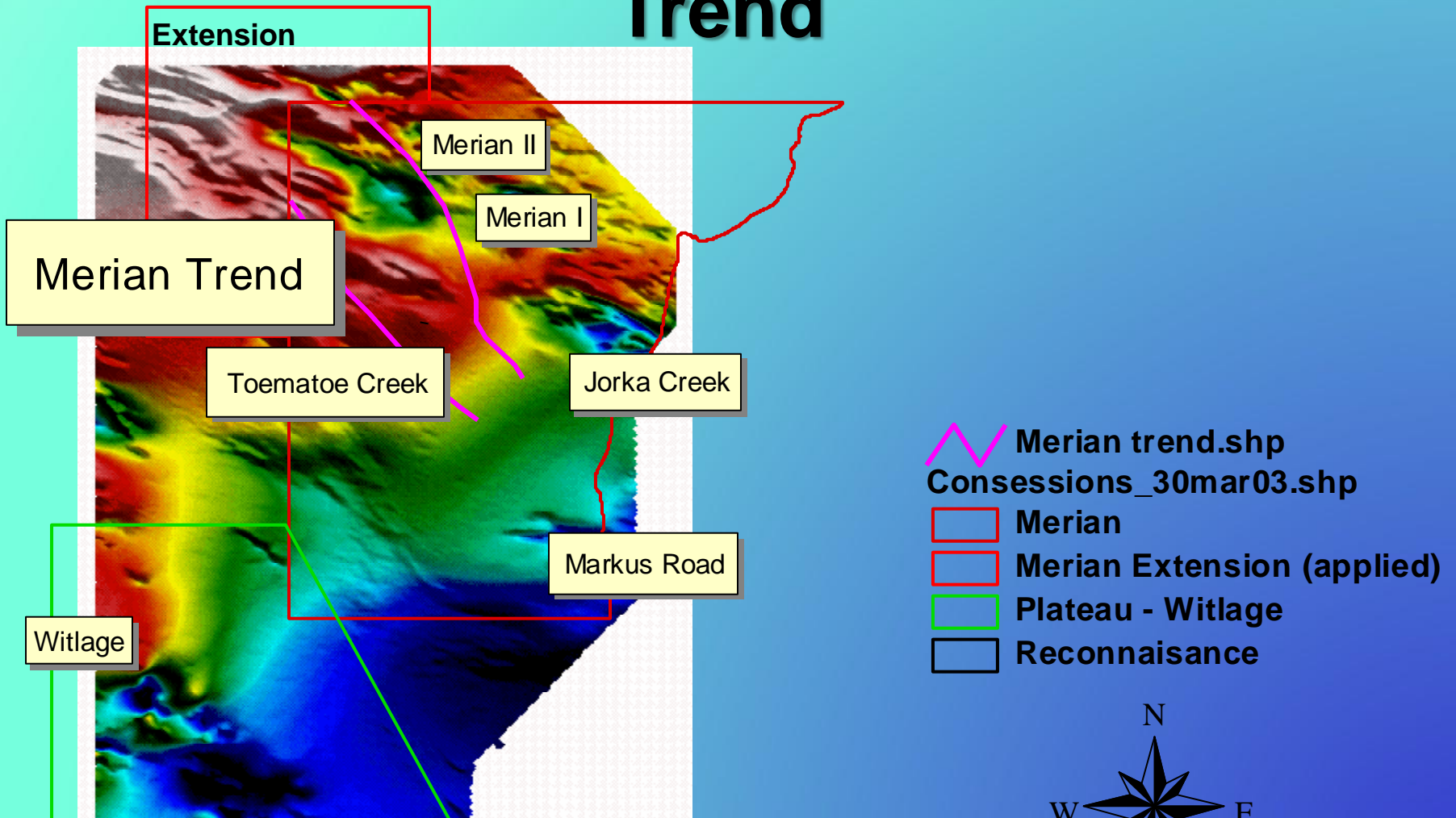




# ROCK SAMPLES NASSAU PROJECT



# Magnetic Total Field and Merian Trend



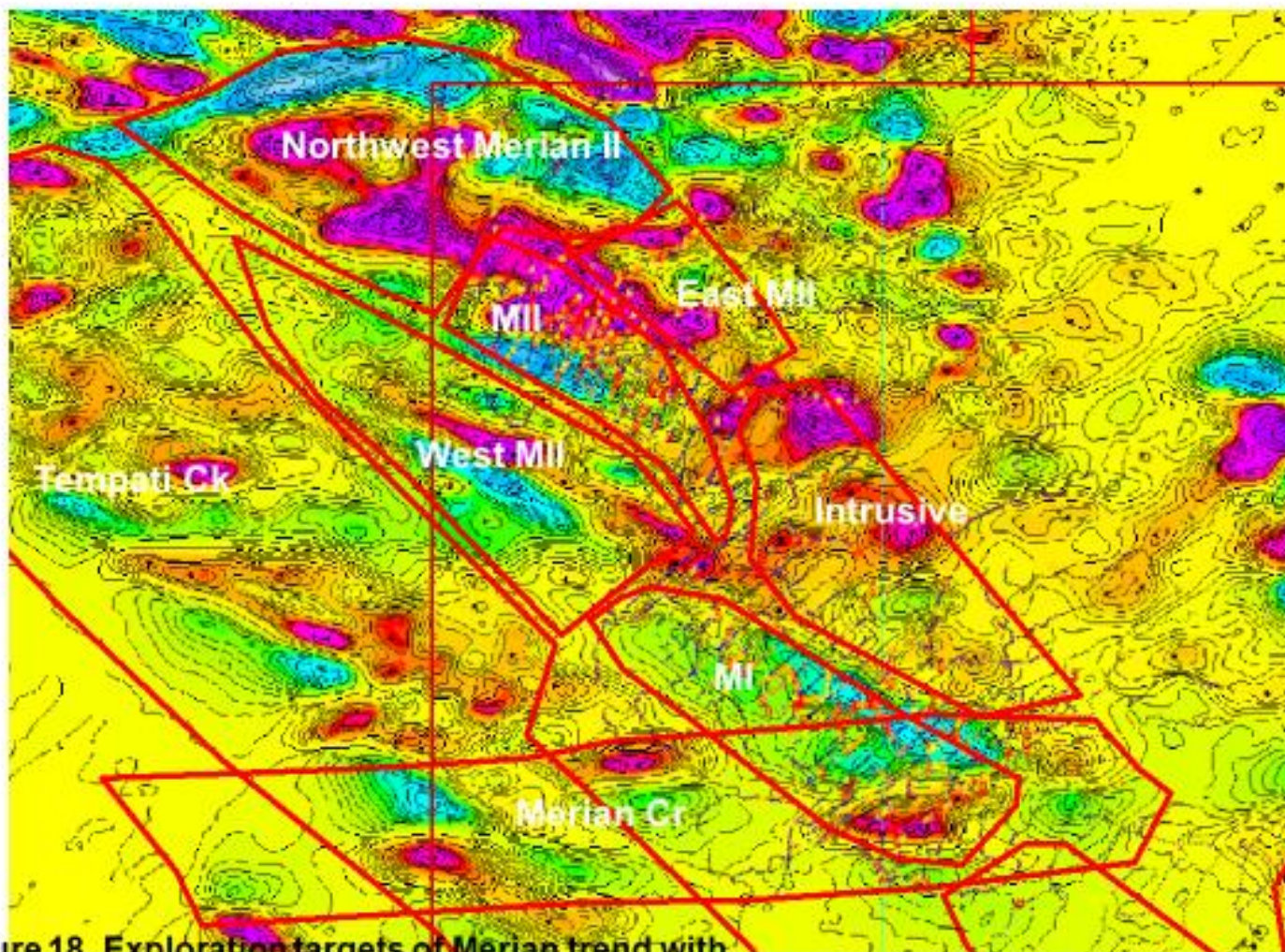


Figure 18. Exploration targets of Merian trend with magnetic, soil and deep auger data.

