ECDIS Display and Alarm Issues

THE UNITED KINGDOM
HYDROGRAPHIC OFFICE

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12th NOIHC Colombo 20-23 March 2012

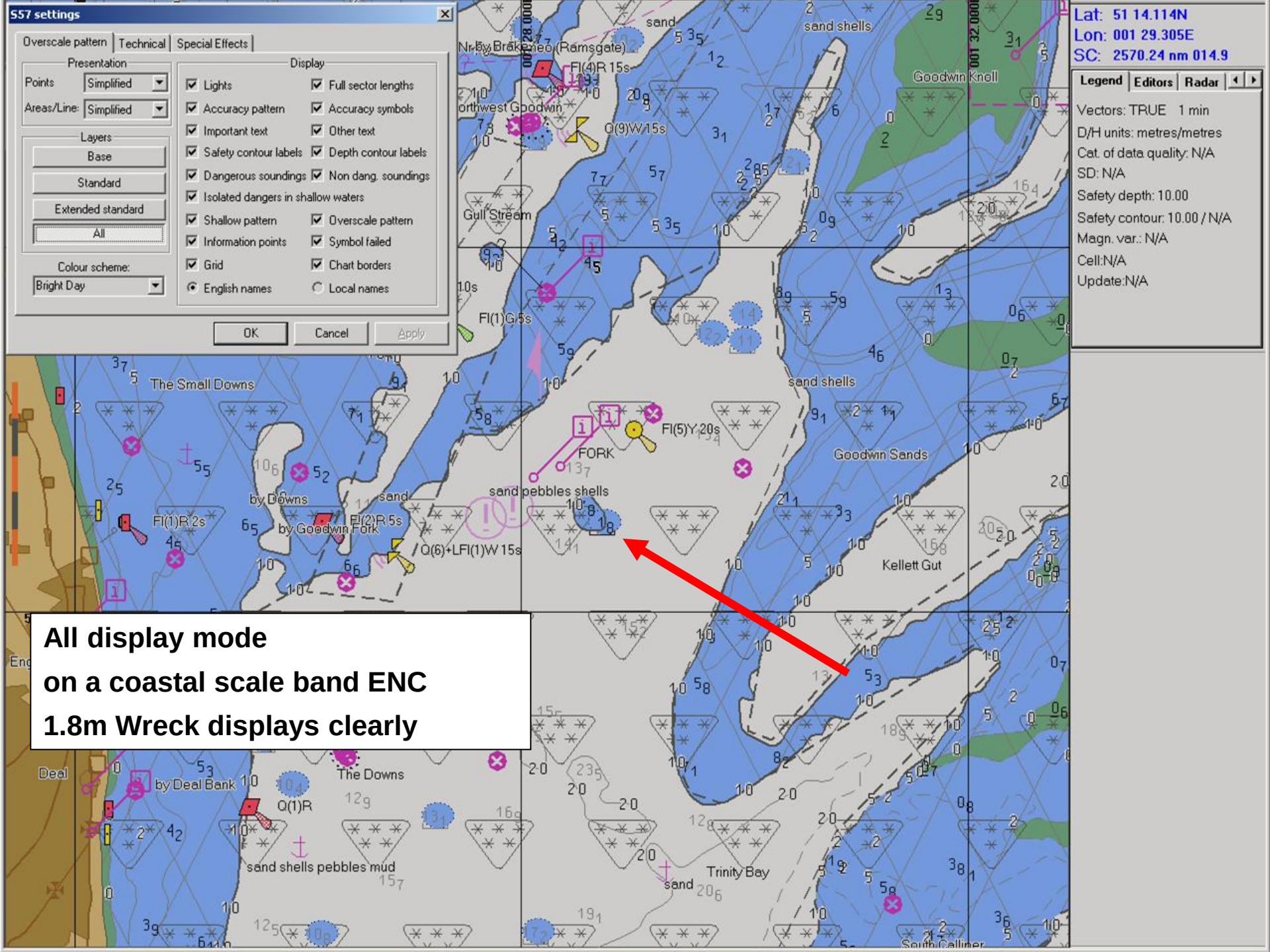
Covering Note

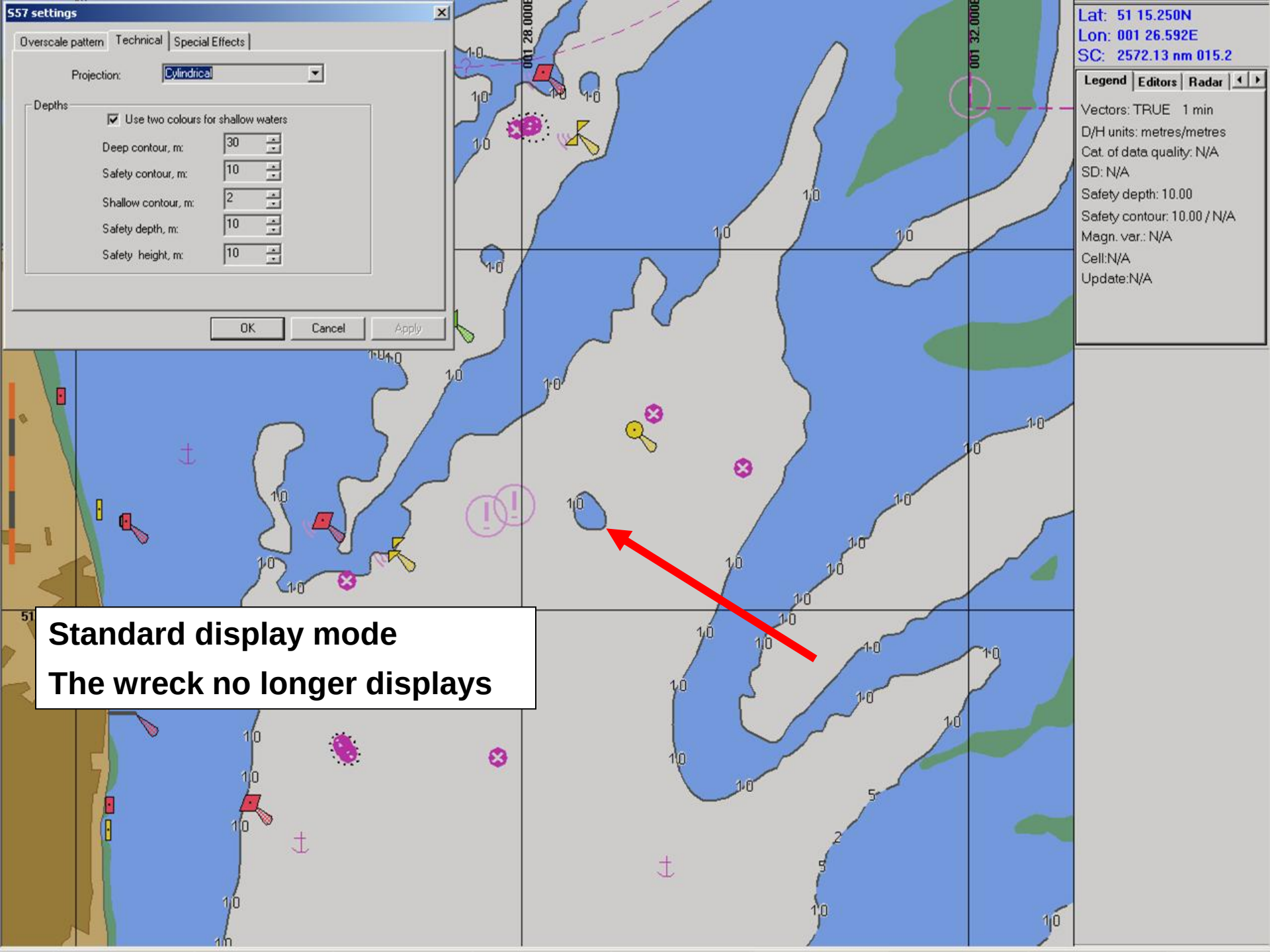
- The following ECDIS display and alarm issues came to light purely by chance as a result of routine UKHO procedures for investigating reports of marine accidents for possible charting implications.
- None of the following examples have been the cause of any marine accident – they simply represent “what if” scenarios.

