



민 · 군 합동조사단

CIV - MIL JIG

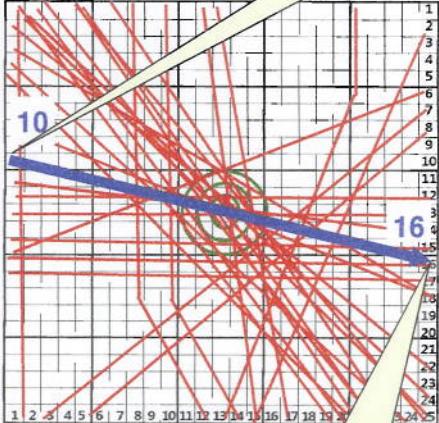



결정적 증거물

Critical evidence

□ 수거 일시 / 위치 Recovery time & location

- 일시 : ' 10. 5. 15(토) 09:25경
Time : 0925 hrs, 15 May '10 (Sat)
- 위치 : 폭발원점 주변
(37°55'45"N 124°36'02"E)
Location : Around the point of explosion



37°55'38"N
124°35'55"E

37°55'46"N
124°36'10"E



결정적 증거물

Critical evidence



□ 수거작전 Operation

- **그물코 : 5mm**
Net loop : 5mm
- **크기 : 폭 25m, 높이 15m, 길이 60m (5t)**
Size : 25m wide, 15m high, 60m long (5t)
- **제작기간 : 4. 21~ 28 (1주일)**
Manufacture : 21~28 Apr. (1 week)
- **운용선박 : 135톤 2척**
Operation Ship : two 135ton ships
- **시험운용 : 5. 3 (외곽지역)**
Test : 3 May (outer region)
- **수거작전 : 5. 10 ~ 현재**
Operation : 10 May~ Present





