



# **Surveying for Subterranean Security Breaches**

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## Gaza 'terror tunnel' uncovered inside Israel, says army



*A spokesman told the BBC the tunnel was some 15-18m (50-60ft) deep and would have taken at least one month to dig.*

*13<sup>th</sup> October 2013*

Example of Types of Feature Terravison Radar can identify

# TERRAVISION

INTELLIGENT EXPLORATION

# THE TIMES

**November 1 2013**

A tunnel complex used to smuggle drugs between the US and Mexico came with its own railway, electricity and ventilation, drug enforcement officers said.

Authorities seized more than eight tons of marijuana and 325 pounds of cocaine in connection with the discovery. Three suspects were in U.S. custody.

The tunnel links warehouses in Tijuana and San Diego's Otay Mesa industrial area. The area is filled with nondescript warehouses, making it easier to conceal trucks being loaded with drugs. More than 75 underground passages have been discovered along the border since 2008, designed largely to smuggle marijuana.



The tunnels are concentrated along the border in California and Arizona. San Diego is popular because its clay-like soil is easy to dig. In Nogales, Ariz., smugglers tap into vast underground drainage canals.

**Example of Types of Feature Terravison Radar can identify**



## **What is Terravision Radar ?**

- **TERRAVISION is built on similar principles to ground-penetrating radar but is substantially more powerful, by combining up to 20MW mono-pulse, multi-frequency approach**
- **TERRAVISION is a Geo-technical device, delivering profiles outlining Geological features such as structures, ore bodies, mineralised zones.**
- **DATA COLLECTION is fast – up to 20km of profiles a day**
- **Deliver “Real Time” reporting via our operators display unit.**
- **TERRAVISION can analyse and interpret data within hours of collection.**
- **TERRAVISION is light-weight and versatile; we can deploy in 4x4 vehicles & light aircraft**

