

BRIDGING THE GAP

Distribution Statement A: Approved for public release: distribution unlimited

2004

Counter Underground Facilities

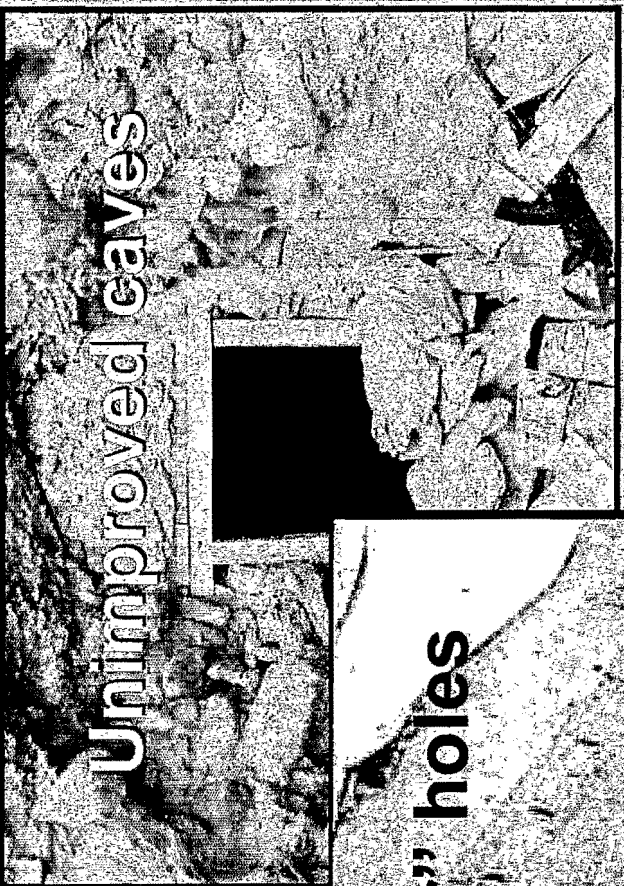
Greg Duckworth



Deep facilities



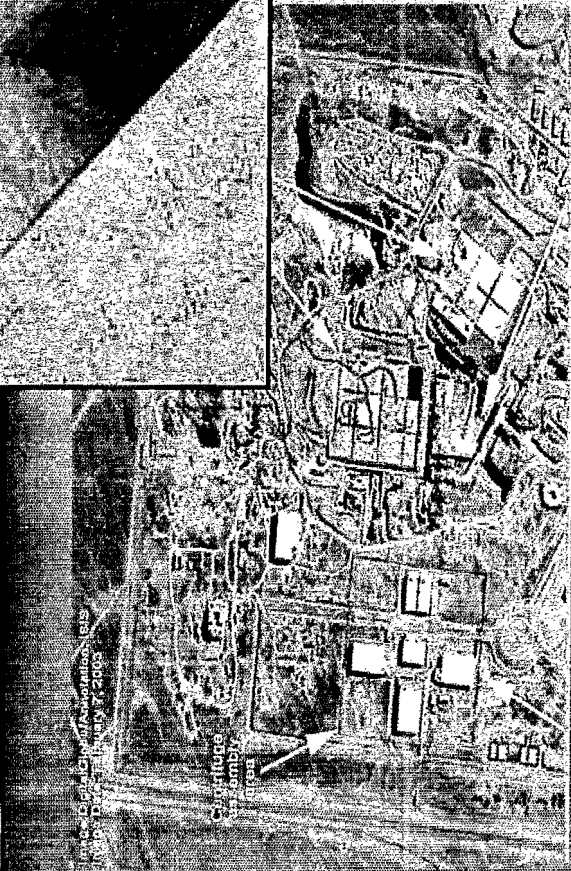
Unimproved caves



"Spider" holes



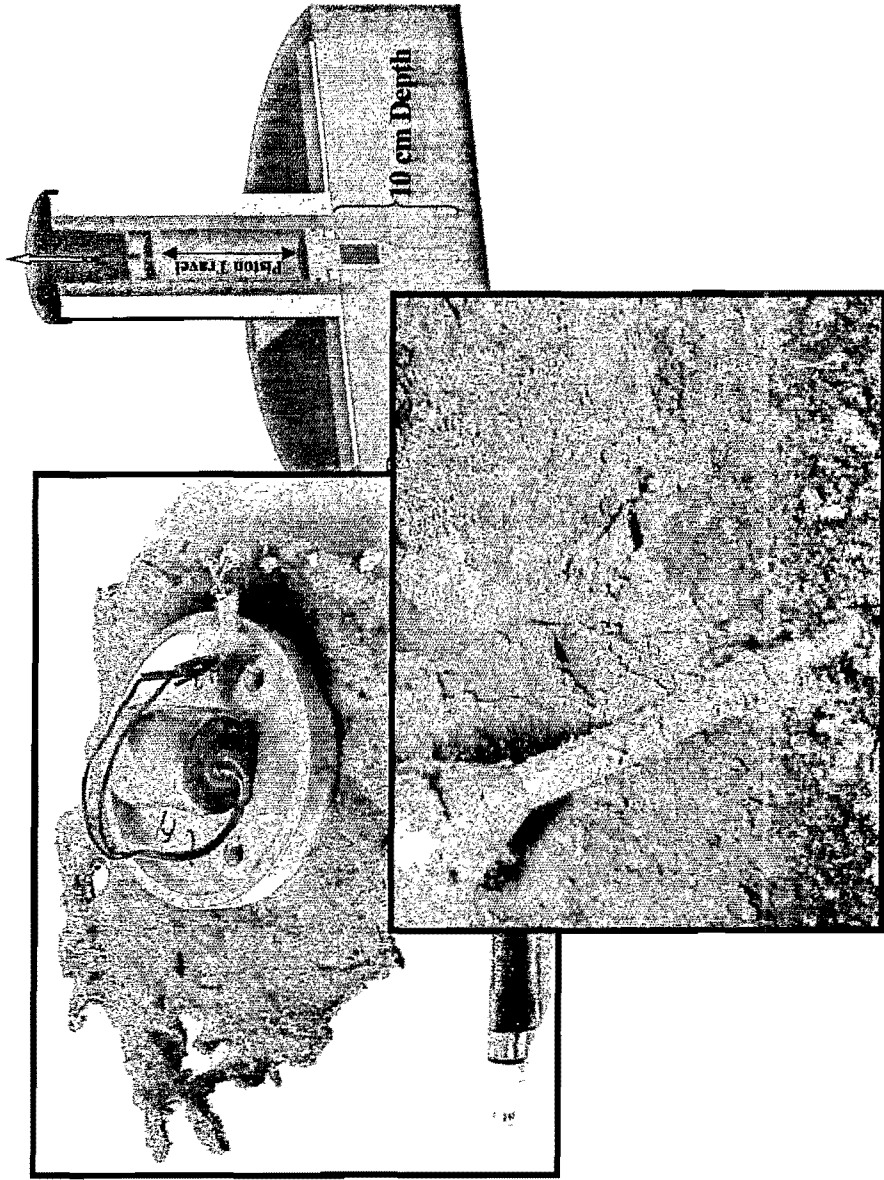
Urban facilities and interconnects



Cut and cover facilities