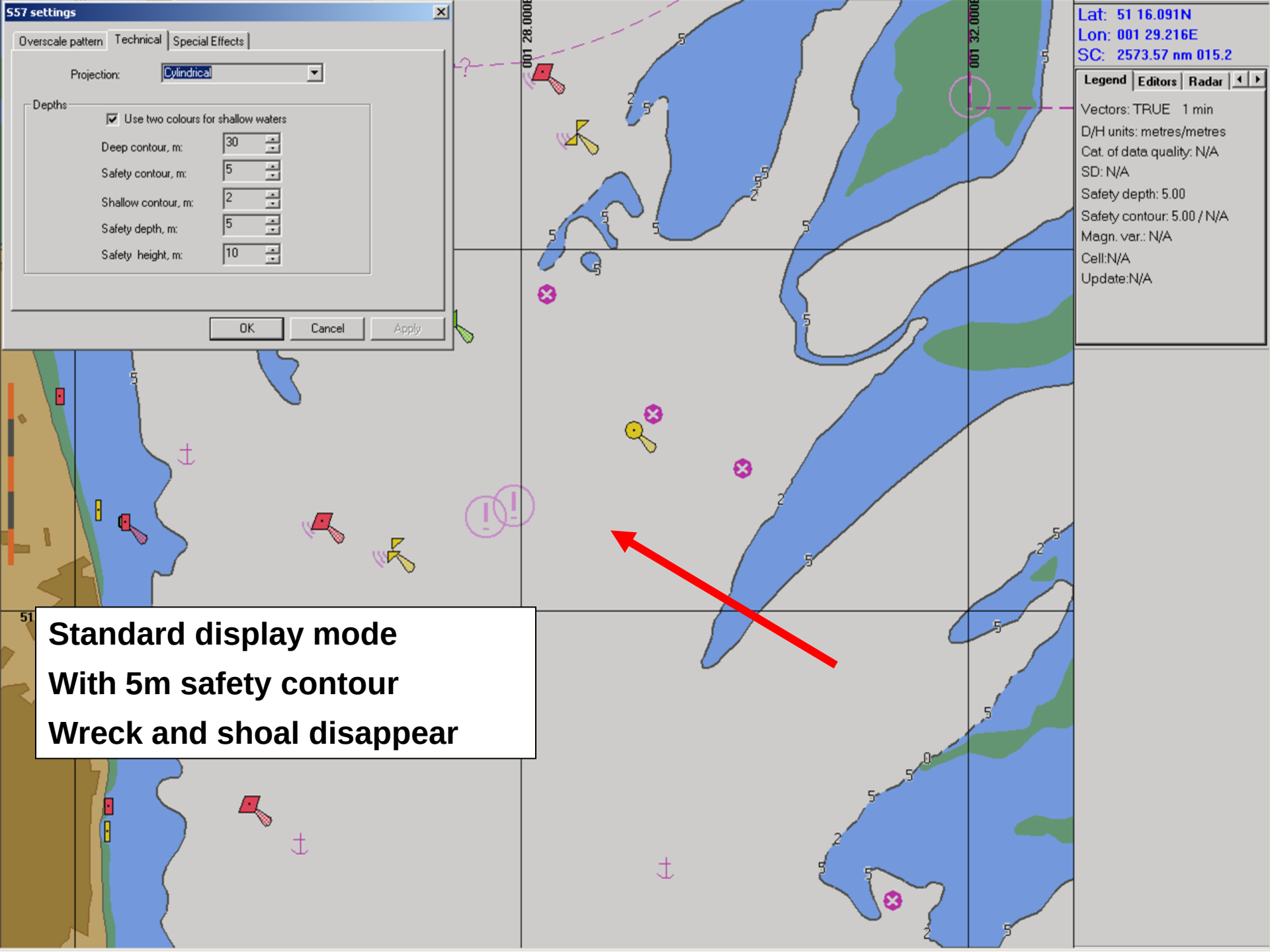
CASE 1 –DOES NOT DISPLAY BUT DOES ALARM

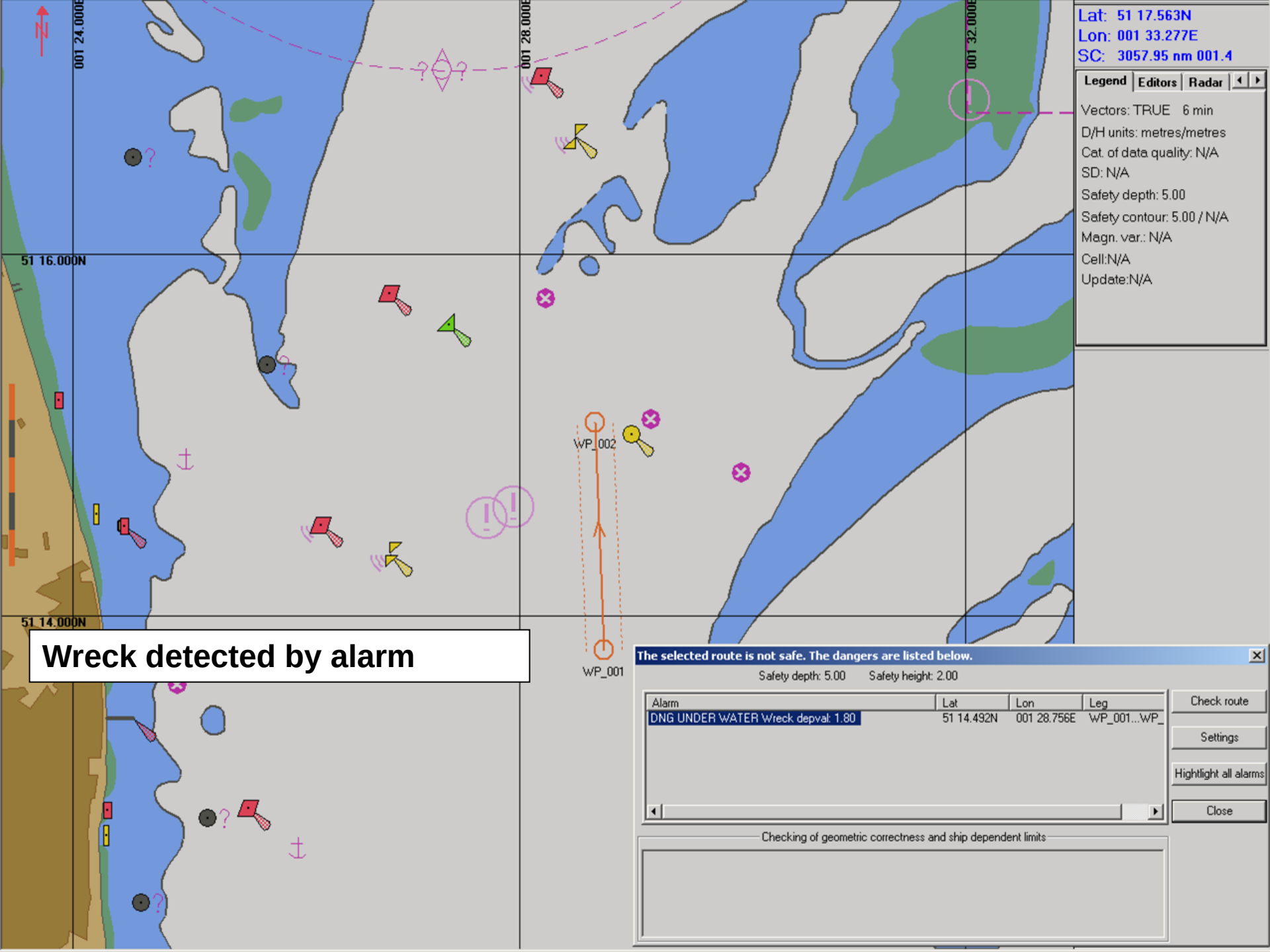
Wreck coincident with a depth contour

- This example came to light in January 2009 as a result of an enquiry from IHB regarding the encoding of a 1.8m wreck on a GB ENC.
- The enquiry was prompted by the UK Marine Accident Investigation Board report on the grounding of P&O ferry “Pride of Canterbury” off the Kent coast in January 2008.


S57 settings
Overscale pattern
Technical
Special Effects
Presentation
Points
Simplified
Areas/Line:
Simplified
Layers
Base
Standard
Extended standard
All
Colour scheme:
Bright Day
Display
Lights
Full sector lengths
Accuracy pattern
Accuracy symbols
Important text
Other text
Safety contour labels
Depth contour labels
Dangerous soundings
Non dang. soundings
Isolated dangers in shallow waters
Shallow pattern
Overscale pattern
Information points
Symbol failed
Grid
Chart borders
English names
Local names
OK
Cancel
Apply
Lat: 51 14.114N
Lon: 001 29.305E
SC: 2570.24 nm 014.9
Legend
Editors
Radar