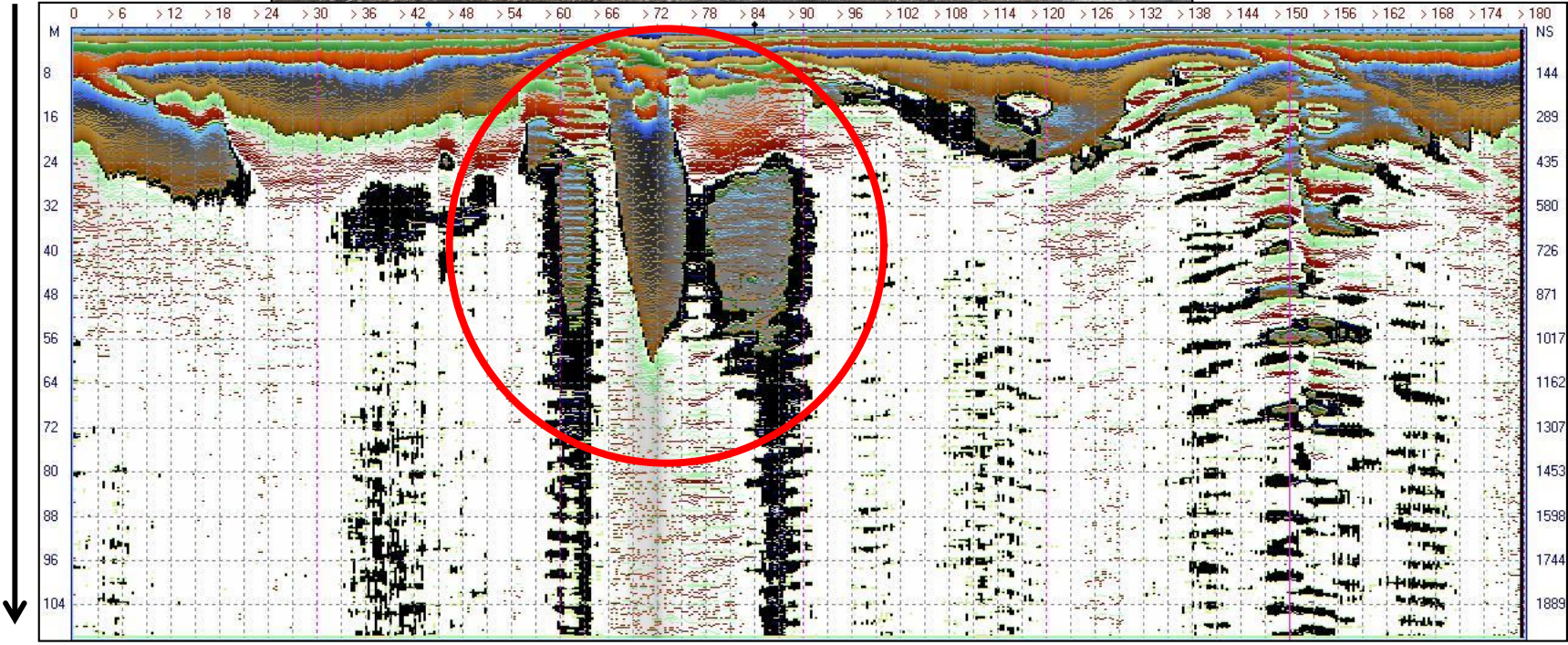
**Case Study 1**



*Survey to detect voids on old industrial development site. 3m antenna array, 10MW