결정적 증거물

Critical evidence



□ 수거 및 채증 과정 Recovery & collection



① **특수그물 투망**
Committing the special net



결정적 증거물
Critical evidence



□ 수거 및 채증 과정 **Recovery & collection**



결정적 증거물
Critical evidence



□ 수거 및 채증 과정 **Recovery & collection**



 **결정적 증거물**
Critical evidence 

□ 수거 및 채증 과정 Recovery & collection

④ 현장감식
Examination on-scene

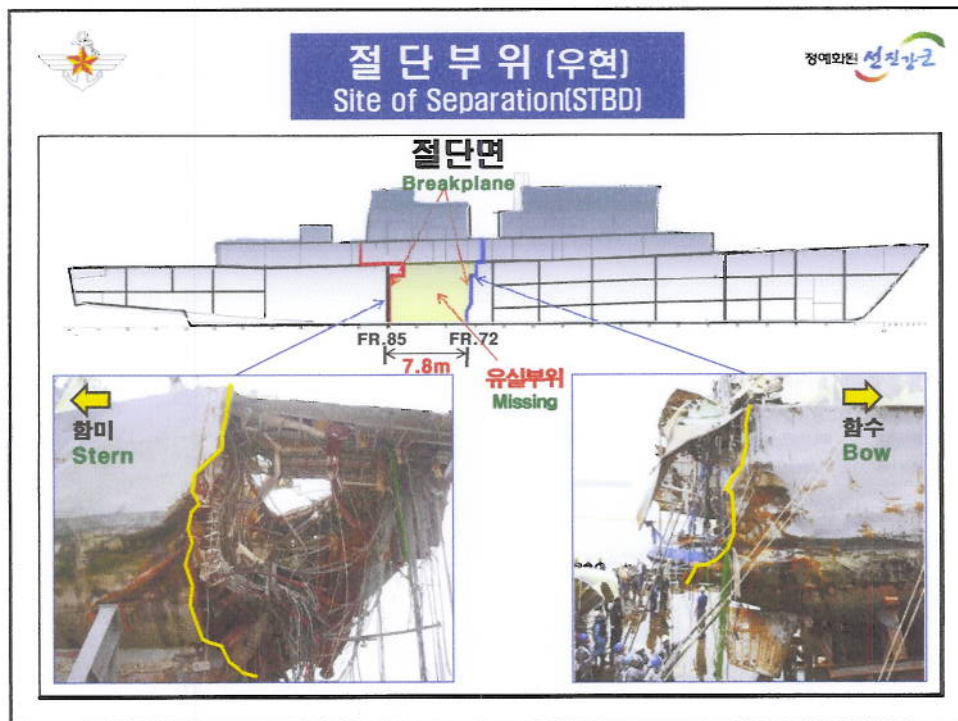
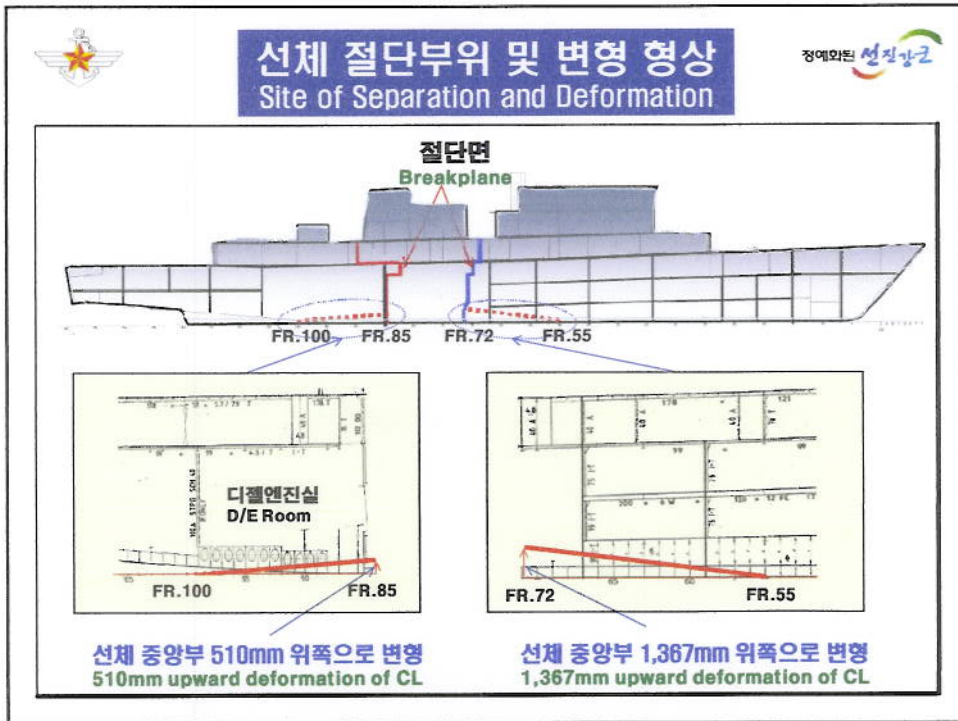


