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Case Study

**Mine and Underwater IED (UIED)
Threat to Piers, Berths, and
Approaches**

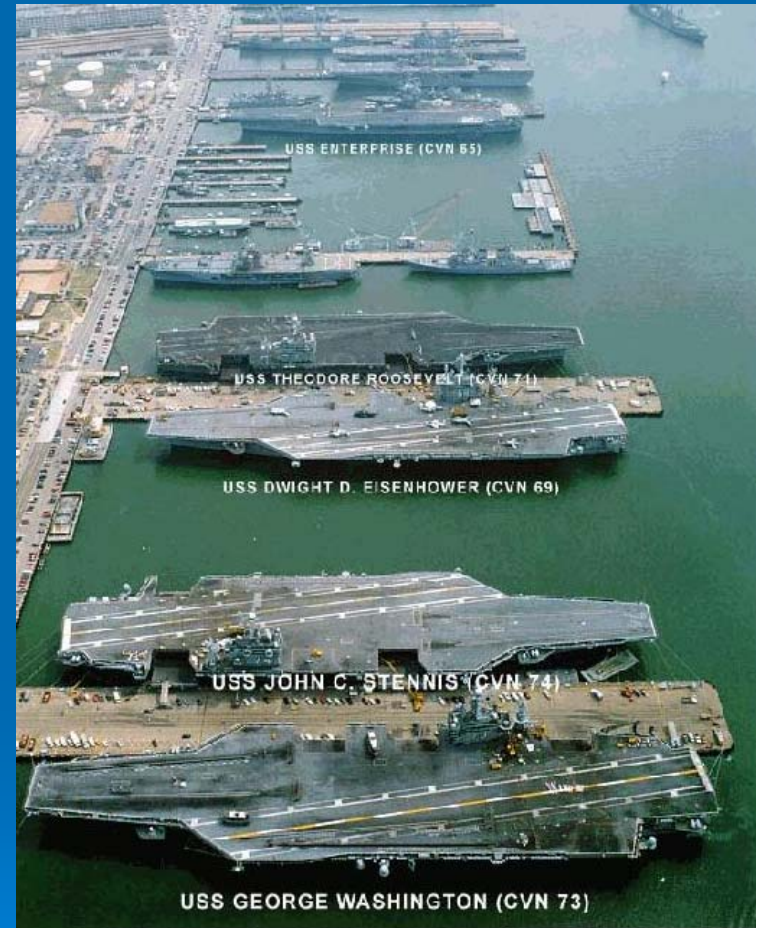


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Situation

- **High Risk Berthing Areas**
 - Asymmetric Warfare
 - Mine and UIED Threat
- **Harbor Environment**
 - Low keel clearances
 - Pier face and Piling Exposure
- **Difficult Targets**
 - Unconventional Explosive Devices
 - Conventional Stealth Mines





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Solution

■ **Apply Existing Mine Warfare Techniques**

- Route Survey/Change Detection
- In-Service Side Scan Sonar System
- L-3 Klein Series 5000 (SQH-4B)
- MEDAL MIW Data Base

■ **Side Scan Advantages**

- High Performance in Bottom Reverberation (backscatter)
- Image Based Data Environment