Transmitter Moscow (2011)*

**Void - ○**

**104m depth**



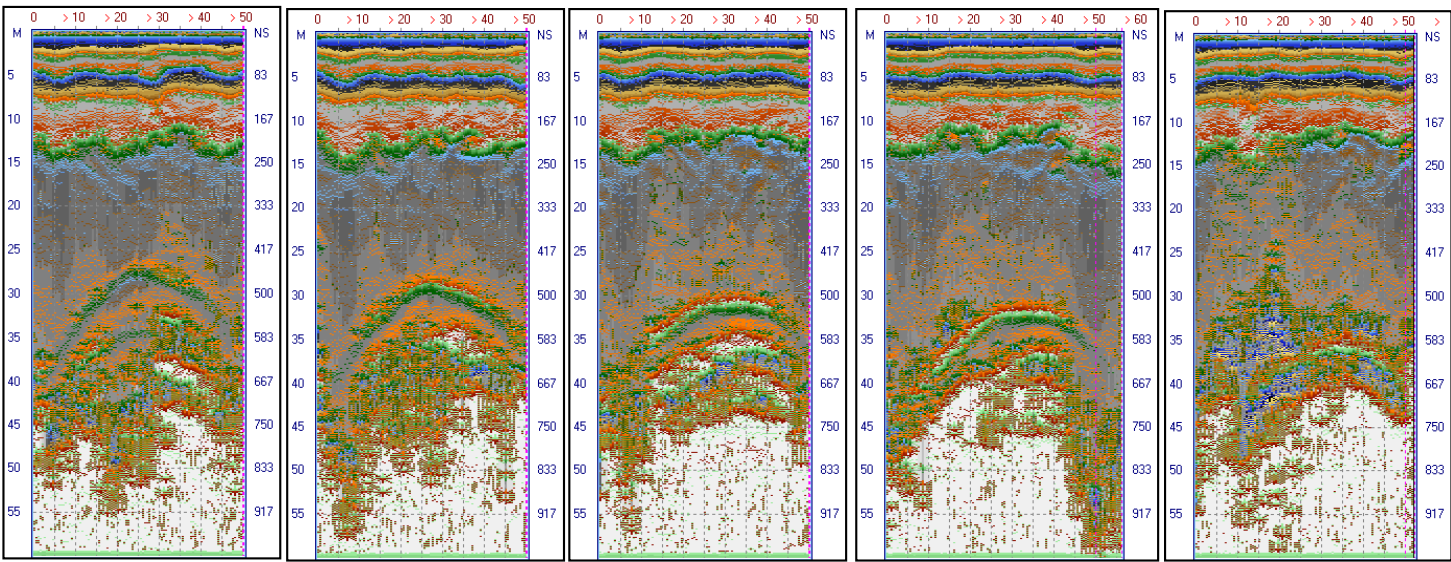
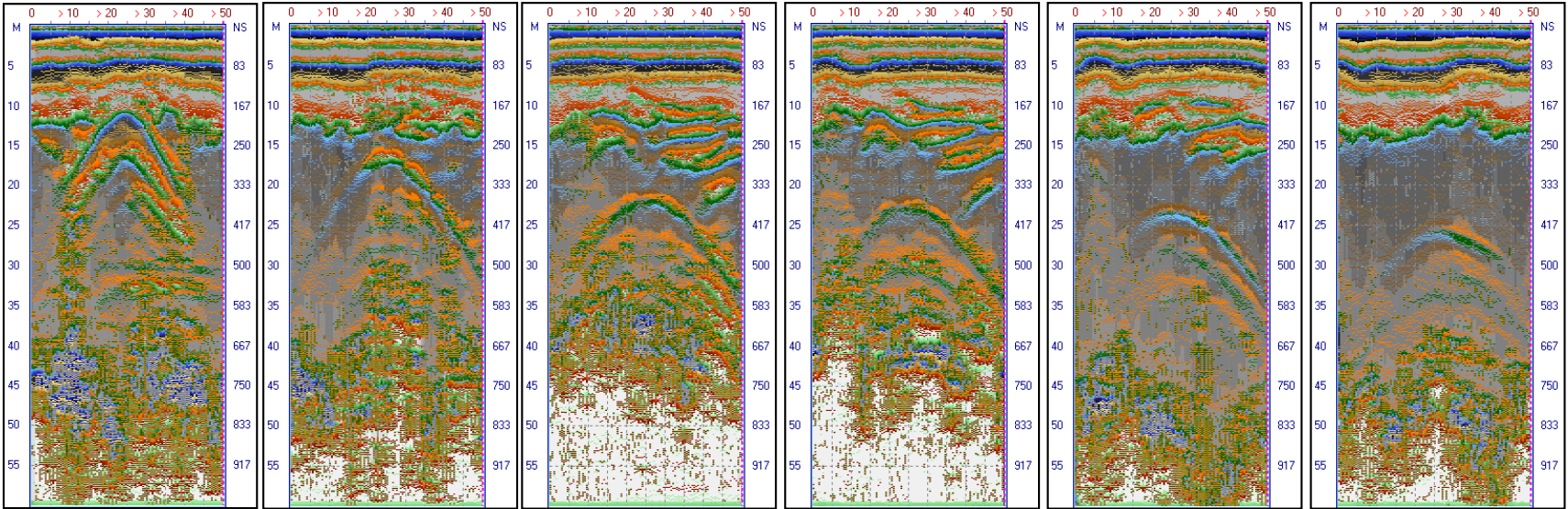