Robust Geophone Coupling



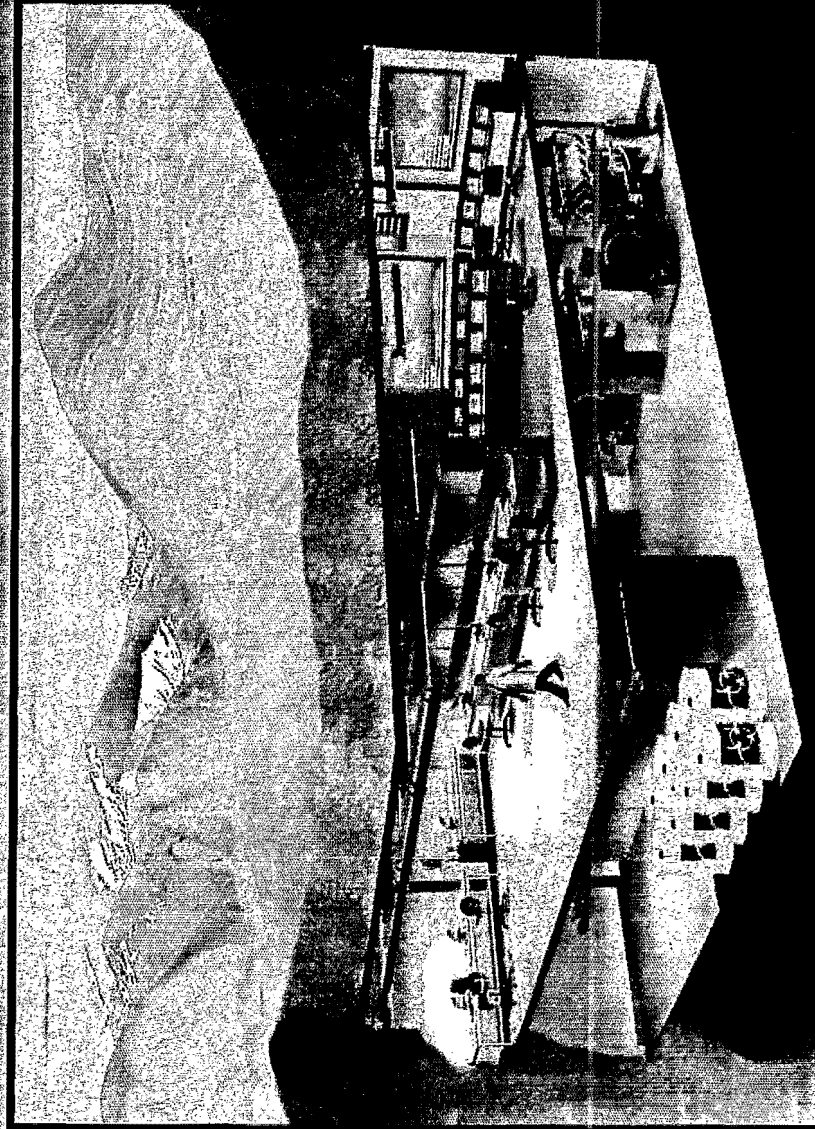
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THE GAPS

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PASEM:

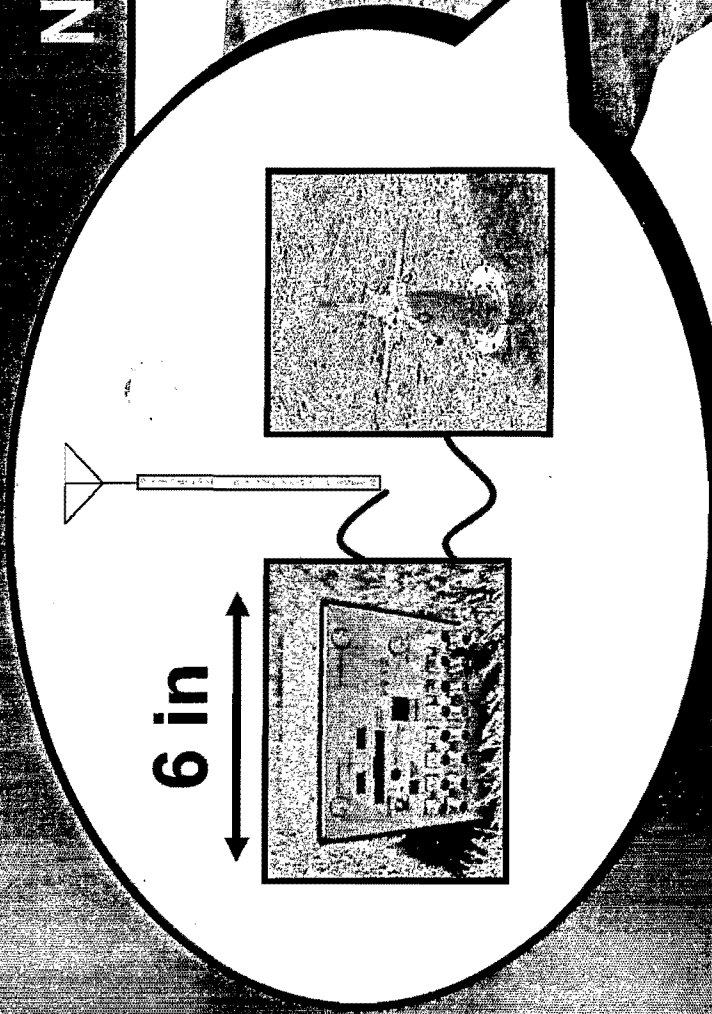
Passive Acoustic, Seismic, and Electromagnetic Monitoring

Exploits the signals emitted by activities within the Underground Facility (UGF)