■ **Technical Risk**

- Nil
- Proven Technology





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Technical Background

■ Side Scan Sonar

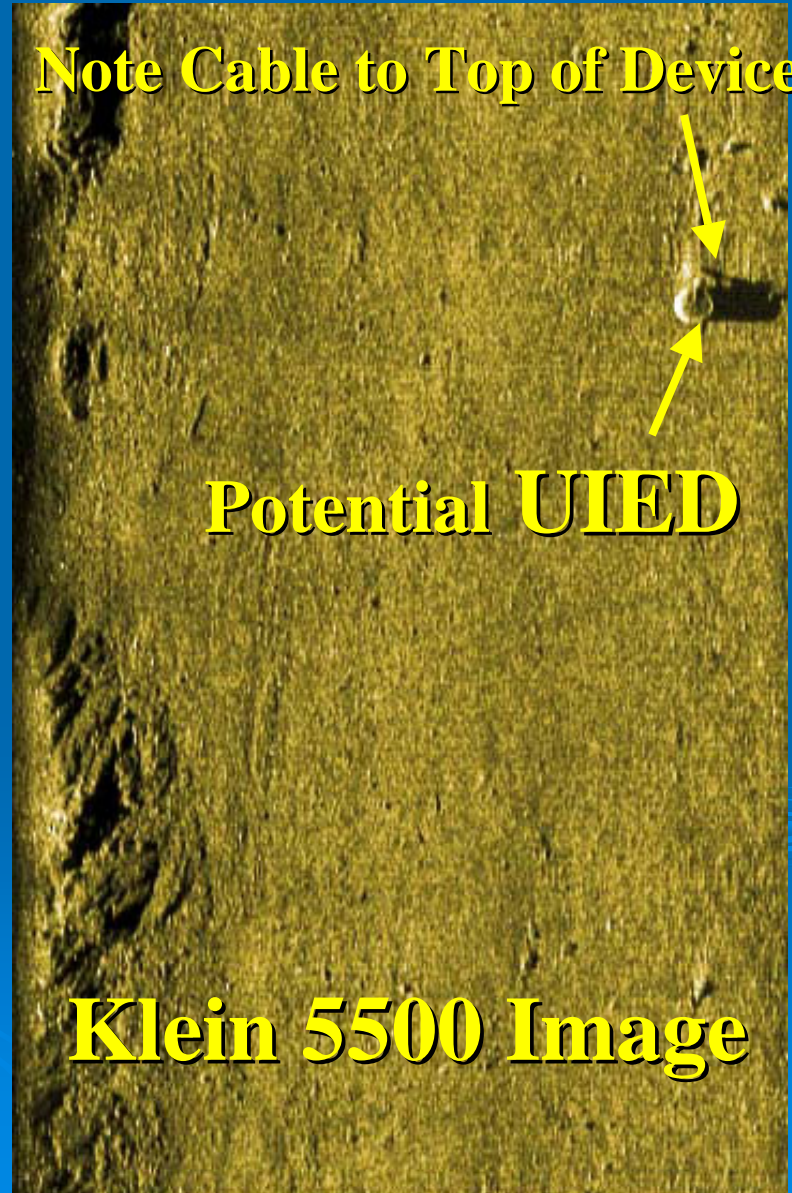
- 2 dimension Backscatter Imaging Tool with a high (DI)
- Creates a finely sampled/resolved backscatter map of ranges along-track.