# Mining at Gowtu Bergi June 6, 2002 visit









# Sampling at Gowtu Bergi July 2002



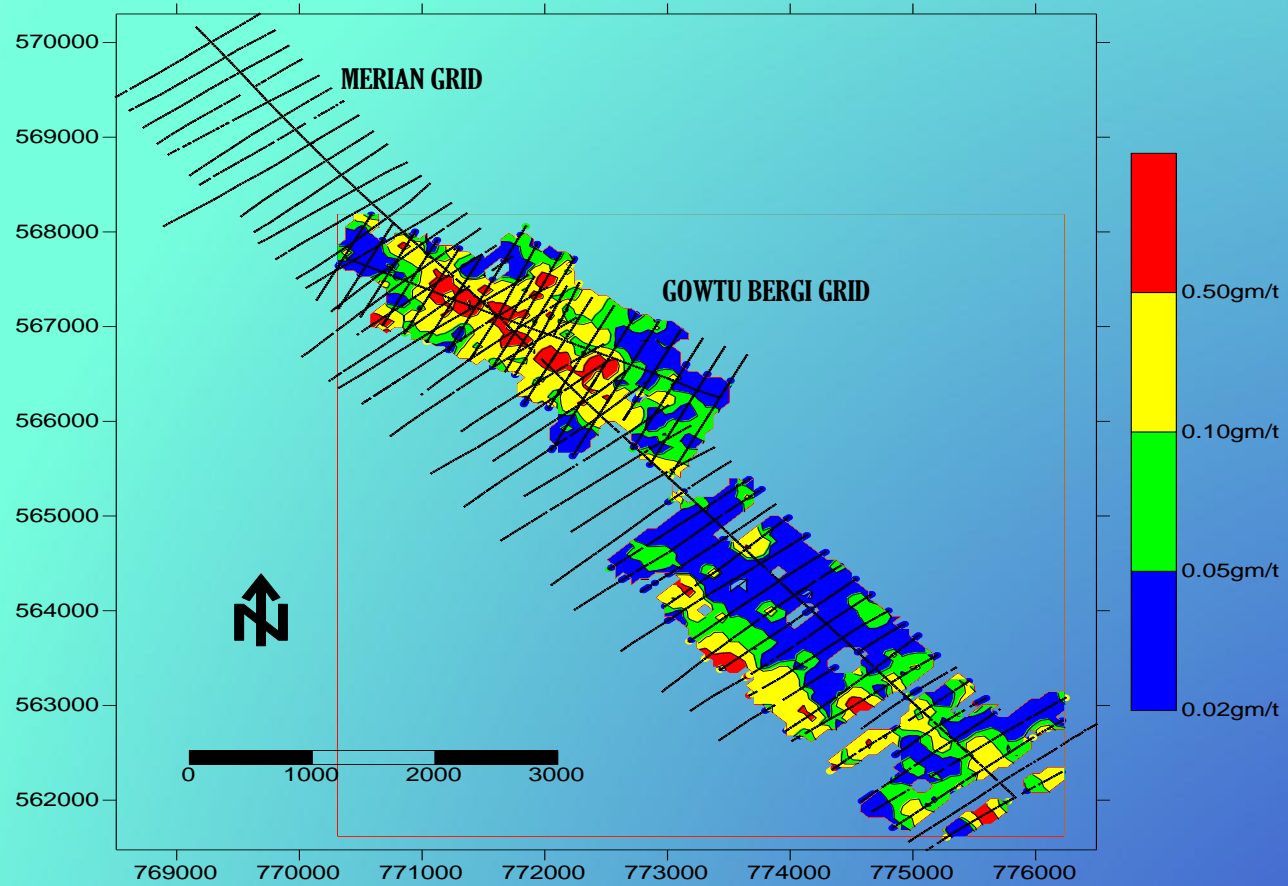


## Police Assistance – Merian Village



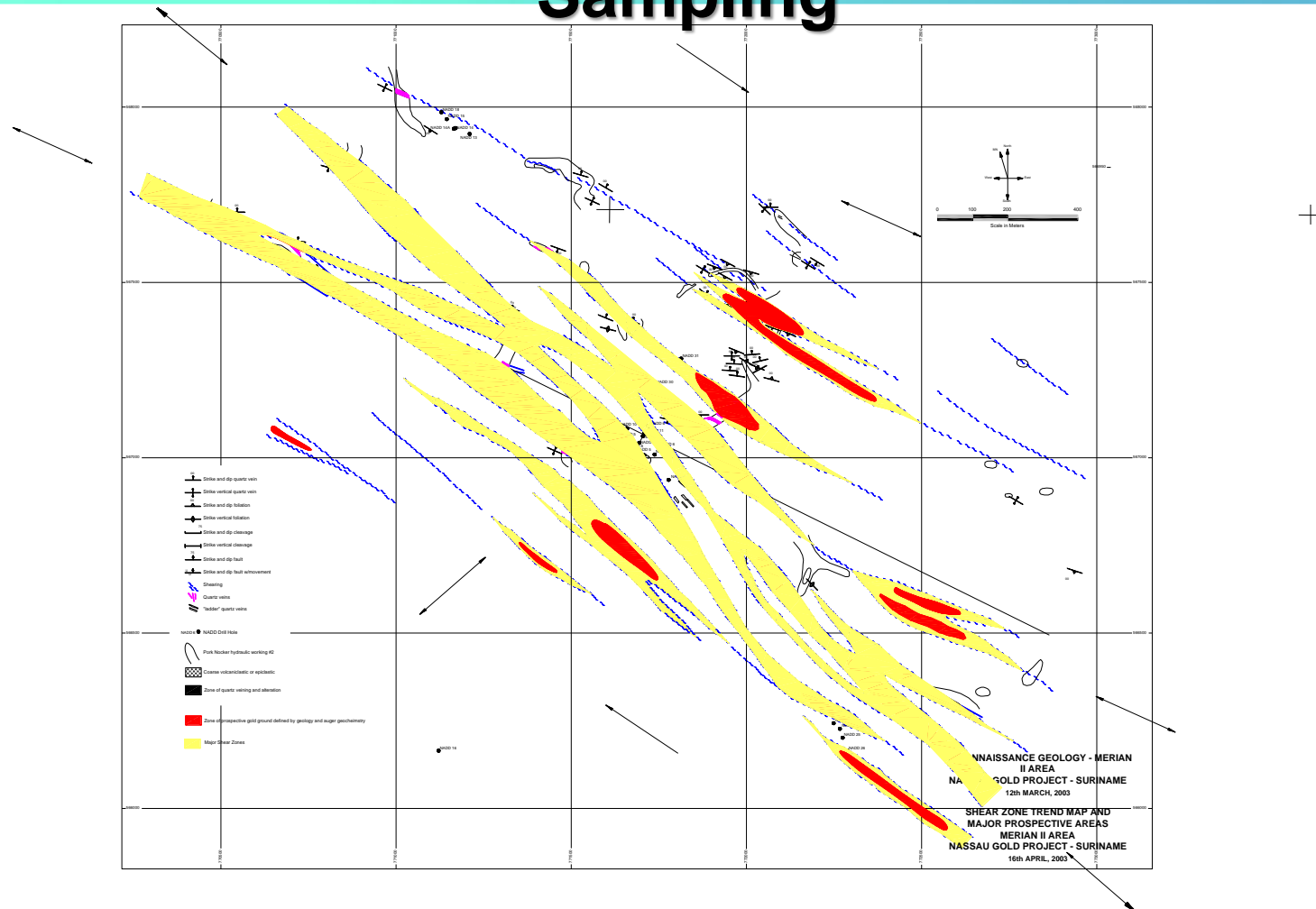
# Porkknocker Trail To Gowtu Bergi





**GOLD VALUES DEEP AUGER MERIAN TREND**

# Gold Targets and Structural Zones Merian II based on Mapping and Deep Auger Sampling



# Saprolite Core Drilling and Logging with Diedrich Drill



# First Core hole August 31, 2002



# Diamond Core Drilling by Forage Orbit: 12 holes all ore holes



# Descriptive Logging

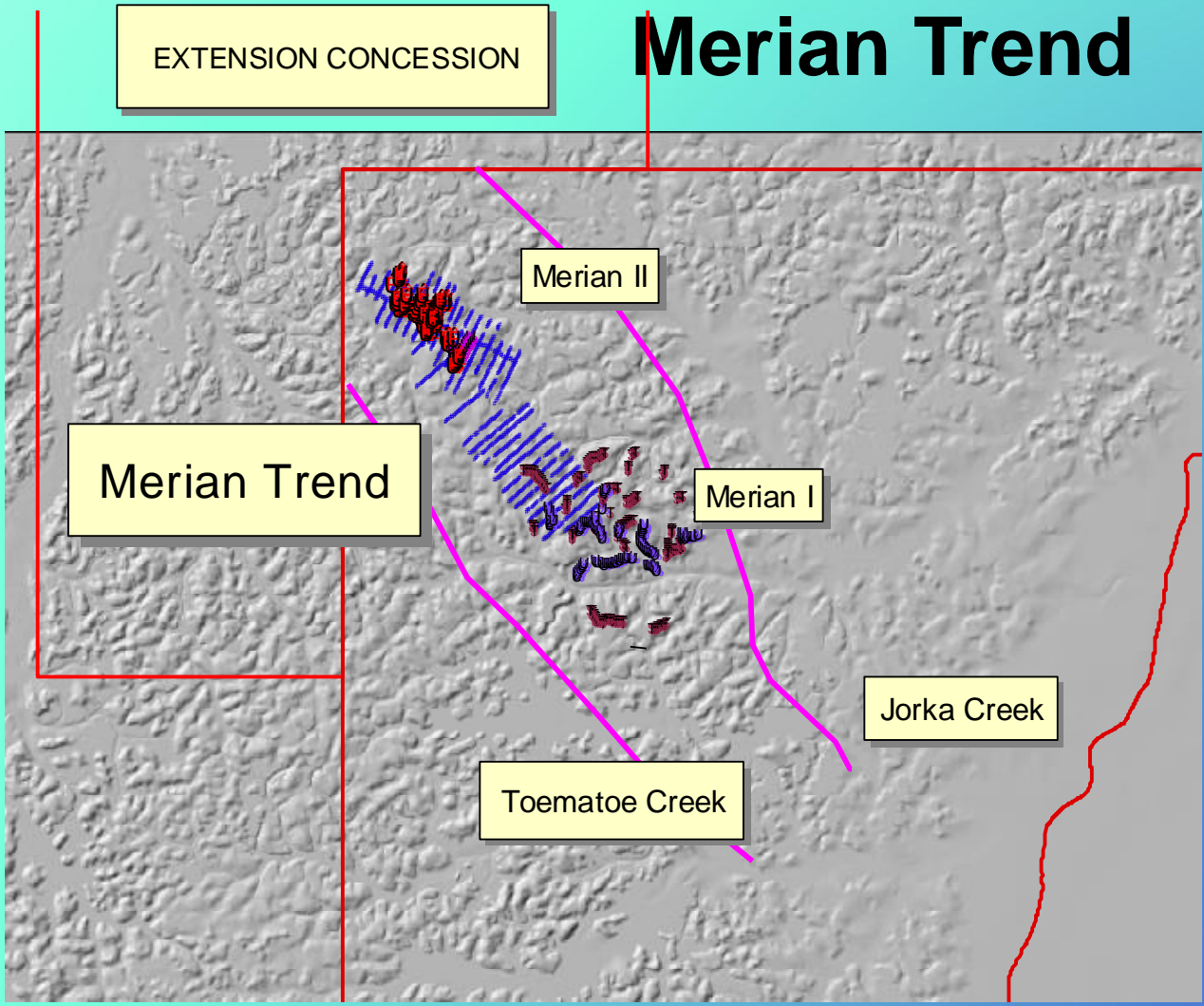




# Mineralized Ore Zones Hole NADD- 011: Oxidized Saprolite and Saprock (unoxidized)

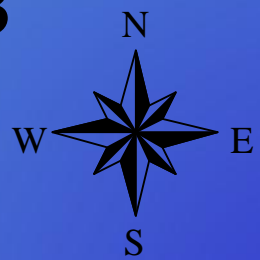


# All Drill Hole and Deep Auger Sites Merian Trend



- Merian trend.shp
- Diamond Core Holes All\_headernadd\_sept29.txt
- Saprolite core holes Merian II All\_headernasa\_sept29
- Merian I saprolite core holes Merian1\_au\_nasalevel1
- Deep Auger Merian 1 Merian1\_deepaugerlevel1.txt
- Concessions\_30mar03.shp
- Merian
- Merian Extension (applied)
- Plateau - Witlage
- Reconnaissance
- Deep Auger Samples Da\_description.shp