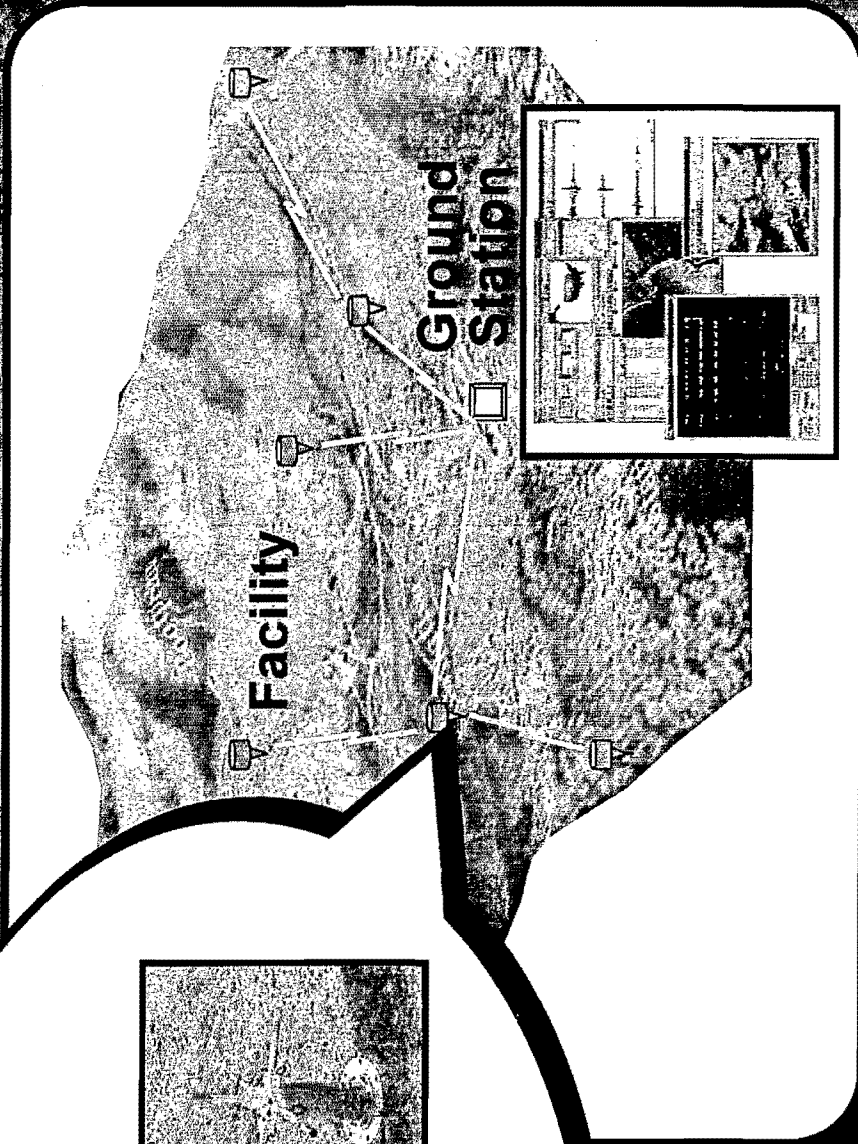


CUGF Ground Sensor System - Functional Prototype

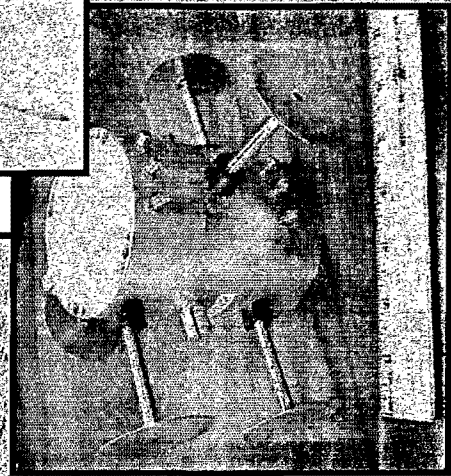
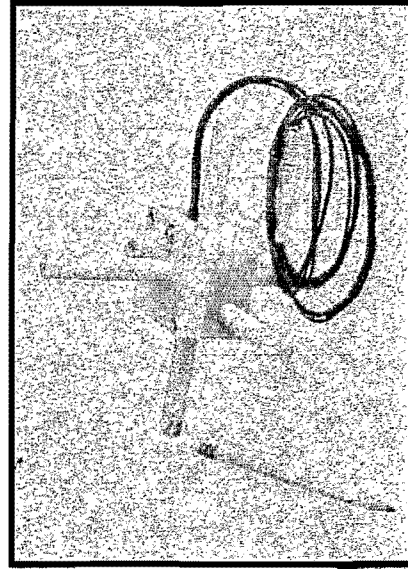
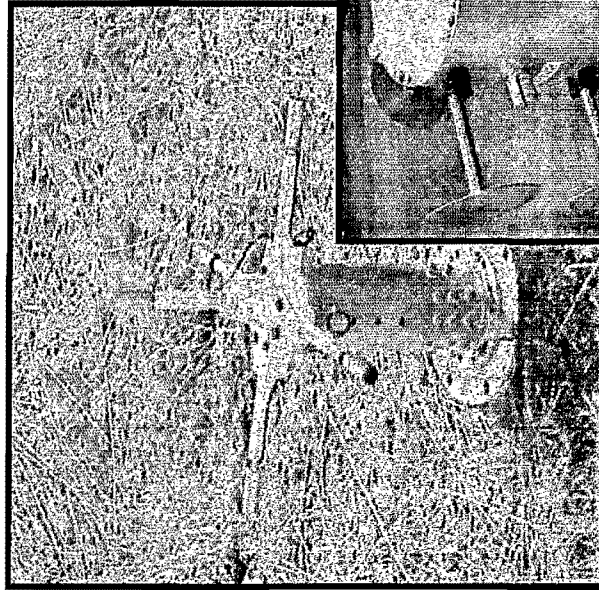
Prototype Sensor Node