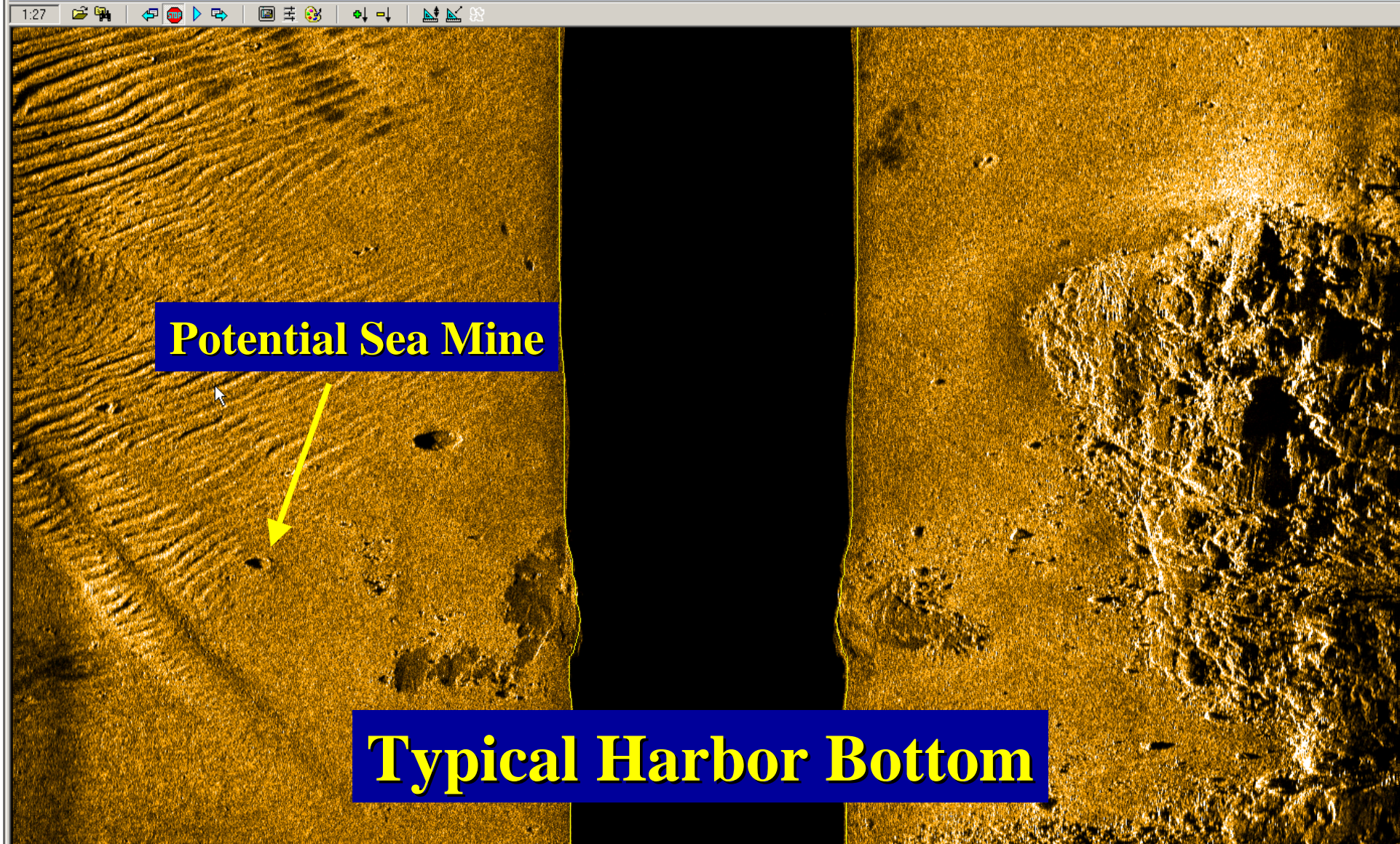
Note Cable to Top of Device



Potential UIED

Klein 5500 Image





Potential Sea Mine

Typical Harbor Bottom

| | | | | | | | | | |
|---------|----------|--------|-----------|------------|---------------|---------------|-----------|-----------|--|
| Ping #: | 53486 | Range: | 37 m | Latitude: | 42:50.2880 N | Fish Heading: | 255.2 deg | Pressure: | |
| Time: | 18:59:41 | Speed: | 3.6 knots | Longitude: | 070:43.5350 W | Pitch: | 4.0 deg | | |



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CONOPS

■ **Berth and Approach Clearance**

- **Periodic Data Collection**
- **Utilization of Local Harbor Craft**
- **Towed Sonar utilizing Limited skill operators**
- **Local Data Storage or Collective Area Data Storage**

■ **Pier Face Clearance**

- **Co-incident with Berth Clearance Operations**
- **Concrete Pier Face – image to pier bottom interface**
- **Pile Piers – image between piles**