2003



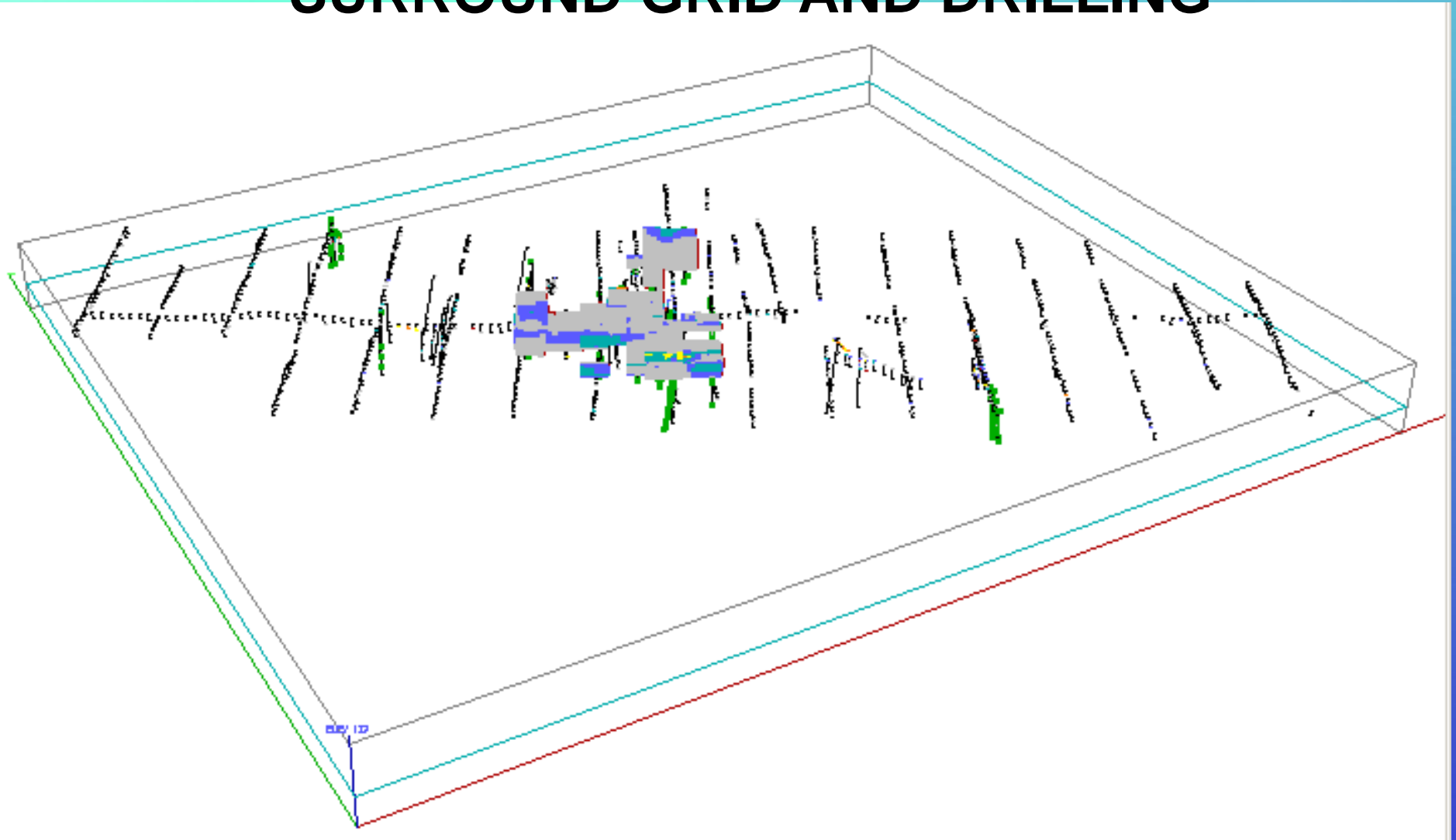
# Resource Modeling

- From February to July, 2003 there was an intense period of evaluation on the understanding of mineralization while drilling and modelling was on-going. Geologists Dr. Criss Capps, Robert J. Moye, Dave Christensen, Mary Stollenwerk, and Tom Watson from the United States were retained to assist the Suriname geologic team of Aroena Ramlal, Manuella Fung, Deepak Narsing, Ryan Kambel, and Linus Diko.