Network of Nodes

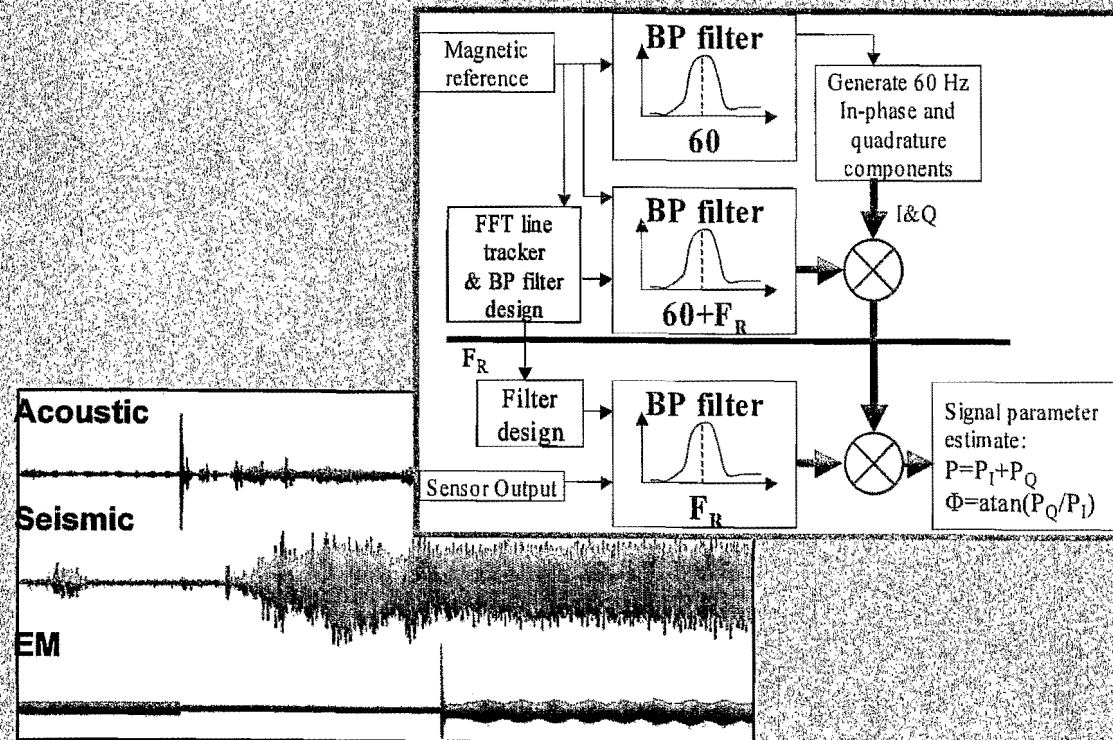


Advanced EM Sensors

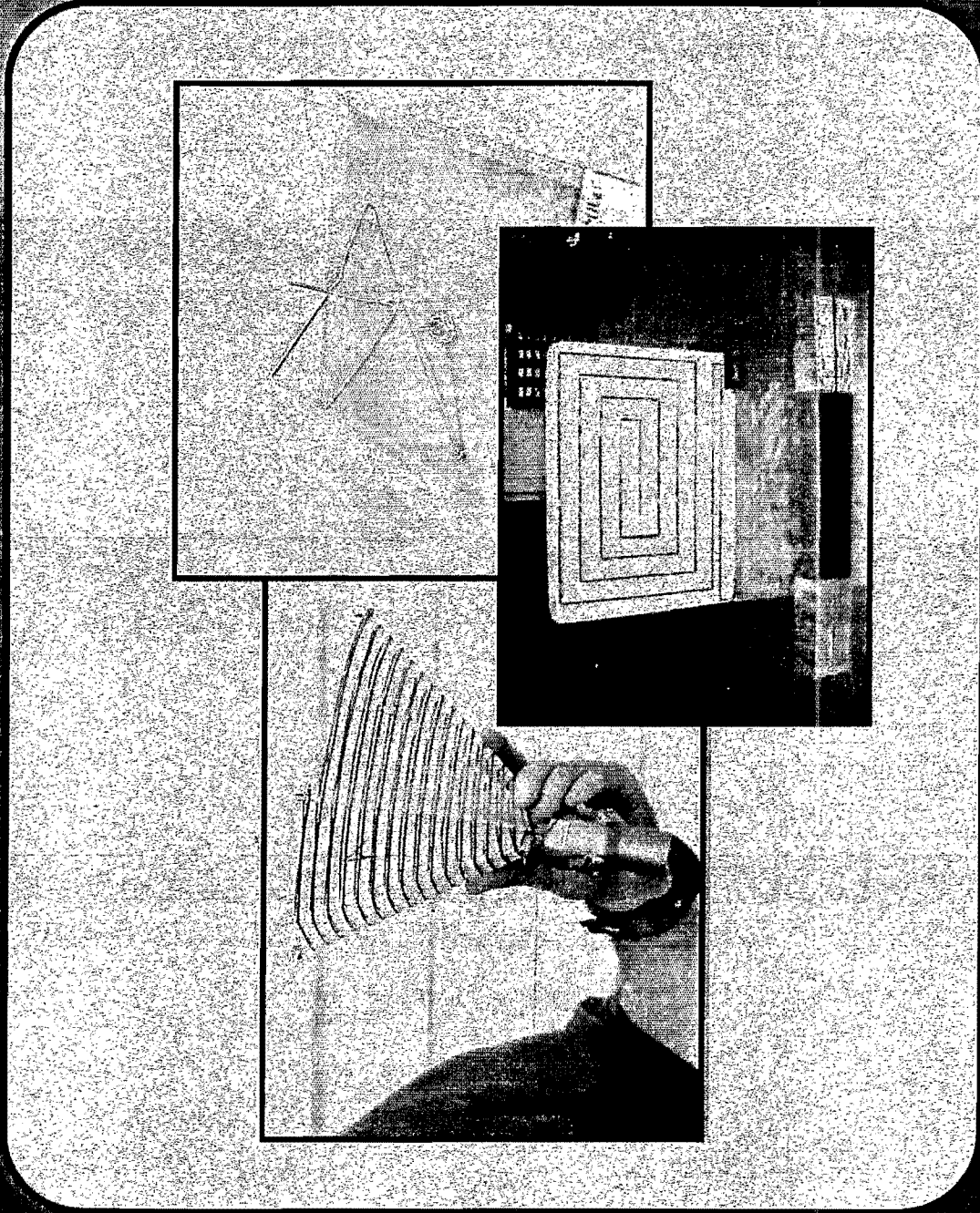


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Coherent Signal Processing

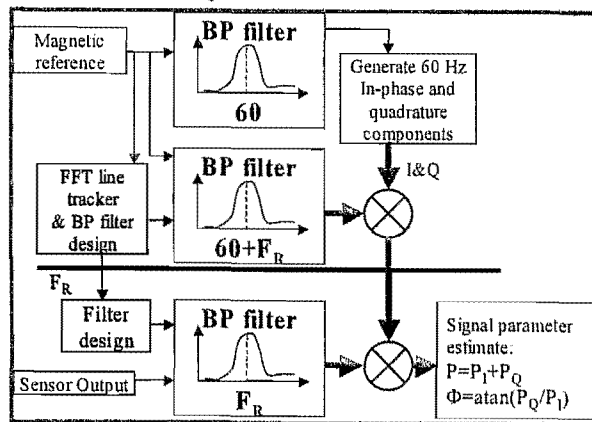
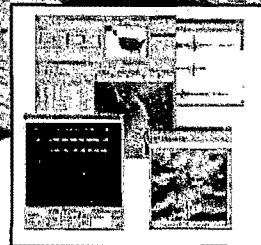