Vectors: TRUE 1 min
D/H units: metres/metres
Cat. of data quality: N/A
SD: N/A
Safety depth: 10.00
Safety contour: 10.00 / N/A
Magn. var.: N/A
Cell:N/A
Update:N/A
Goodwin Knoll
sand shells
Gull Stream
Fl(1)G 5s
The Small Downs
Fl(5)Y 20s
FORK
sand pebbles shells
Goodwin Sands
Fl(1)R 2s
by Downs
Fl(2)R 5s
by Goodwin Fork
Q(6)+LFl(1)W 15s
Kellett Gut
Deal
by Deal Bank
Q(1)R
The Downs
sand shells pebbles mud
Trinity Bay
sand
All display mode
on a coastal scale band ENC
1.8m Wreck displays clearly


557 settings
Overscale pattern
Technical
Special Effects
Projection:
Cylindrical
Depths
Use two colours for shallow waters
Deep contour, m: 30
Safety contour, m: 10
Shallow contour, m: 2
Safety depth, m: 10
Safety height, m: 10
OK
Cancel
Apply
Lat: 51 15.250N
Lon: 001 26.592E
SC: 2572.13 nm 015.2
Legend
Editors
Radar
Vectors: TRUE 1 min
D/H units: metres/metres
Cat. of data quality: N/A
SD: N/A
Safety depth: 10.00
Safety contour: 10.00 / N/A
Magn. var.: N/A
Cell:N/A
Update:N/A
001 28.000E
001 32.000E
Standard display mode
The wreck no longer displays