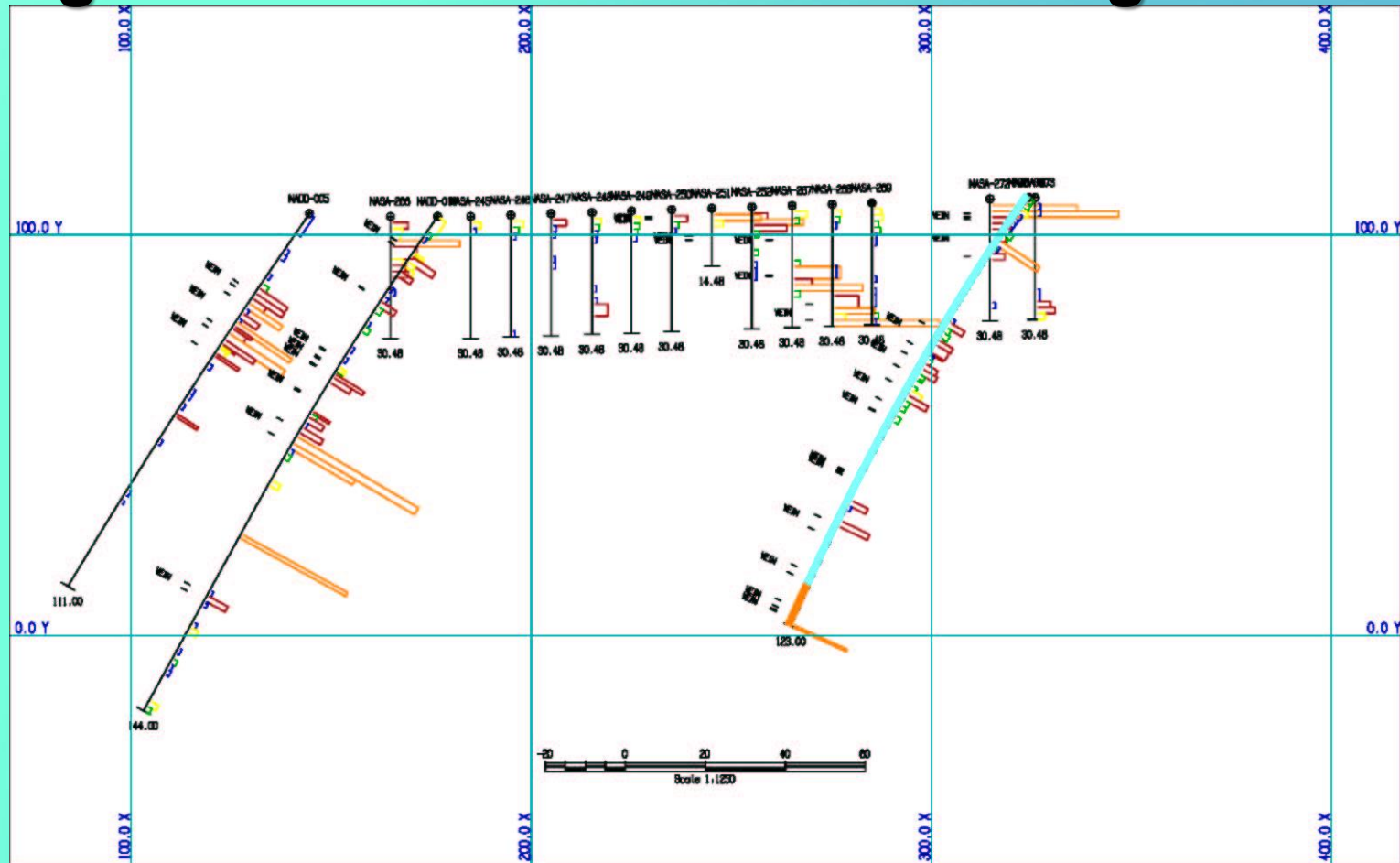
# Interpretation and Modeling



# 3D PERSPECTIVE VIEW OF BLOCK MODEL AND SURROUND GRID AND