**Kazakhstan: Series of profiles taken at 10m intervals, perpendicular to the decline.**

**Decline had a diameter of 3m wide. Decline was 190m long**

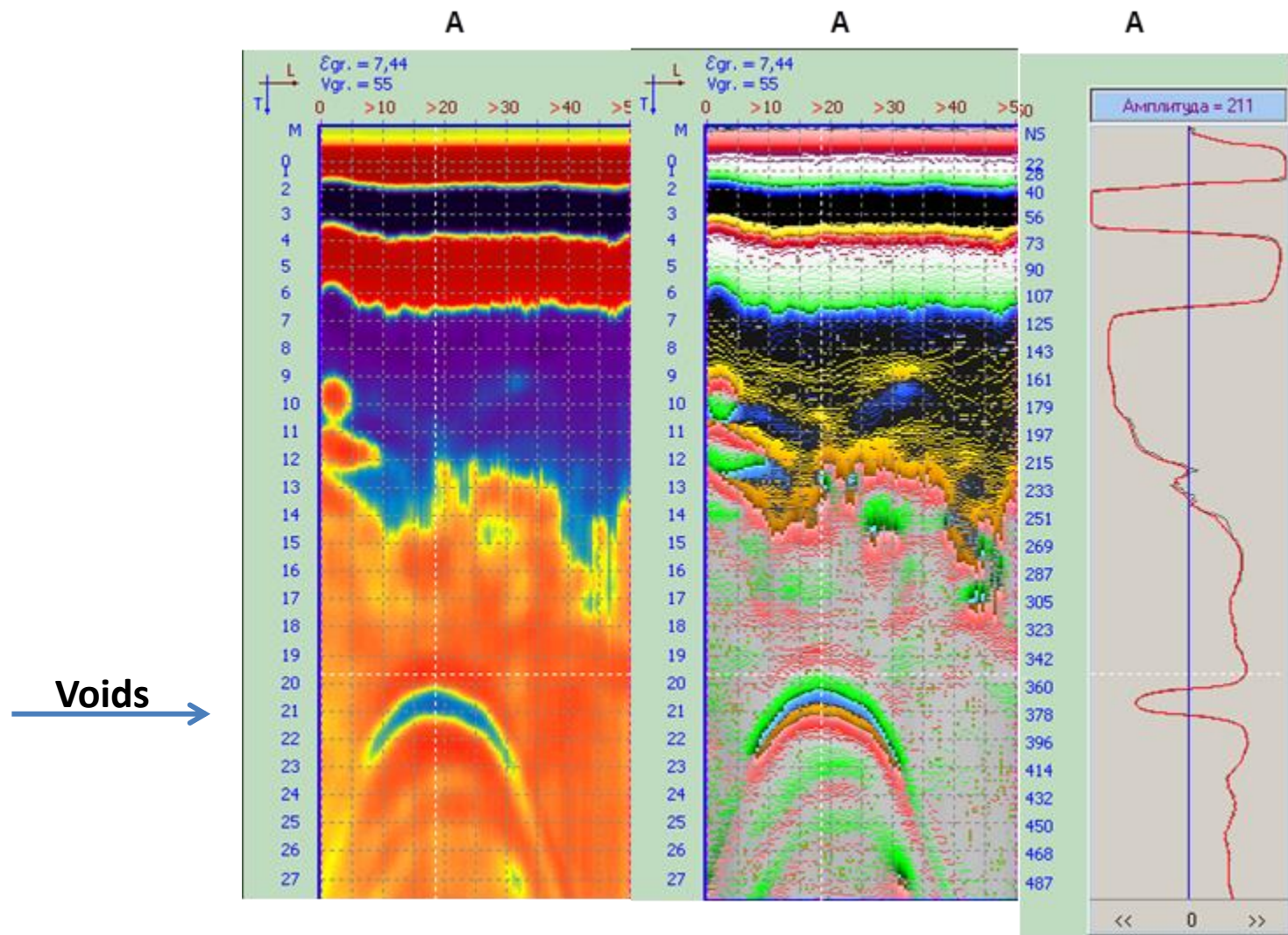
**Survey was set to look 50m depth, using 6m antennas with 10mw transmitter. Hyperbola shows the top of the decline**