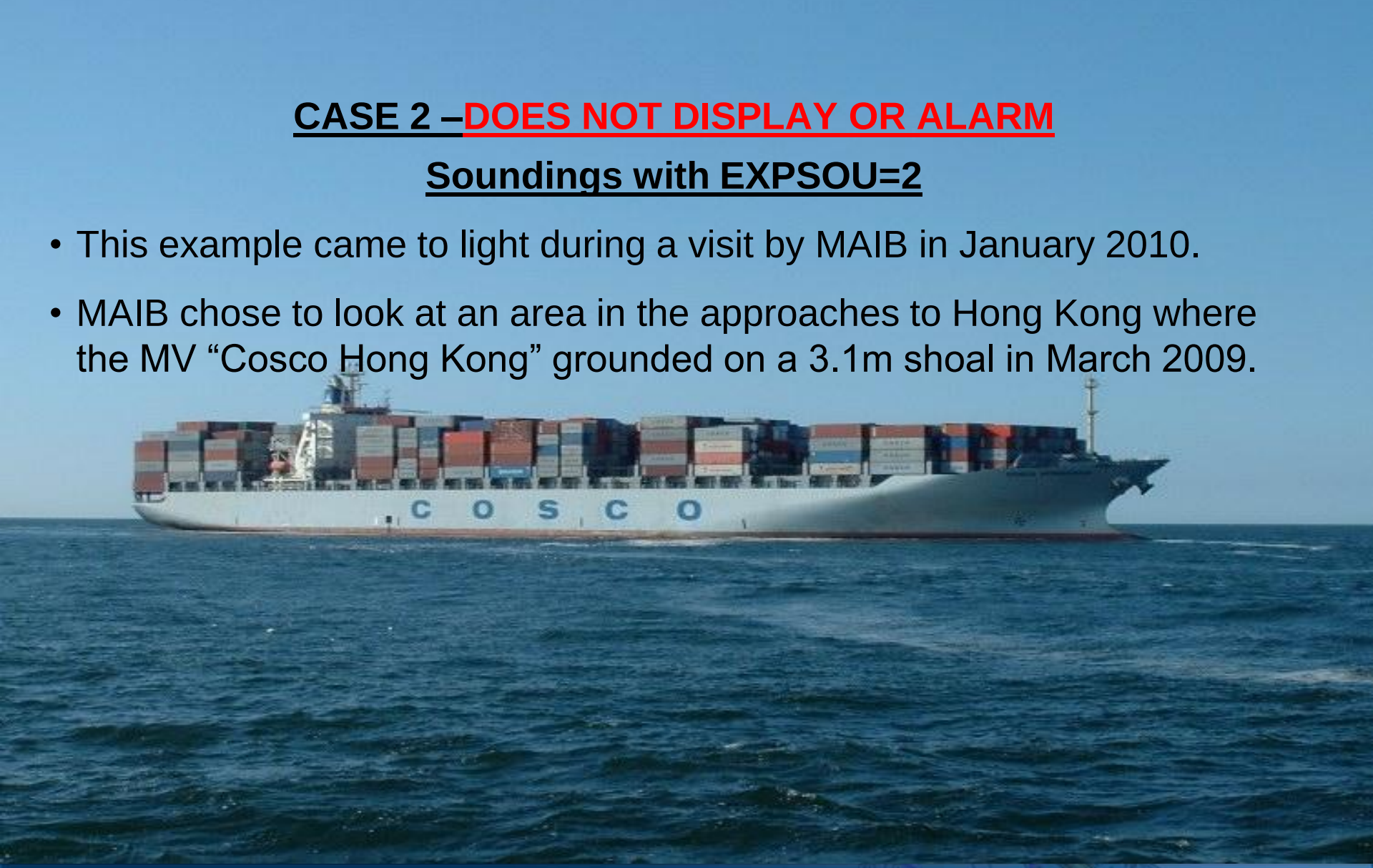

557 settings
Overscale pattern
Technical
Special Effects
Projection:
Cylindrical
Depths
Use two colours for shallow waters
Deep contour, m: 30
Safety contour, m: 5
Shallow contour, m: 2
Safety depth, m: 5
Safety height, m: 10
OK
Cancel
Apply
Lat: 51 16.091N
Lon: 001 29.216E
SC: 2573.57 nm 015.2
Legend
Editors
Radar
Vectors: TRUE 1 min
D/H units: metres/metres
Cat. of data quality: N/A
SD: N/A
Safety depth: 5.00
Safety contour: 5.00 / N/A
Magn. var.: N/A
Cell:N/A
Update:N/A
001 28.000E
001 32.000E
Standard display mode
With 5m safety contour
Wreck and shoal disappear

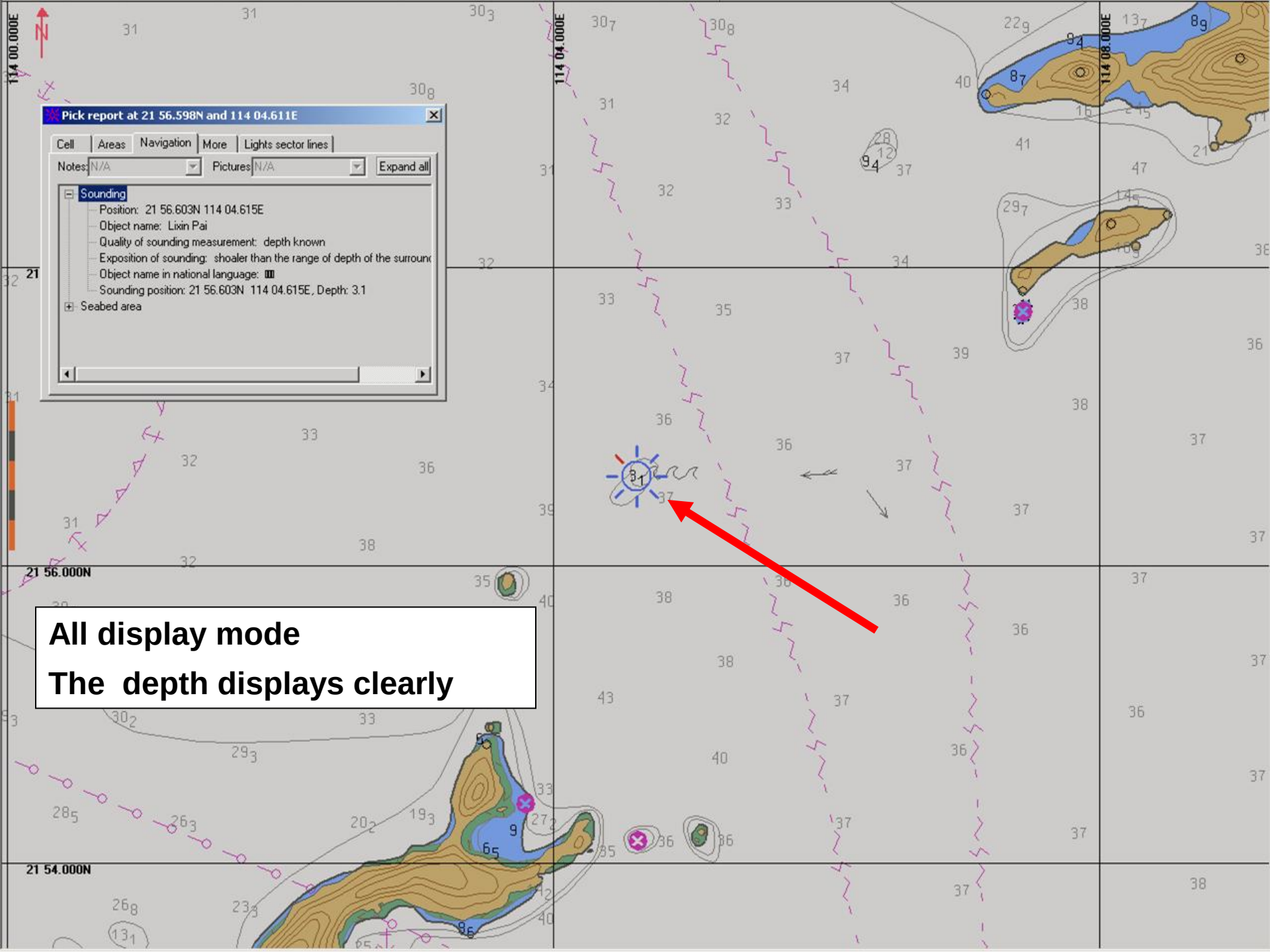

Lat: 51 17.563N
Lon: 001 33.277E
SC: 3057.95 nm 001.4
Legend
Editors
Radar
Vectors: TRUE 6 min
D/H units: metres/metres
Cat. of data quality: N/A
SD: N/A
Safety depth: 5.00
Safety contour: 5.00 / N/A
Magn. var.: N/A
Cell:N/A
Update:N/A
001 24.000E
001 28.000E
001 32.000E
51 16.000N
51 14.000N
WP_002
WP_001
Wreck detected by alarm
The selected route is not safe. The dangers are listed below.
Safety depth: 5.00
Safety height: 2.00
Alarm
Lat
Lon
Leg
DNG UNDER WATER Wreck depval: 1.80
51 14.492N
001 28.756E
WP_001...WP_
Check route
Settings
Hightlight all alarms
Close
Checking of geometric correctness and ship dependent limits