DRILLING



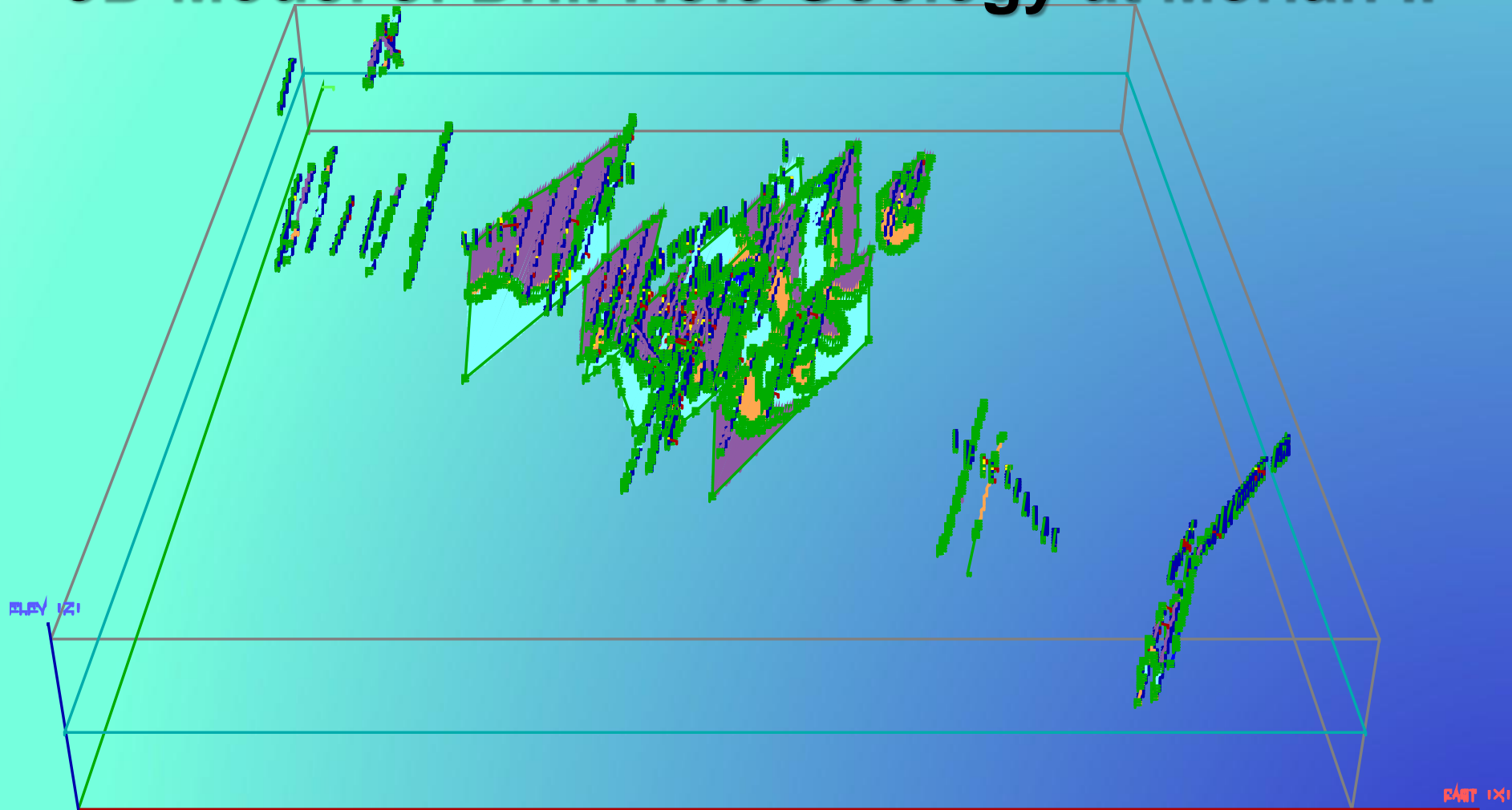
# Construct Cross Sections using computer programs to evaluate resource and gold trends