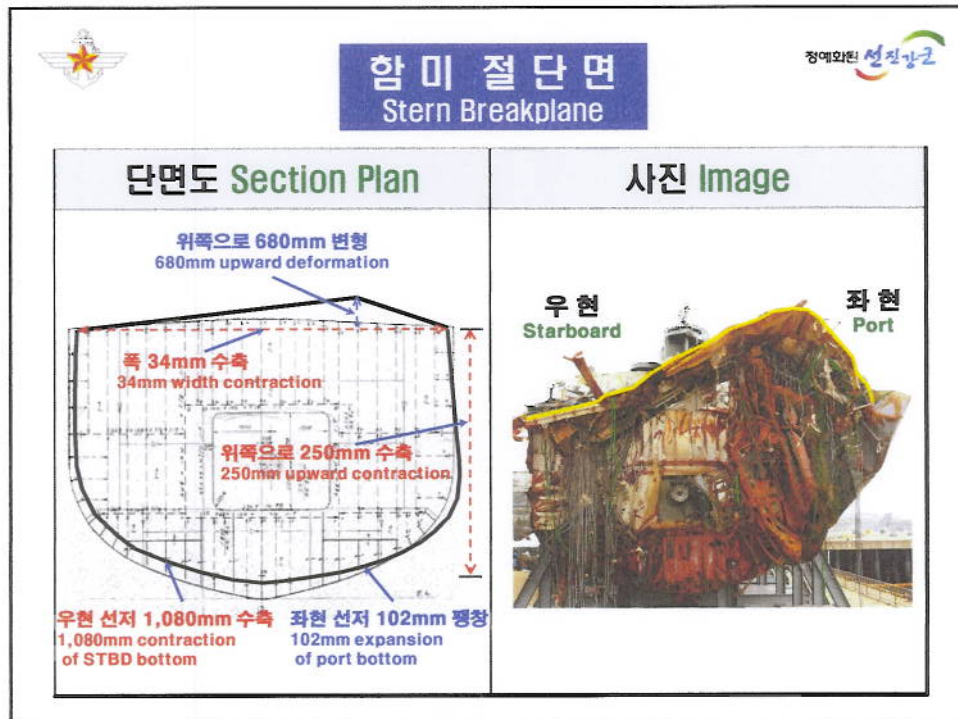
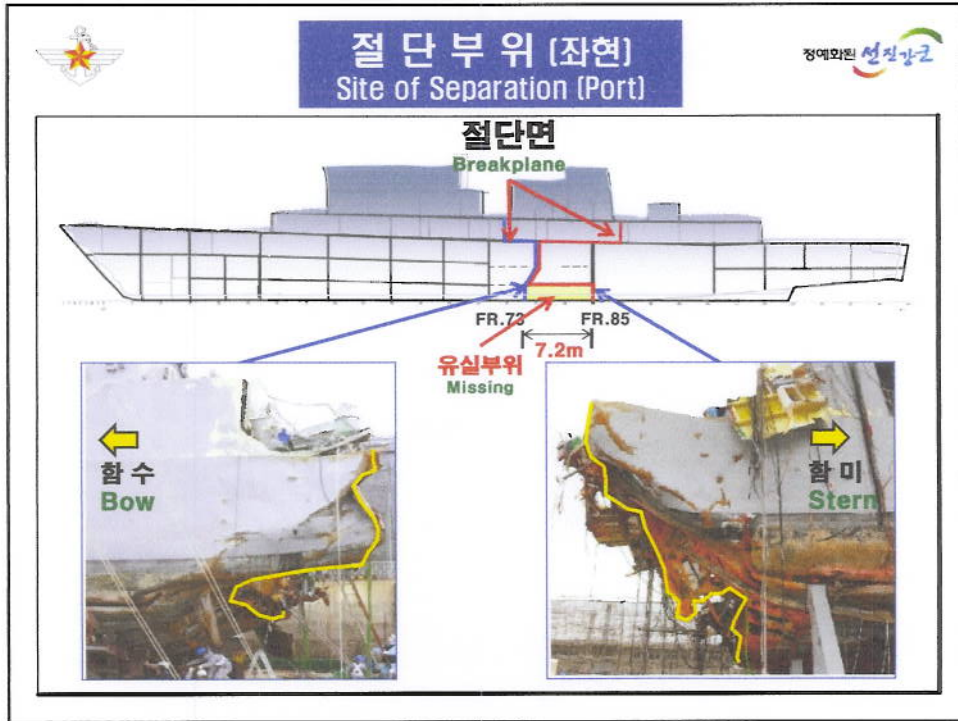
 **결정적 증거물**
Critical evidence 