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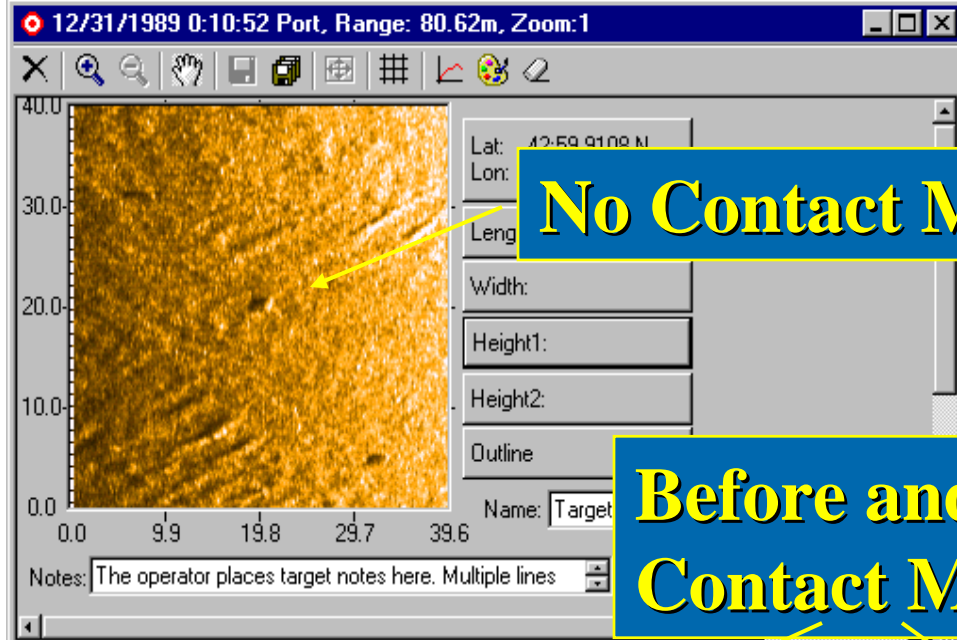
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CONOPS

- **Change Detection Technique**
 - Comparison Baseline Data and Current Data
 - Electronic or Visual Comparison