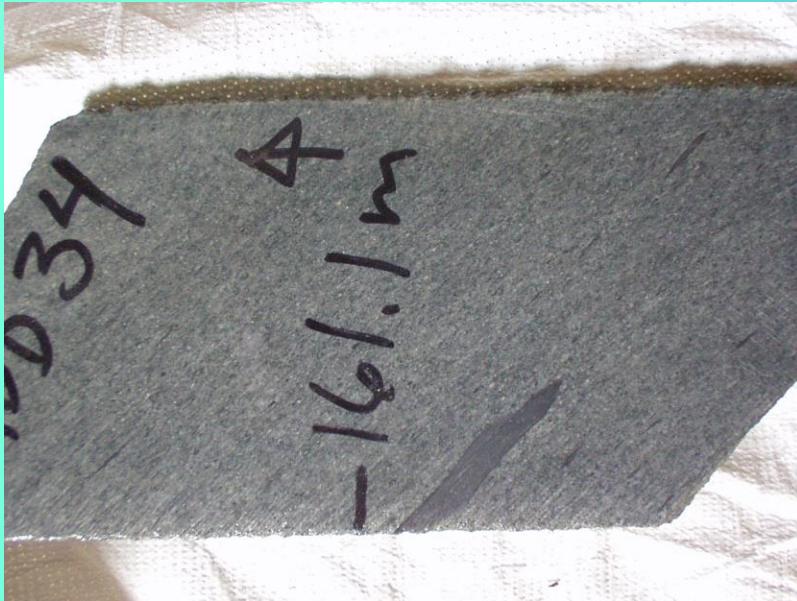
Planview = Dynamic

UNITS : METRES DATE: 03/10/24 TIME: 07:28:44

# 3D Model of Drill Hole Geology at Merian II



# Host: Fine- to Coarse-Grained Siliciclastic Sediments



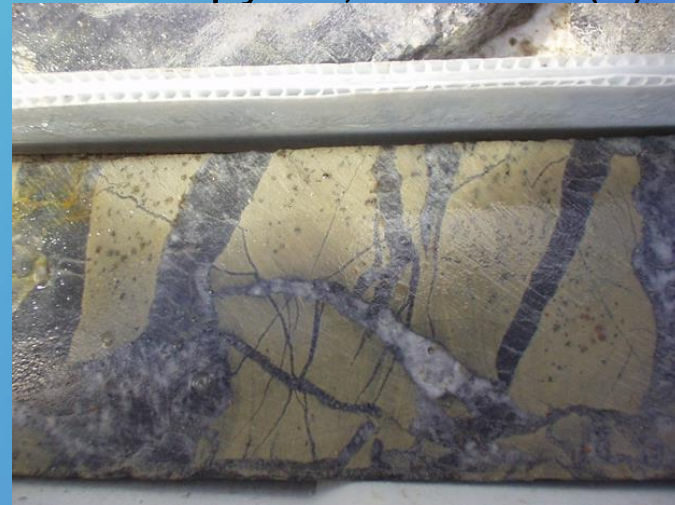
- Poorly-sorted litharenite and intercalated discontinuous quartz arenite (arkosic?) Are about 20 percent of the stratigraphic section.
- Most litharenite clasts are subangular to subrounded quartz and heterolithic rock fragments.
- This unit is a good marker horizon.