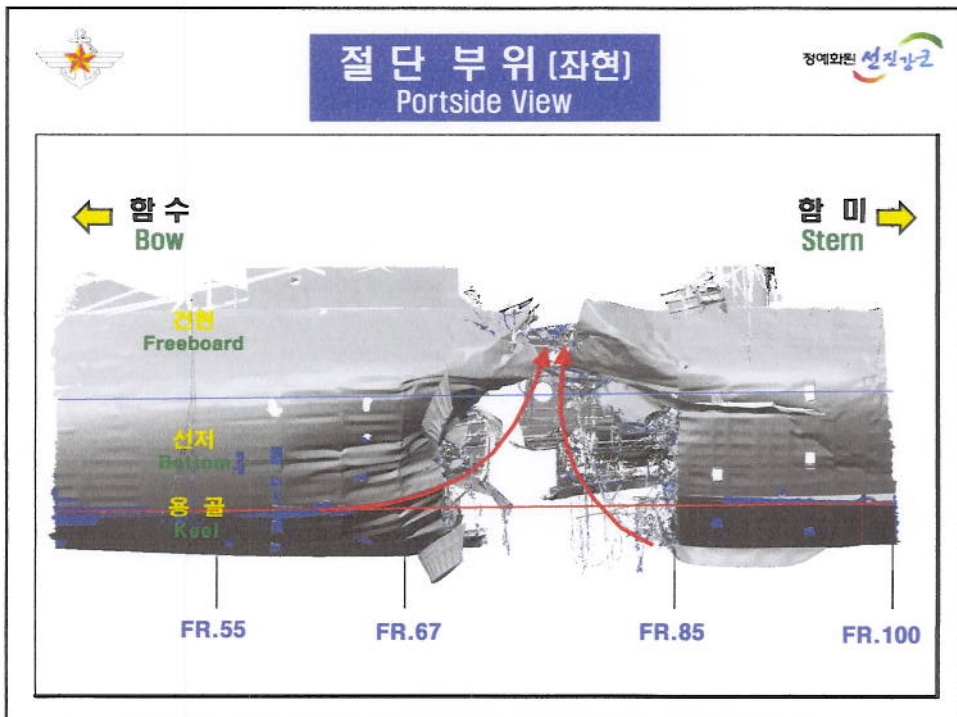
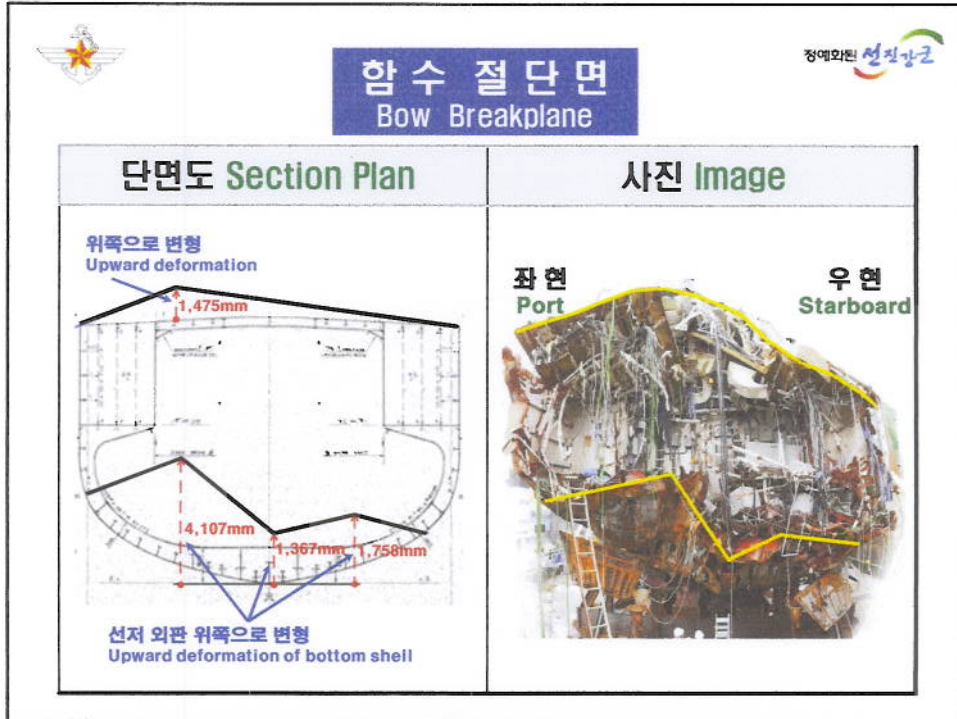
□ 수거 및 채증 과정 Recovery & collection