Case Study 2



**Survey was set to look 50m depth, using 6m antennas with 10mw transmitter. Hyperbola shows the top of the decline**

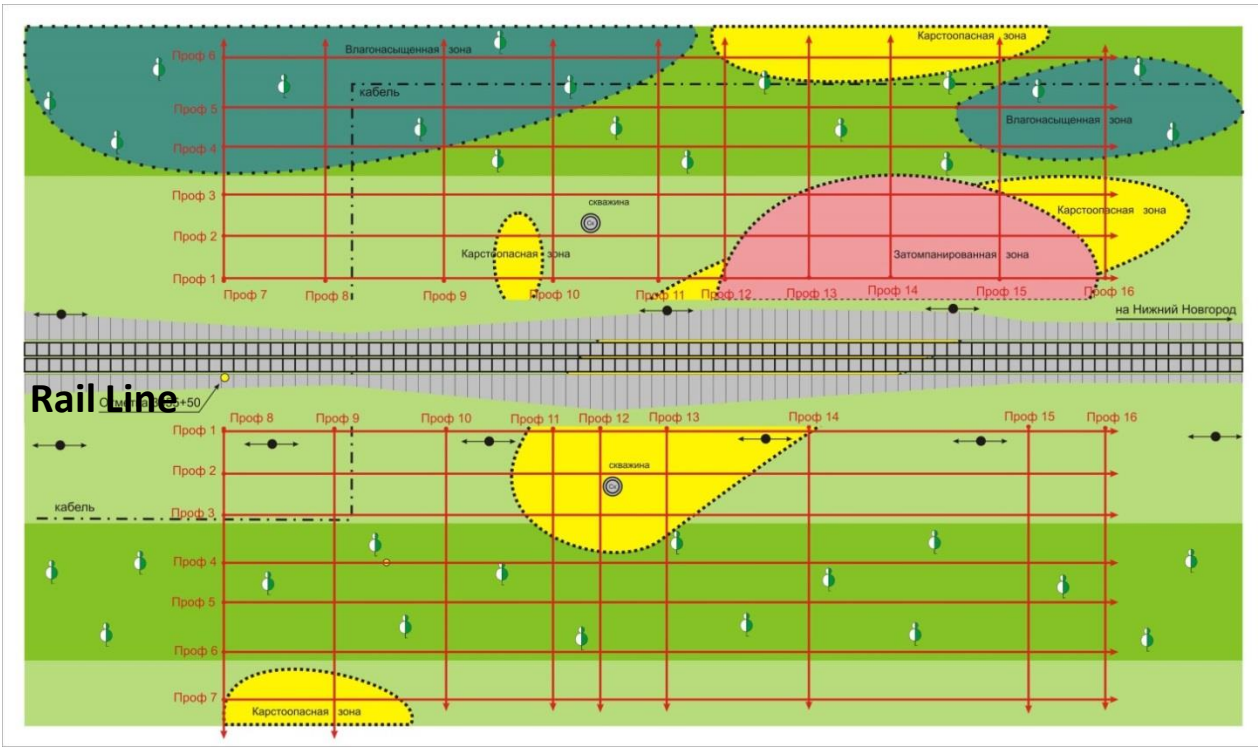
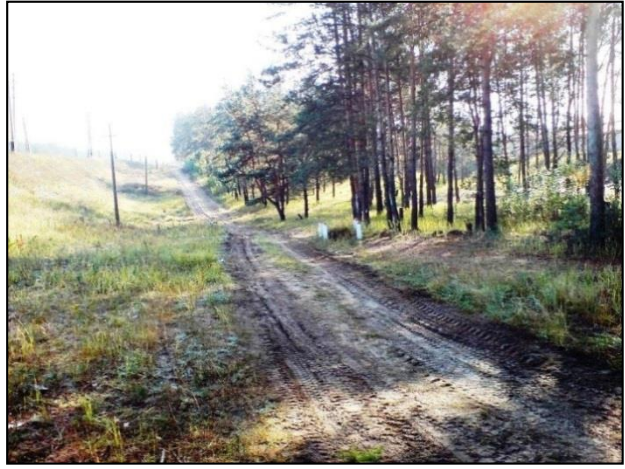
Case Study 2