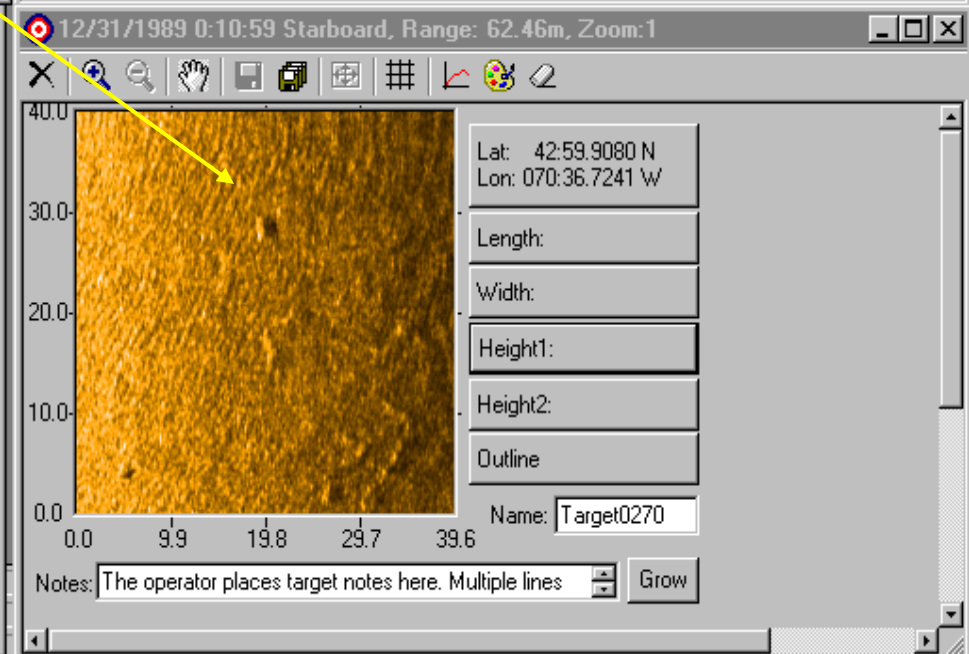
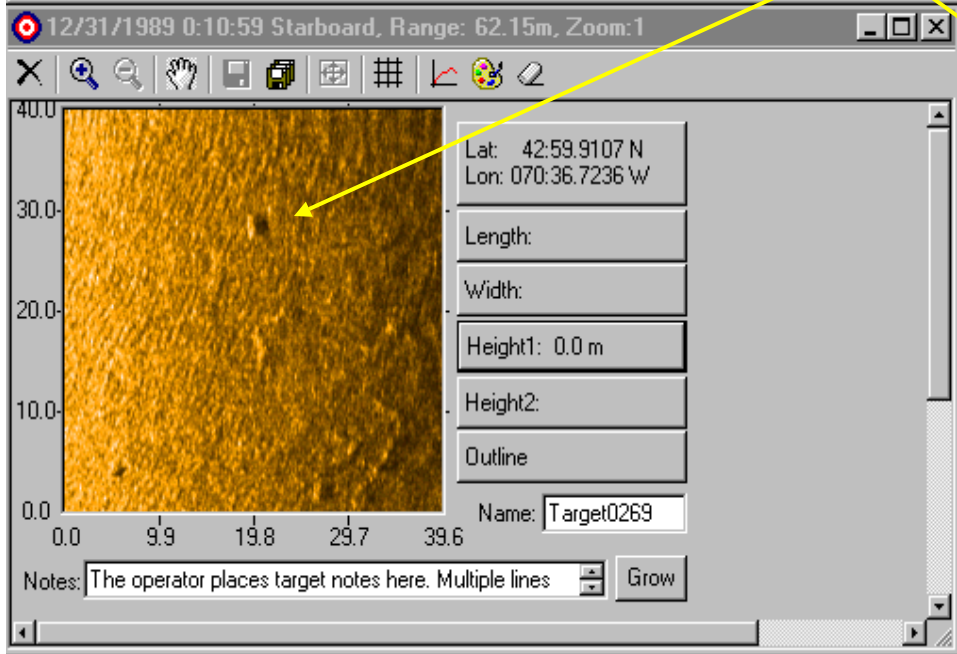
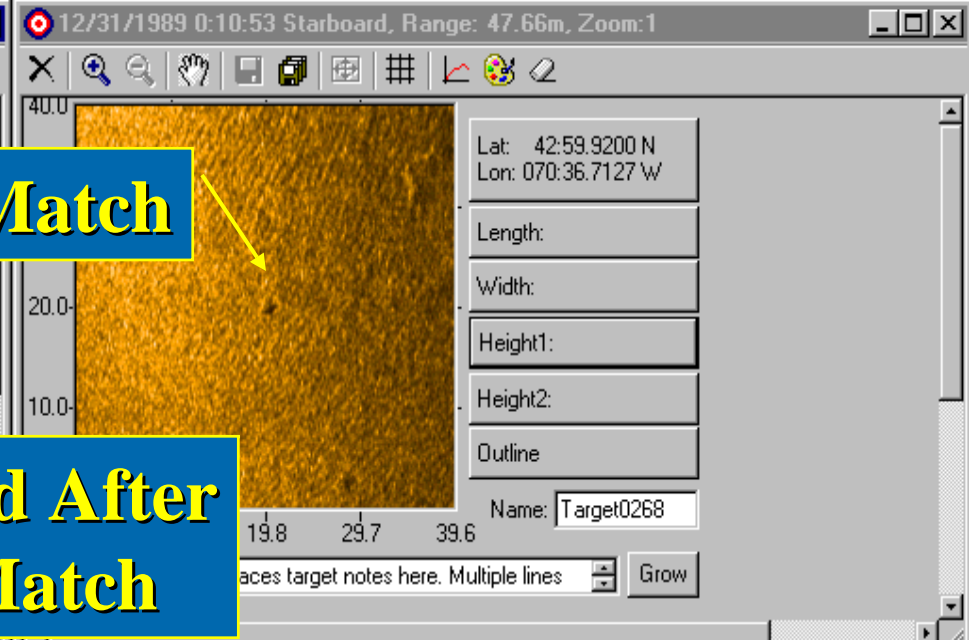
- **Baseline Data**
 - Updated Periodically
 - Used for Base Comparison

- **Current Data Set**
 - Taken prior to Vessel arrival
 - Direct Comparison to Baseline
 - Determination of “Changes”



No Contact Match

Before and After Contact Match





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CONOPS

- **New Target Detected**
 - Local Personnel
 - Result of On-Site Comparison

- **Transit/Berthing**
 - Aborted
 - Shifted to “Clean” Berth

- **Classification/Neutralization**
 - EOD Personnel
 - Action Appropriate for Port Area



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Our Goal

Effective Port and Harbor MIW Operations