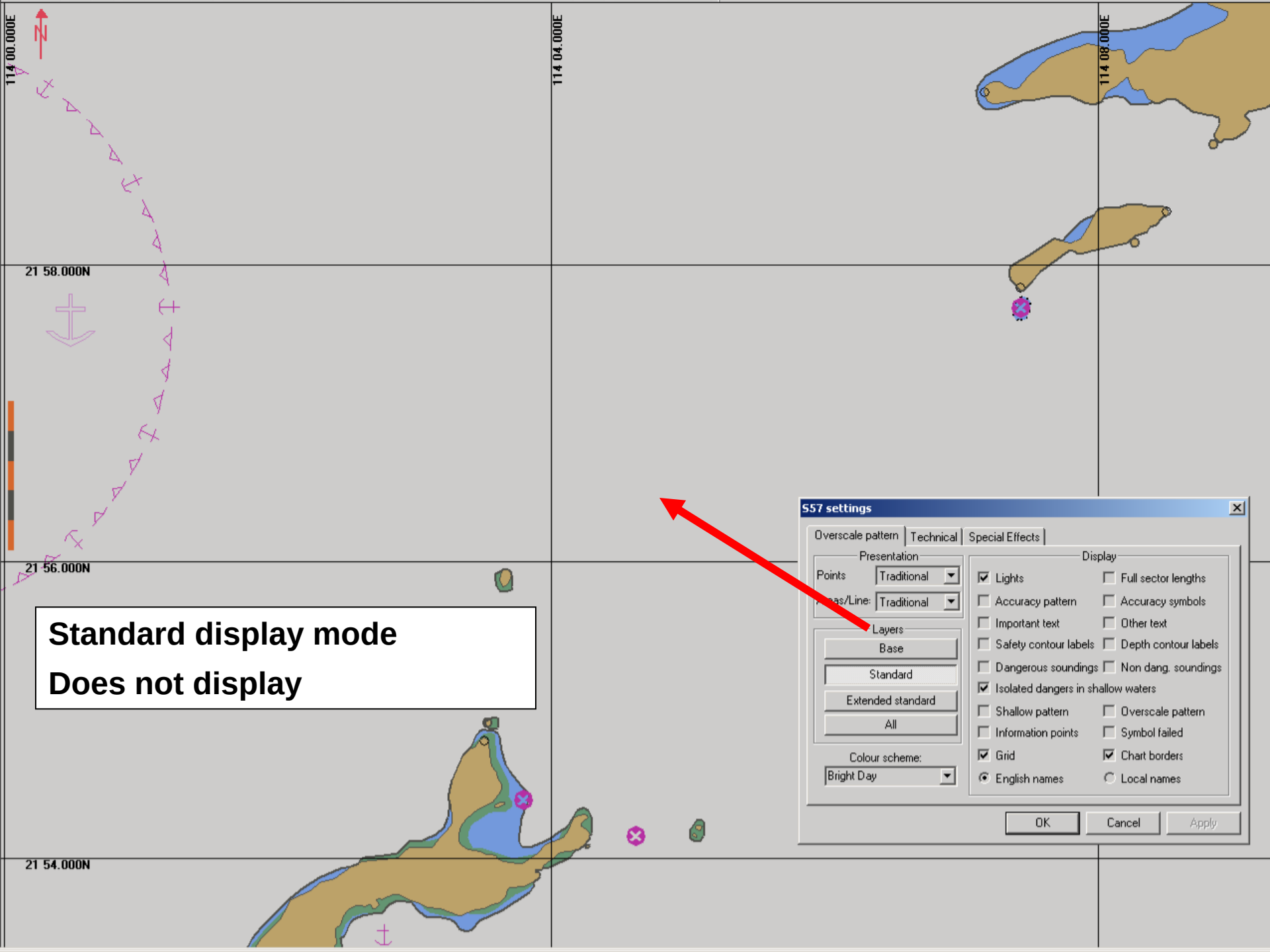
CASE 2 –DOES NOT DISPLAY OR ALARM

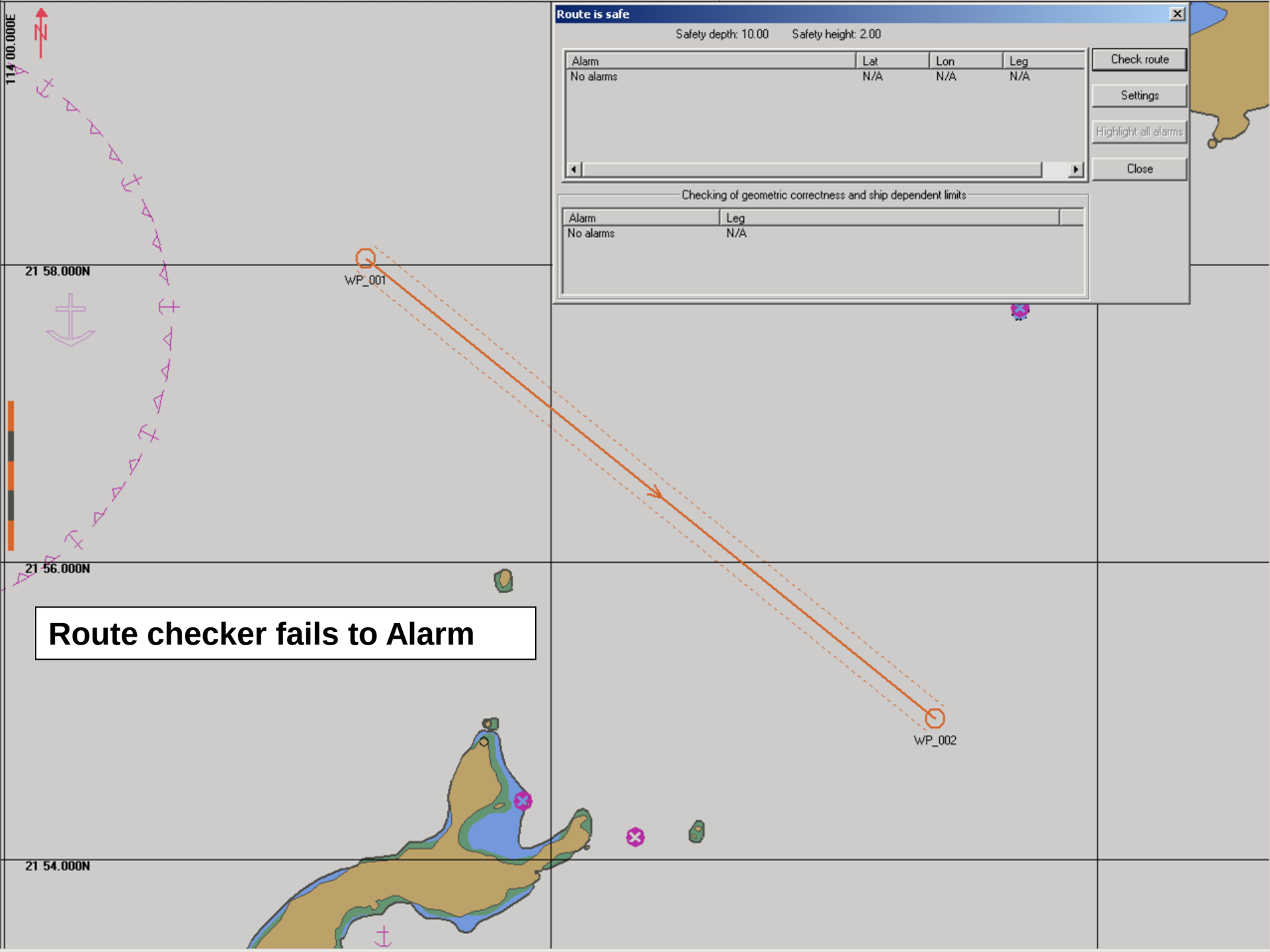
Soundings with EXPSOU=2

- This example came to light during a visit by MAIB in January 2010.
- MAIB chose to look at an area in the approaches to Hong Kong where the MV “Cosco Hong Kong” grounded on a 3.1m shoal in March 2009.