**Example:** Further Detail – Terravision amplitude signal shown



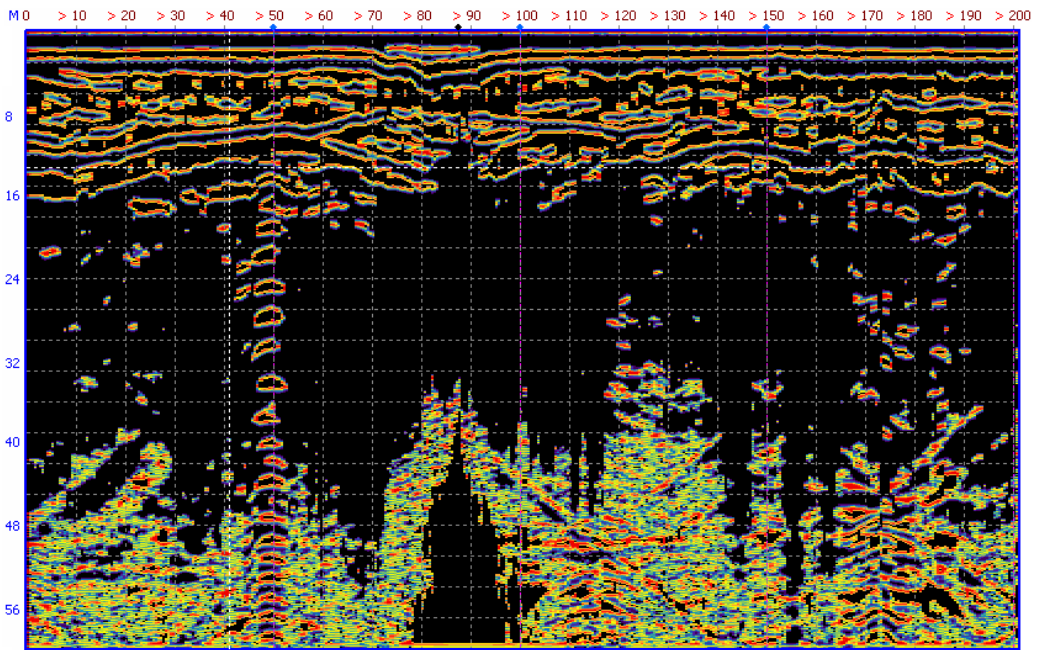
# Case Study 3



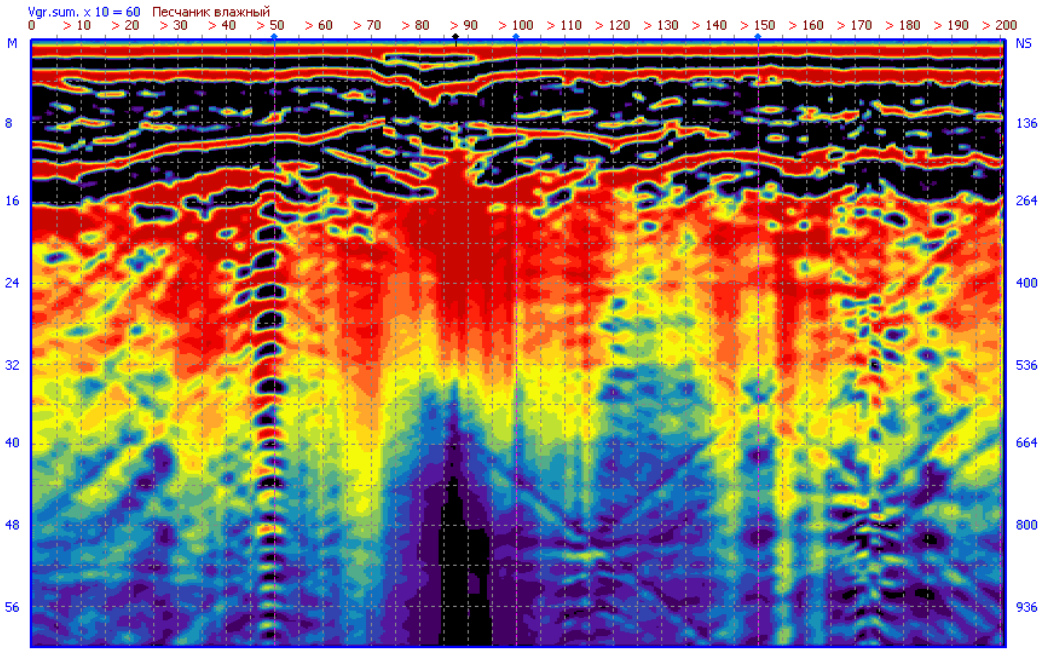
- Cement Infill already in place
- Water Zone
- Void Zone
- Survey Grid