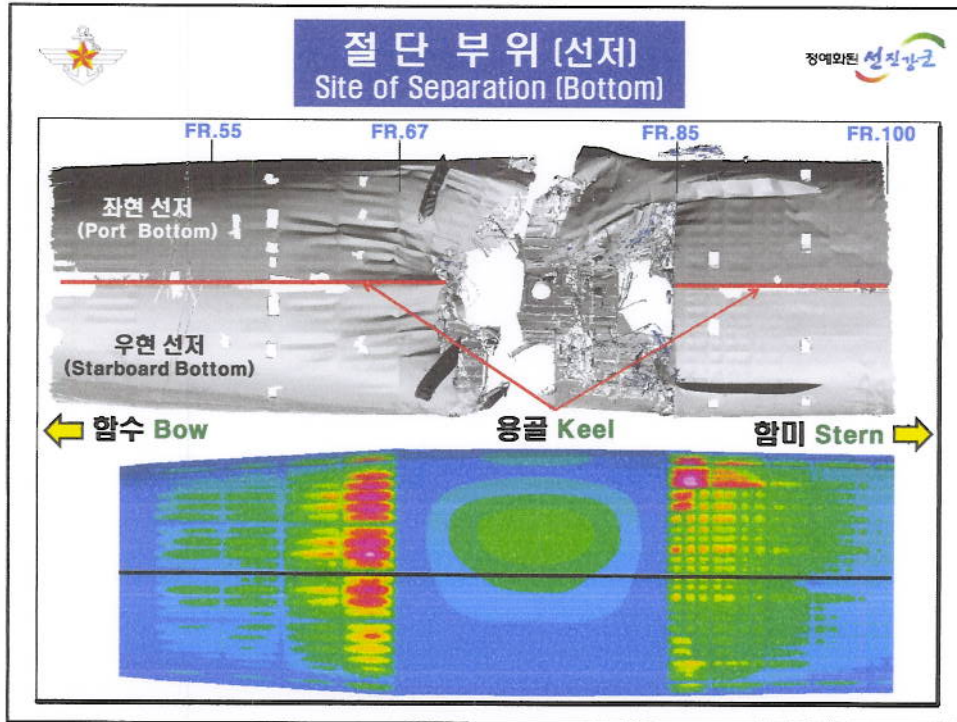
⑤ 증거물 포장
Packing





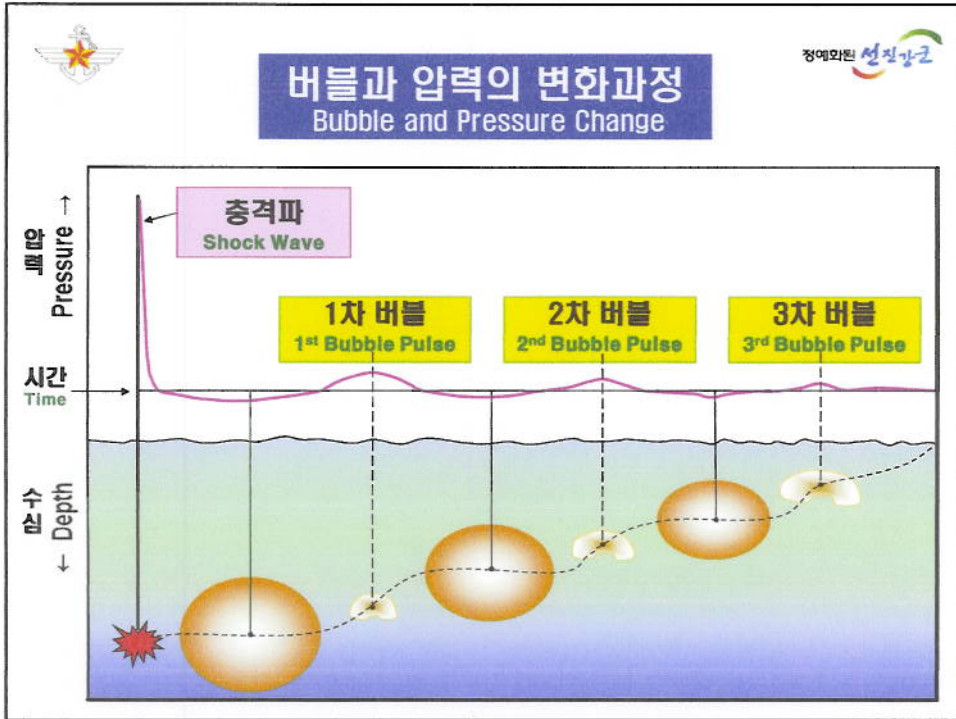






수중 폭발 현상
UNDEX Events

- 충격파와 가스버블 발생
Shock wave/gas bubble generated
- 충격파 (총 에너지의 54%) : 압력은 크나 조기 소멸
Shock wave (54% of total energy) : High pressure, short duration
- 가스버블 (총 에너지의 46%) : 압력은 적으나 장시간 지속
Gas bubble (46% of total energy) : Lower pressure, longer duration



버블 진행 과정 (1/3)
Bubble Process

정예외원 선진강국

① 수중폭발 UNDEX
가스버블 Gas bubble ← 충격파 Shock wave

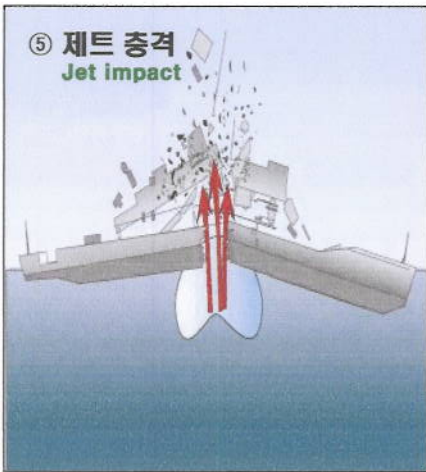
② 버블 팽창 Bubble expansion



버블 진행 과정 (2/3) Bubble Process

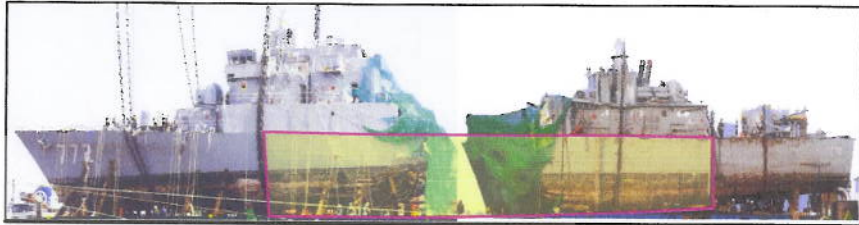


버블 진행 과정 (3/3) Bubble Process





시뮬레이션 분석 Simulation Analysis



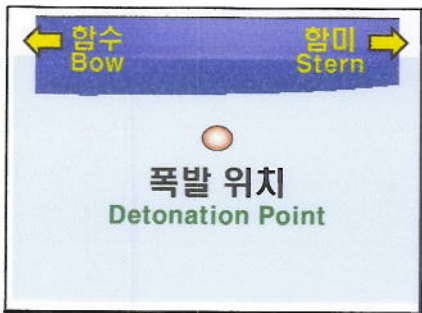
Fr 39

Fr 115

<p>입력 조건 Input conditions</p>	<ul style="list-style-type: none"> ○ 분석 범위 : Frame 39 ~ 115 Analysis range ○ 폭약량 : 45 kg ~ 420 kg TNT Charge weight ○ 폭발위치 : 수심 6 m ~ 13 m, 좌현 3 m Site : 6m~13m water depth, 3m to port
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시뮬레이션 결과 Simulation Result



가스터빈실 좌현 3m, 수심 6~9m에서
고성능 폭약 250kg 규모가 폭발시, 천안함 변형현상과 유사
Explosion of about 250kg high explosive at 6~9m in water depth and at 3m to port from center line of gas turbine room results in similar deformation as seen on ROKS Cheonan



선 체 외부
Hull Exterior



전체 모습
Overall structure



선 체 외부
Hull Exterior



함수 좌현
Bow portside



선 체 외부
Hull Exterior



함수 우현
Bow starboard side



선 체 외부
Hull Exterior



함미 좌현
Stern portside