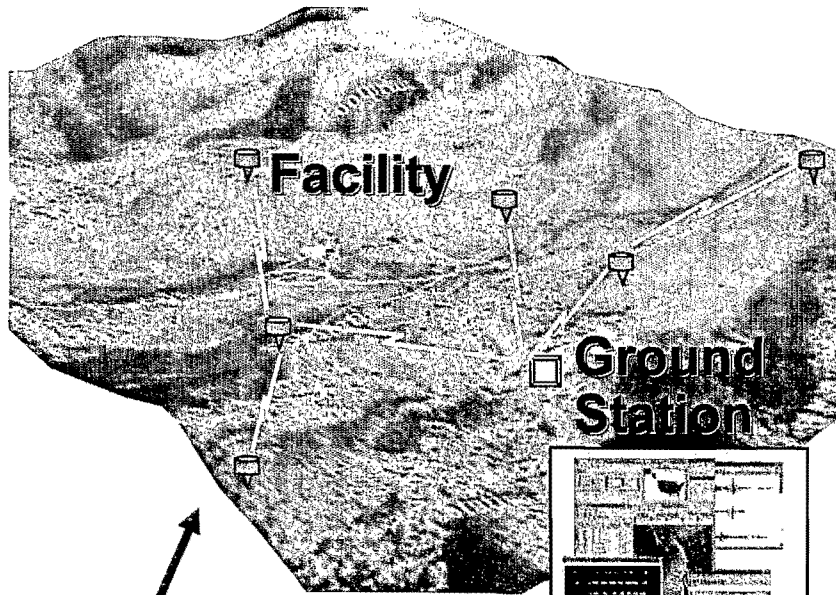


NLOS Antennas

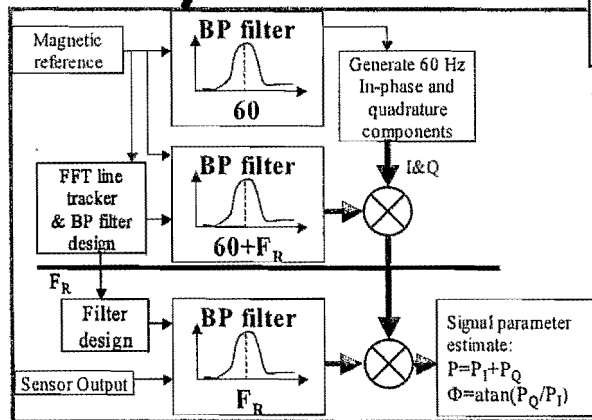
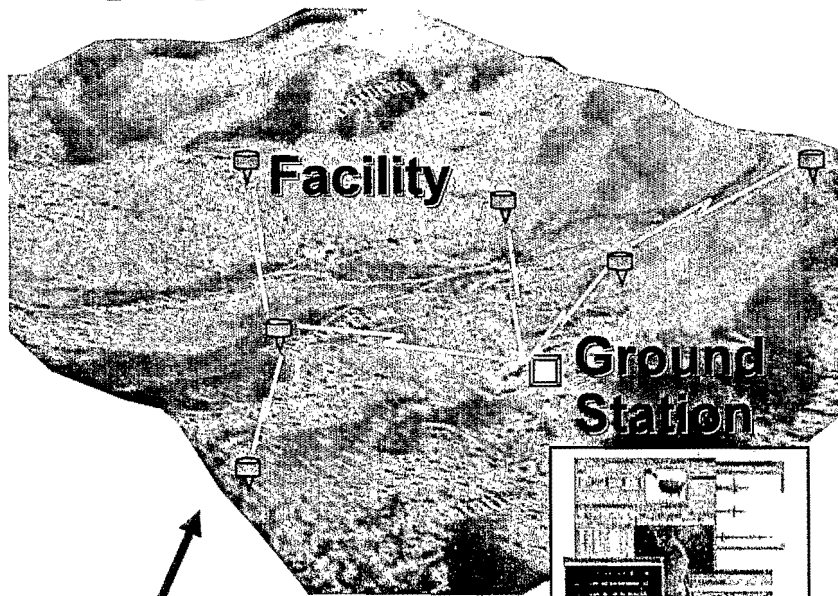


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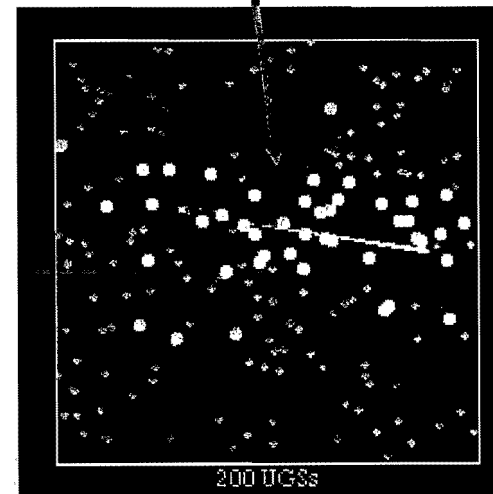
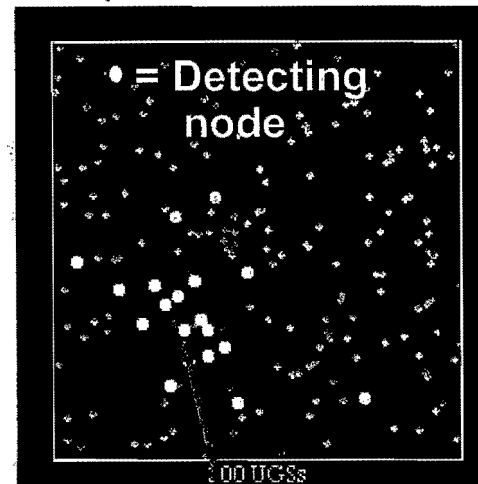
Small "N" systems High performance sensors