**Survey of Rail Line in High risk void zone (limestone environment)**

# Case Study 3

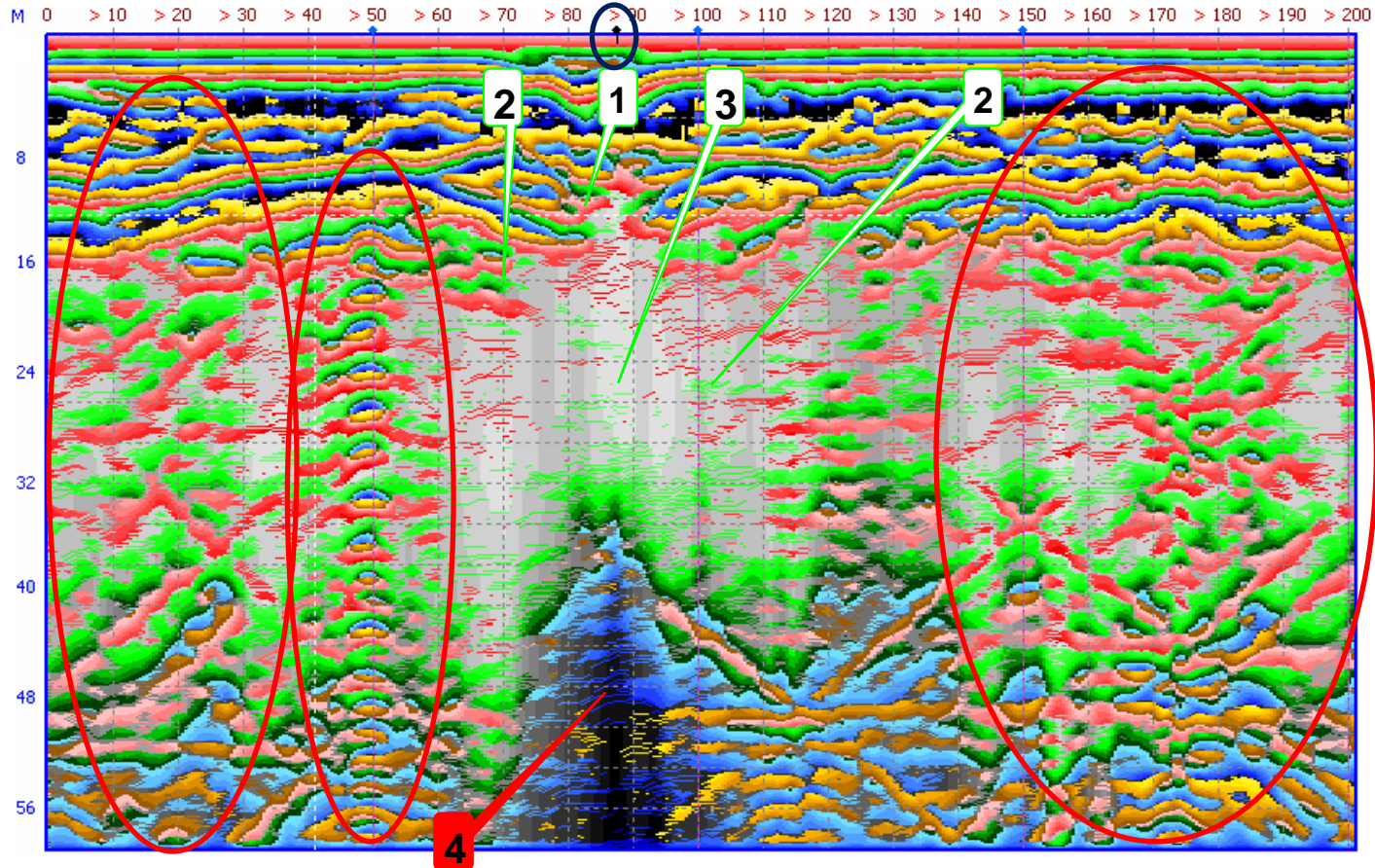


*Example of different filters applied to the profile to draw out the key features.*