Pick report at 21 56.598N and 114 04.611E
Cell
Areas
Navigation
More
Lights sector lines
Notes: N/A
Pictures: N/A
Expand all
Sounding
Position: 21 56.603N 114 04.615E
Object name: Lixin Pai
Quality of sounding measurement: depth known
Exposition of sounding: shoaler than the range of depth of the surrounc
Object name in national language:
Sounding position: 21 56.603N 114 04.615E, Depth: 3.1
Seabed area
114 00.000E
114 04.000E
114 08.000E
21 56.000N
21 54.000N
All display mode
The depth displays clearly


114 00.000E
114 04.000E
114 08.000E
21 58.000N
21 56.000N
21 54.000N
S57 settings
Overscale pattern
Technical
Special Effects
Presentation
Points
Traditional
Areas/Line:
Traditional
Layers
Base
Standard
Extended standard
All
Colour scheme:
Bright Day
Display
Lights
Full sector lengths
Accuracy pattern
Accuracy symbols
Important text
Other text
Safety contour labels
Depth contour labels
Dangerous soundings
Non dang. soundings
Isolated dangers in shallow waters
Shallow pattern
Overscale pattern
Information points
Symbol failed
Grid
Chart borders
English names
Local names
OK
Cancel
Apply
Standard display mode
Does not display

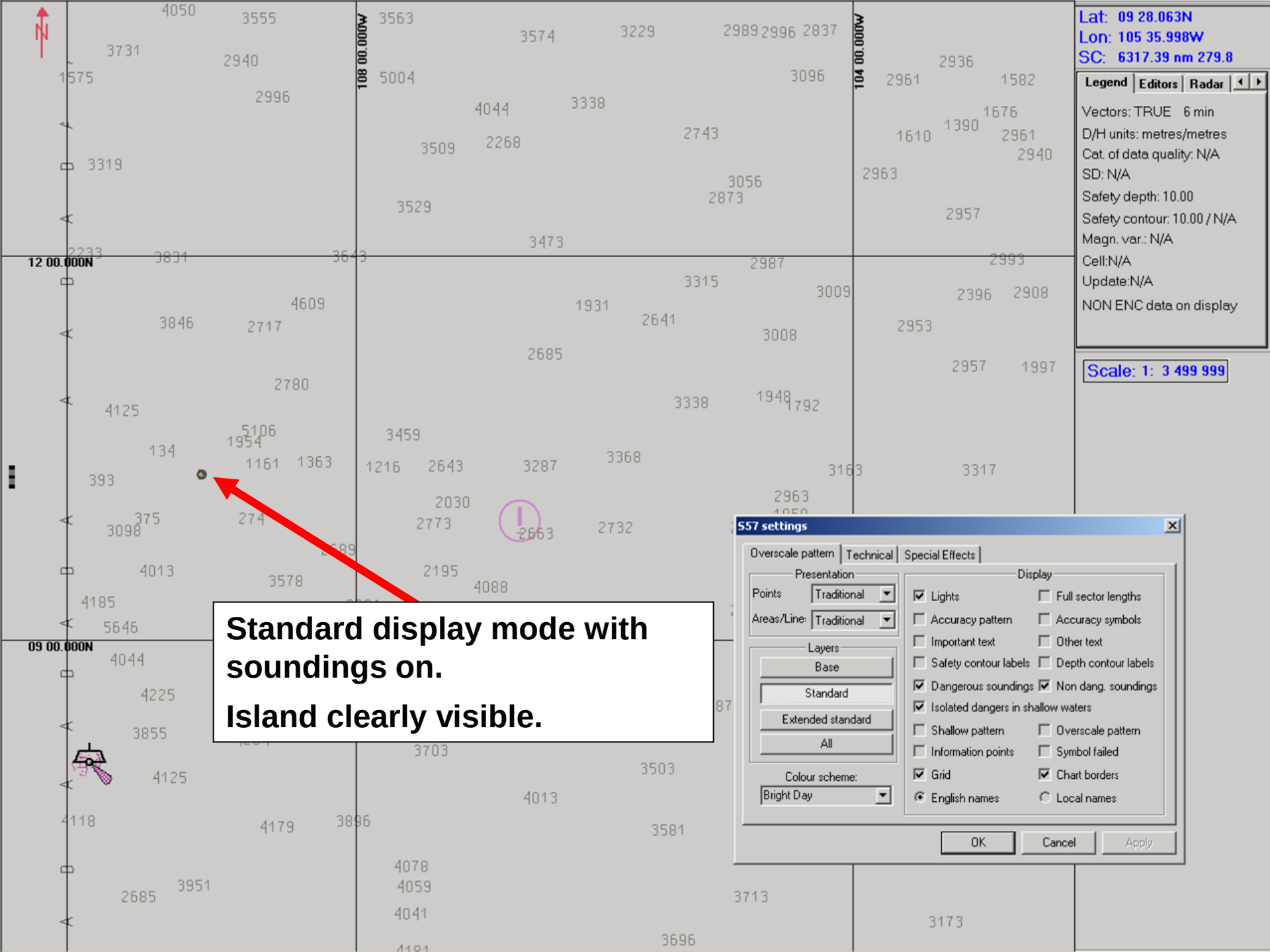

Route is safe
Safety depth: 10.00
Safety height: 2.00
Alarm
Lat
Lon
Leg
No alarms
N/A
N/A
N/A
Check route
Settings
Highlight all alarms
Close
Checking of geometric correctness and ship dependent limits
Alarm
Leg
No alarms
N/A
114 00.000E
21 58.000N
21 56.000N
21 54.000N
WP_001
WP_002
Route checker fails to Alarm