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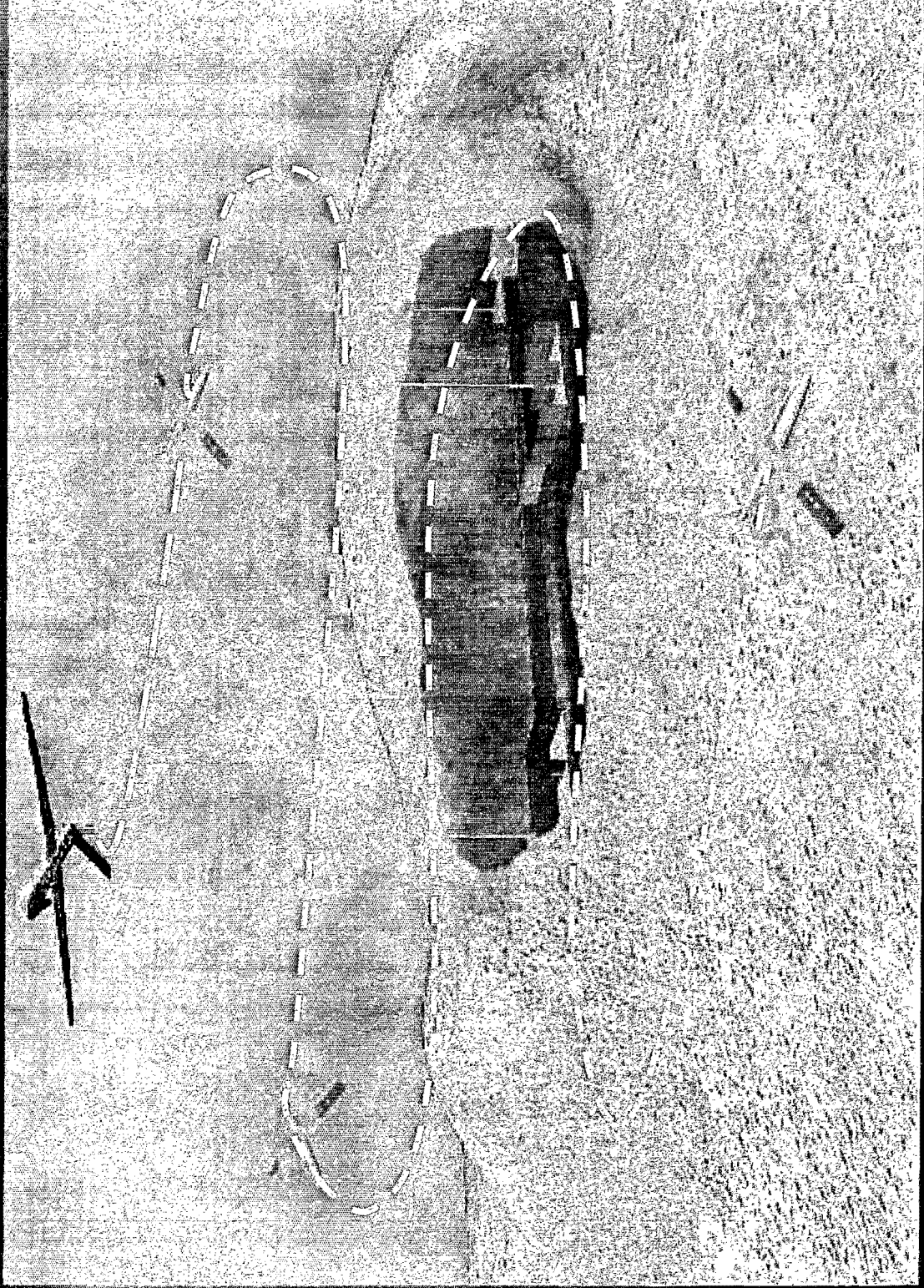


Large "N" systems μ-sensors



THE GMP

LAASS Low-Altitude Airborne Sensor System



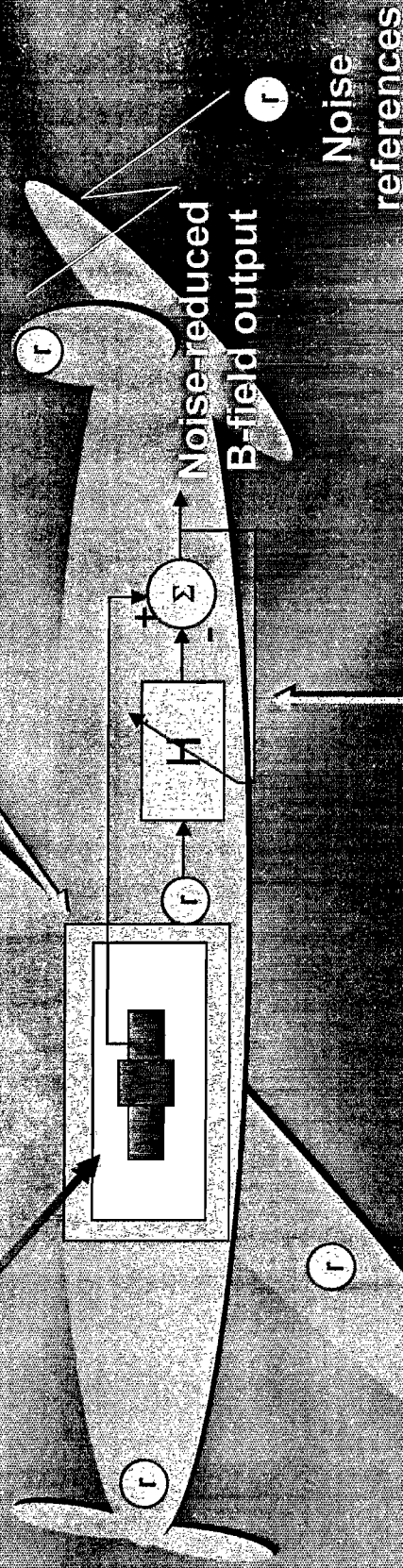
SING
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EM noise mitigation approaches