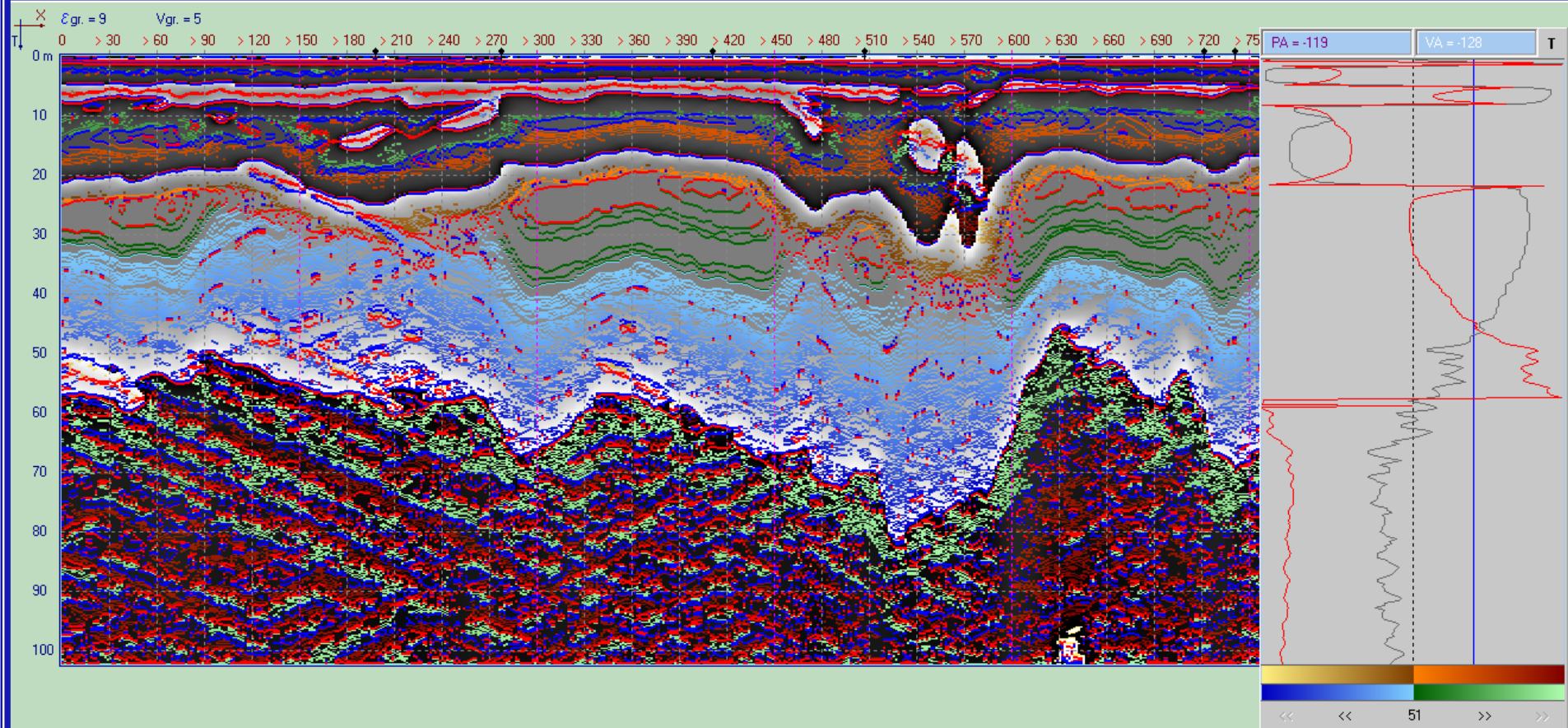


NS  
136  
264  
400  
536  
664  
800  
936  
↓ 50m Depth

## Case Study 3



- 1: Zone of vertical divergent strains of soil layers the upper crust.
  - 2: Zone of vertical divergent strains of soil layers the middle part of the geological section.
  - 3: Decompression zone in the middle part of the geological section (funnel).
  - 4: Vertical decompression zone in the lower part of the geological section (void).
- Interference from electrical poles, cables and other objects.  
○ Recommended "control" drill position



**How it works:** Our device radiates super-short electromagnetic pulses. The electromagnetic wave is reflected from subsurface material with different electro physical properties. The reflected signal is received, registered and transformed into a digital signal. Analysis is subsequently conducted on the data using proprietary geophysical software (above). The transmitted pulse is programmable according to the nature of the required task with consideration for depth and resolution.

- The capacity of the transmitter can be from 1 to 10-20 Megawatt
- Working frequency range (MHz) 1-100
- Number of samples per scan (ns/m) 512/25, 1024/50, 2048/100, 4096/200



## **Voids**

- **TERRAVISION can scan for voids such as pipelines, tunnels, caves etc**
- **RESOLUTION – Depends on the depth and size of the void**
- **DATA COLLECTION – The larger the void, the faster the data can be collected**
- **VERTICAL DISPLACEMENT – There is a margin of error depending on depth**
- **LATERAL DISPLACEMENT – There is no lateral displacement**
- **TRACKING VOIDS - “Real Time” reporting via our operators display unit.**
- **TERRAVISION can analyse and interpret data within hours of collection.**
- **TERRAVISION is light-weight and versatile; we can deploy in 4x4 vehicles & light aircraft**



**For further information and enquiries,  
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