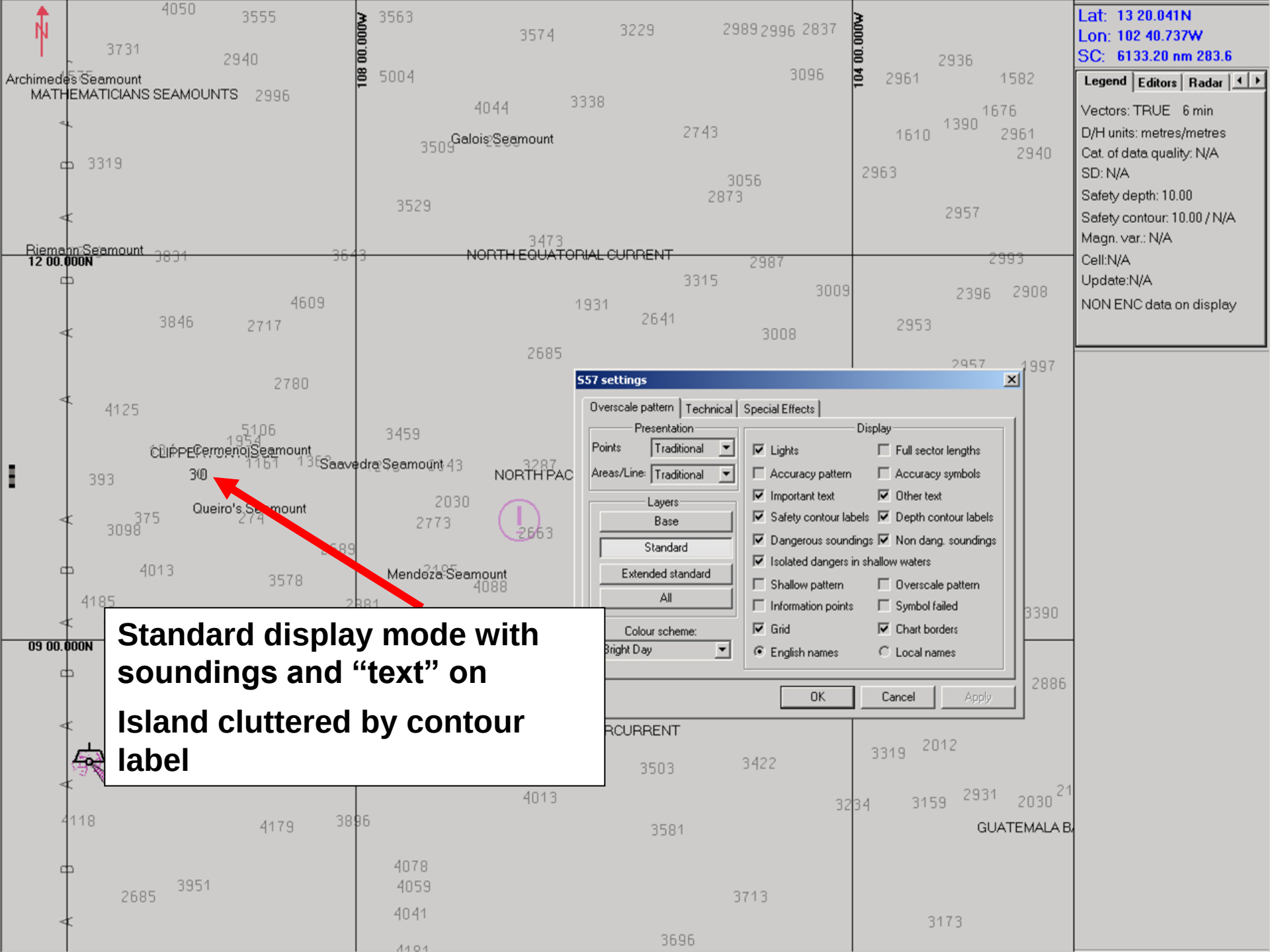
CASE 3 –DOES NOT DISPLAY OR ALARM

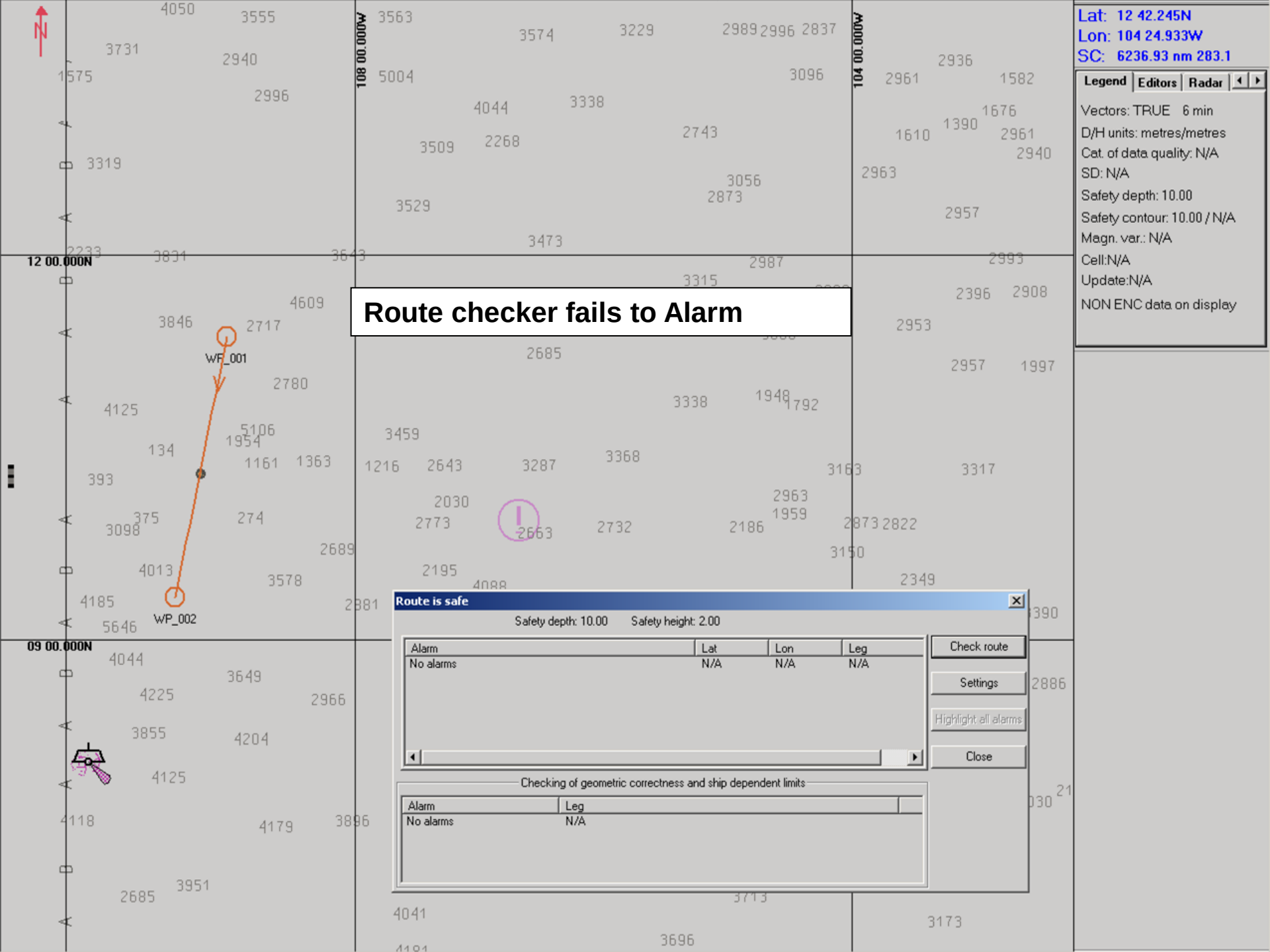
LNDARE objects with point geometry

- This next example came to light following receipt of a Hydrographic Note in April 2010.
- The H Note was sent in by chemical tanker “Sichem Osprey” following a grounding on Île Clipperton in February 2010.
- Île Clipperton is a small French atoll in the Pacific Ocean, about 1300km off the coast of Mexico.
- Accident Investigation Report shows ECDIS was not the cause of this incident