Passive Vibration Isolation

Sensor
Modifications



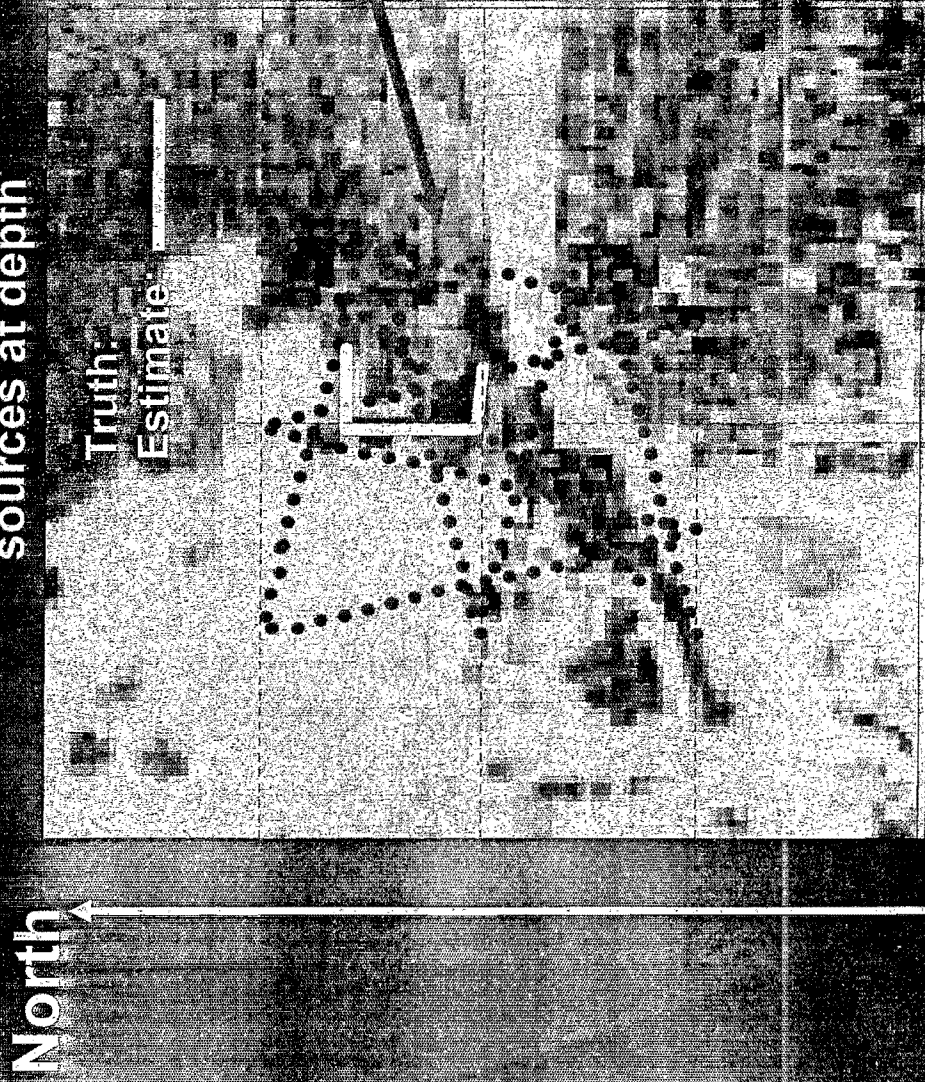
Active Electronic Noise Cancellation

Platform Choice and Modifications

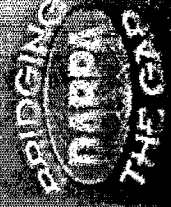


LAASS EM Inversion Problem

Parametric inversion of EM
sources at depth



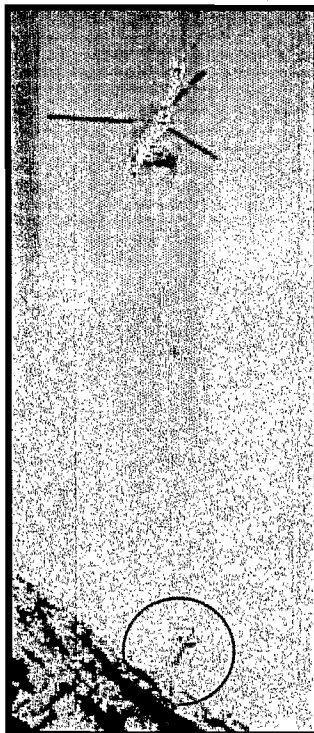
East



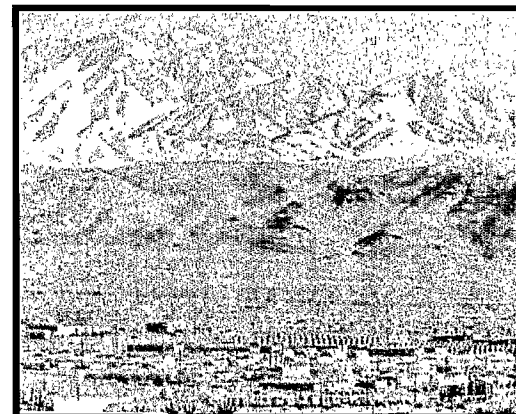
LAASS

Data Collection and Proof-of-Principle Demo