# Three Vein Sets: Vein Set 2 Most Extensive



- Most extensive vein set
- Marked interval runs 8 grams/tonne
- Vein minerals are: quartz, carbonate (ankerite? & calcite), white mica, alkali feldspar, pyrrhotite?, pyrite, gold, and chalcoppyrite, & carbon(?).



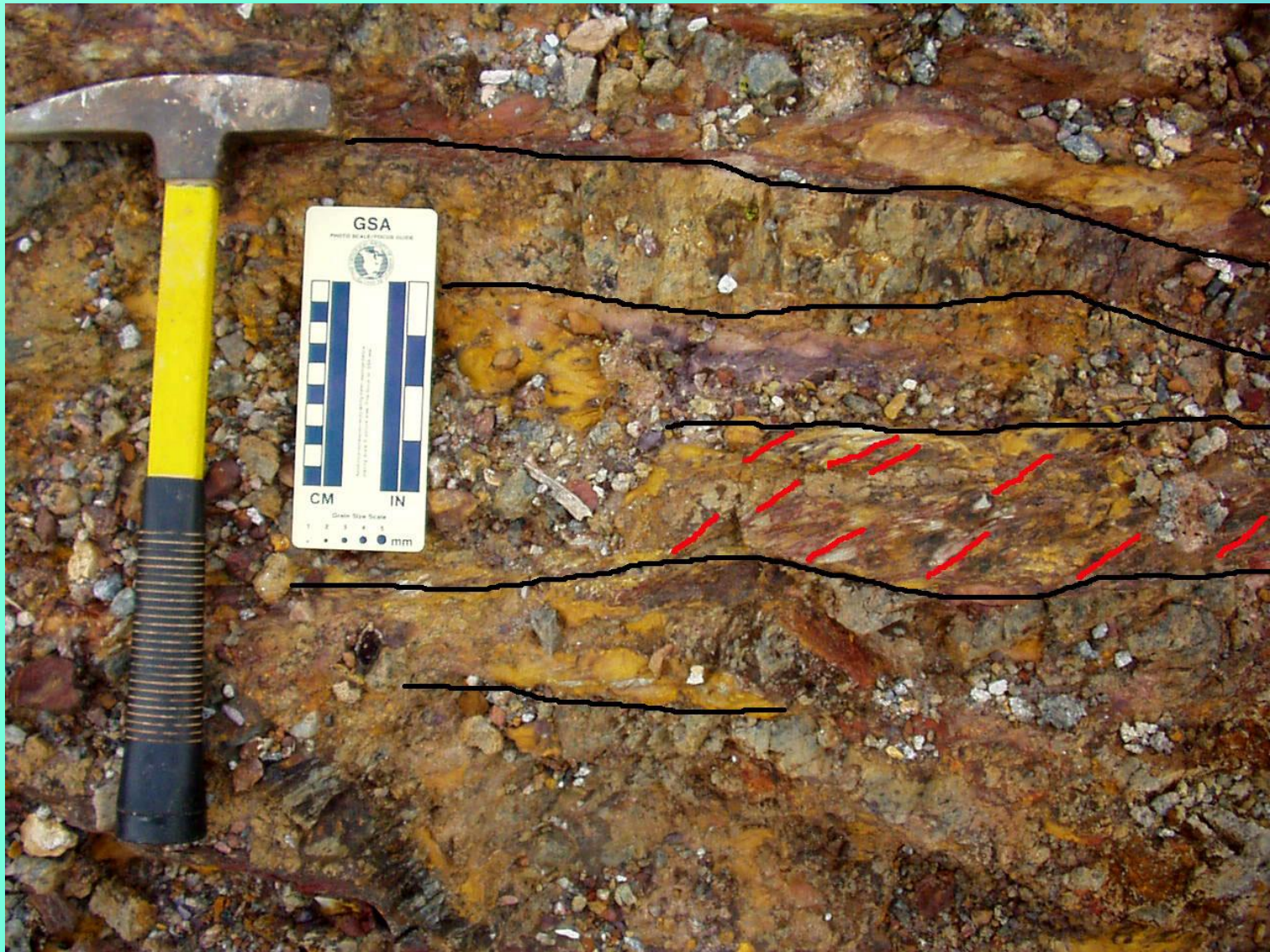
# Shortening Increases Vein Material



- fold limbs are sheared and highly attenuated, forming an imbricate system of shear zones dipping  $35^{\circ}$  to  $60^{\circ}$  northeast.
- anticlinal structures are highly attenuated - this results in *extreme* shortening.
- Preferentially removes micas and chlorite (argillites, thin-bedded lithologies, and vein wall alteration) and concentrates all earlier quartz vein material into the shear zones.



**Zone of intense subvertical quartz veining and alteration flanked by swarms of tension gash ladder veins, Gowtu Bergi Pit, Merian 2 Area, Nassau Au Project**



**Well developed c-s fabric indicating dextral shear, center of Gowtu Bergi pit, Merian 2 Area, Nassau Au Project**

# Suralco Team 2003 Structural Exploration Model

- Oblique compression (transpressional) structures forming at same time as mineralization and host the gold and veins
- Shear and tension vein sets
- Gowtu Bergi occurs at a structural inflection in the trend