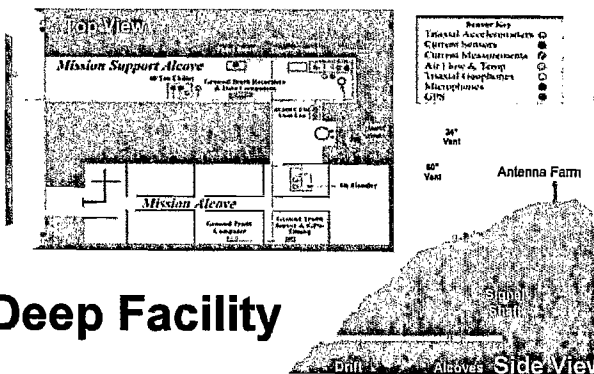
Rural Site



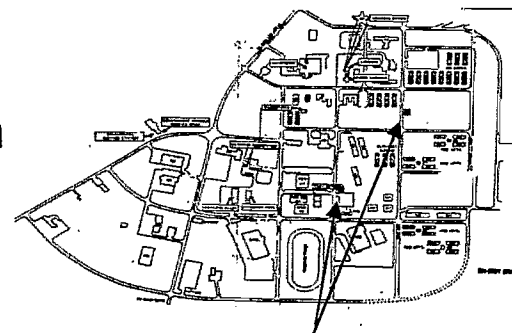
"Urban" Site



Ground Truth Sensors



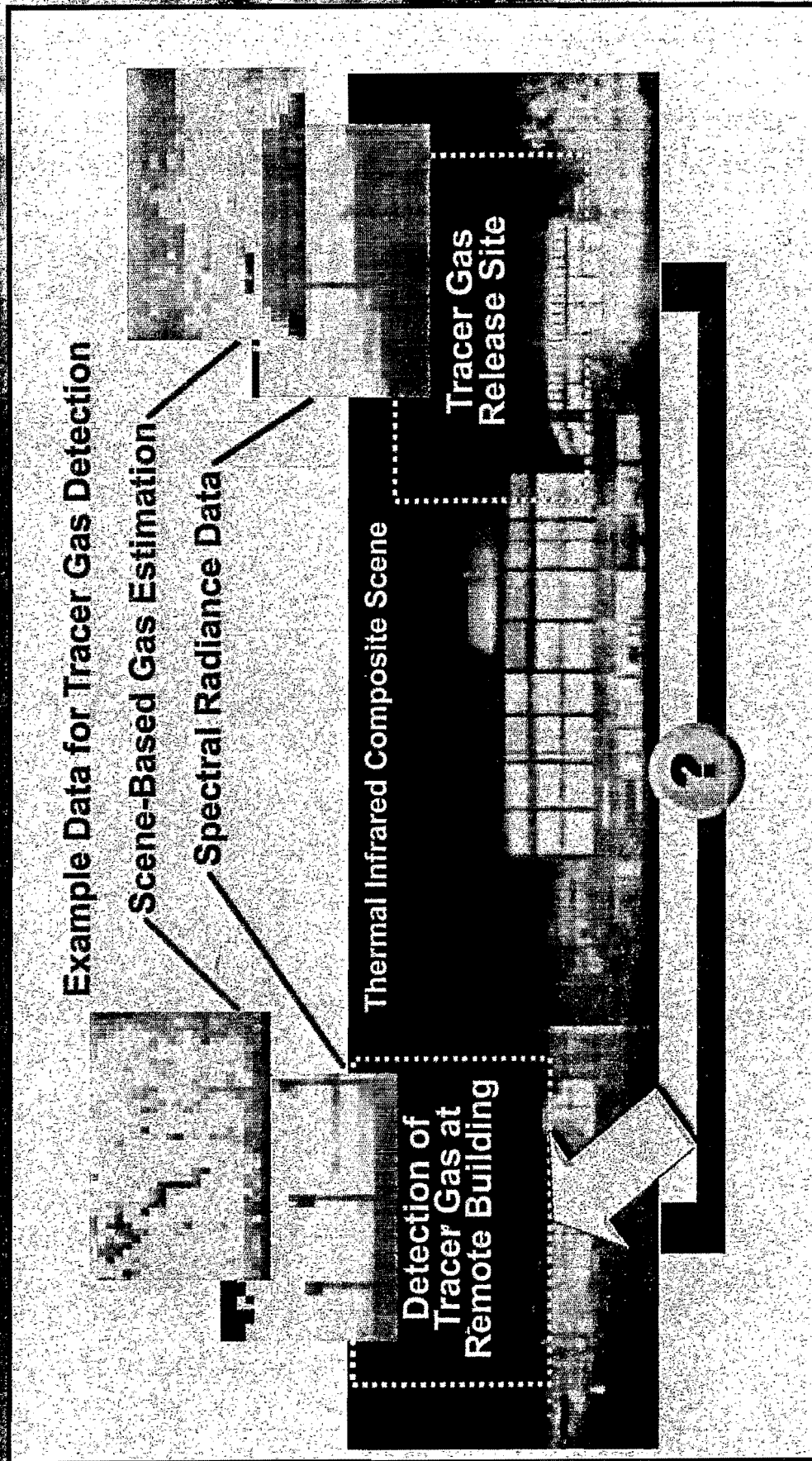
Collection Platform



Deep Facility

Generators/Ground Truth Sensors

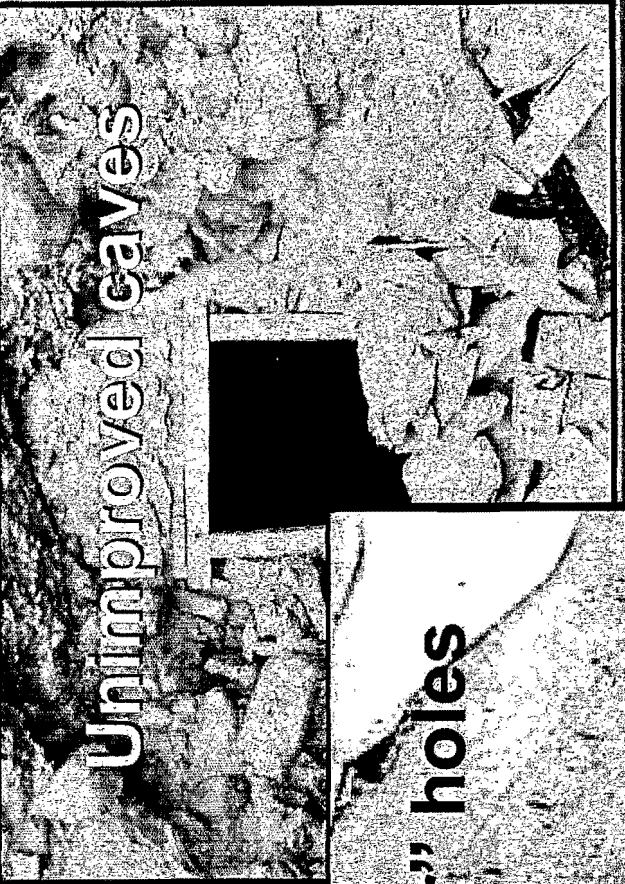
Interconnect Assessment Strategic and Tactical Applications



Deep facilities



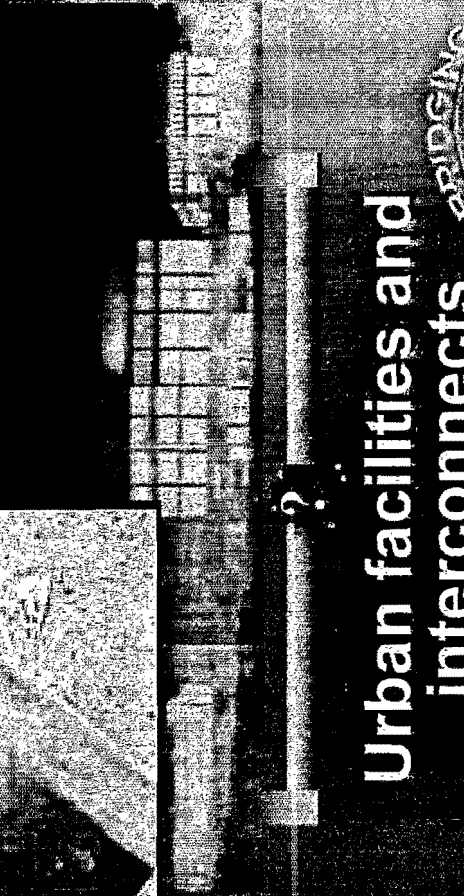
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