Sichem Osprey aground on the reef at Clipperton Island near Clipperton Rock

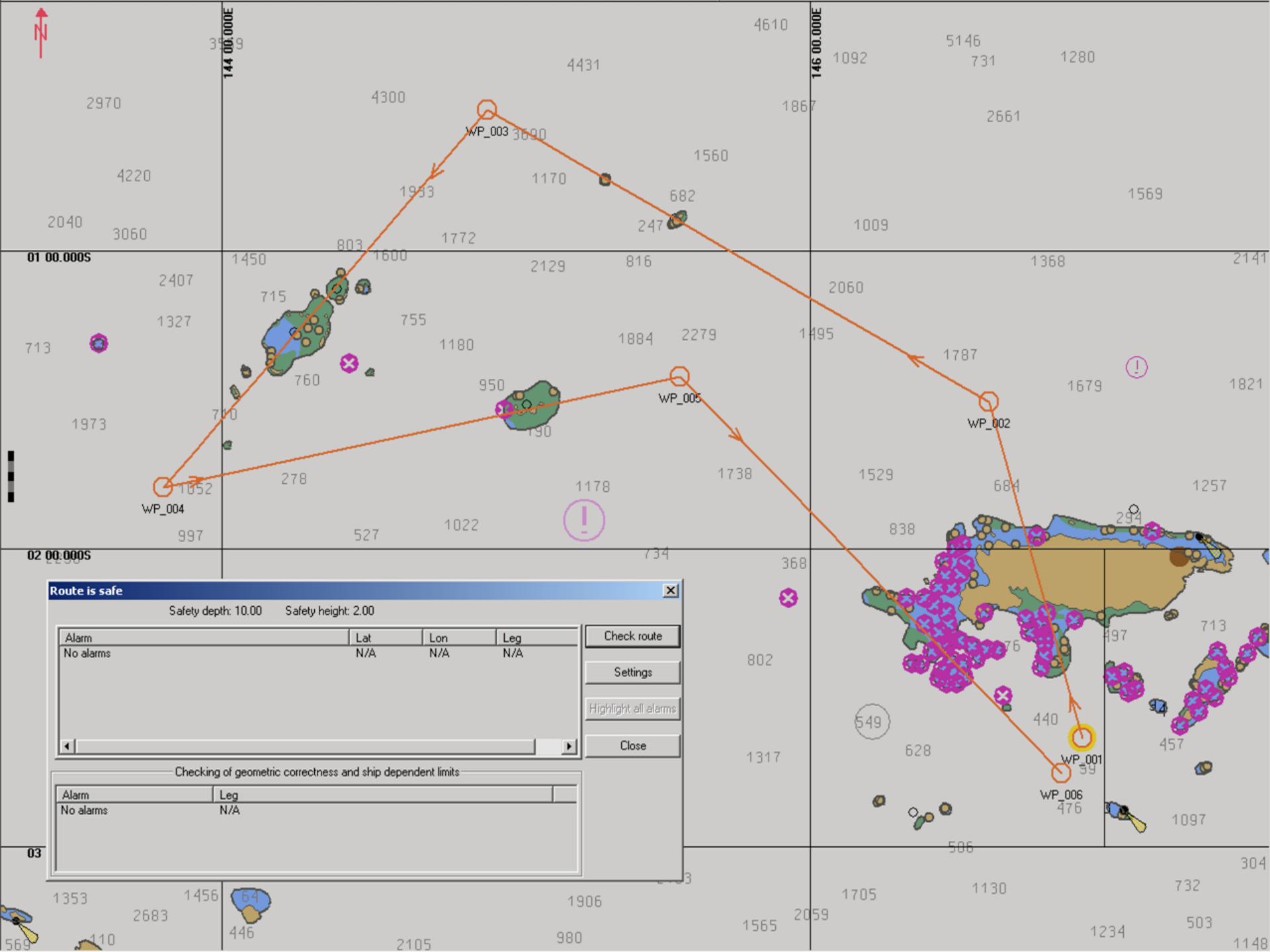

Lat: 09 28.063N
Lon: 105 35.998W
SC: 6317.39 nm 279.8
Legend
Editors
Radar
Vectors: TRUE 6 min
D/H units: metres/metres
Cat. of data quality: N/A
SD: N/A
Safety depth: 10.00
Safety contour: 10.00 / N/A
Magn. var.: N/A
Cell:N/A
Update:N/A
NON ENC data on display
Scale: 1: 3 499 999
108 00.000W
104 00.000W
12 00.000N
09 00.000N
S57 settings
Overscale pattern
Technical
Special Effects
Presentation
Points
Traditional
Areas/Line:
Traditional
Layers
Base
Standard
Extended standard
All
Colour scheme:
Bright Day
Display
Lights
Full sector lengths
Accuracy pattern
Accuracy symbols
Important text
Other text
Safety contour labels
Depth contour labels
Dangerous soundings
Non dang. soundings
Isolated dangers in shallow waters
Shallow pattern
Overscale pattern
Information points
Symbol failed
Grid
Chart borders
English names
Local names
OK
Cancel
Apply
Standard display mode with soundings on.
Island clearly visible.


Lat: 13 20.041N
Lon: 102 40.737W
SC: 6133.20 nm 283.6
Legend
Editors
Radar
Vectors: TRUE 6 min
D/H units: metres/metres
Cat. of data quality: N/A
SD: N/A
Safety depth: 10.00
Safety contour: 10.00 / N/A
Magn. var.: N/A
Cell:N/A
Update:N/A
NON ENC data on display
Archimedes Seamount
MATHEMATICIANS SEAMOUNTS
Galois Seamount
Riemann Seamount
NORTH EQUATORIAL CURRENT
Cermeno Seamount
Saavedra Seamount
Queiro's Seamount
Mendoza Seamount
GUATEMALA B
108 00.000W
104 00.000W
12 00.000N
09 00.000N
S57 settings
Overscale pattern
Technical
Special Effects
Presentation
Points
Traditional
Areas/Line:
Traditional
Layers
Base
Standard
Extended standard
All
Colour scheme:
Bright Day
Display
Lights
Full sector lengths
Accuracy pattern
Accuracy symbols
Important text
Other text
Safety contour labels
Depth contour labels
Dangerous soundings
Non dang. soundings
Isolated dangers in shallow waters
Shallow pattern
Overscale pattern
Information points
Symbol failed
Grid
Chart borders
English names
Local names
OK
Cancel
Apply
Standard display mode with soundings and “text” on
Island cluttered by contour label


Lat: 12 42.245N
Lon: 104 24.933W
SC: 6236.93 nm 283.1
Legend
Editors
Radar
Vectors: TRUE 6 min
D/H units: metres/metres
Cat. of data quality: N/A
SD: N/A
Safety depth: 10.00
Safety contour: 10.00 / N/A
Magn. var.: N/A
Cell:N/A
Update:N/A
NON ENC data on display
Route checker fails to Alarm
12 00.000N
09 00.000N
108 00.000W
104 00.000W
WP_001
WP_002
Route is safe
Safety depth: 10.00
Safety height: 2.00
Alarm
Lat
Lon
Leg
No alarms
N/A
N/A
N/A
Check route
Settings
Highlight all alarms
Close
Checking of geometric correctness and ship dependent limits
Alarm
Leg
No alarms
N/A

Route checking on small scale ENCs

- On further investigation, we found that some Original Equipment Manufacturers (OEMs) have implemented route checking with a scale limit.
- These scale limits have been implemented in different ways by different OEMs, perhaps assuming usage bands 1 or 2 will not be used for coastal navigation.
- IEC 61174 states: “The largest scale data available…shall always be used by the ECDIS for all alarms…”
- In many areas, small scale ENCs in usage band 1 or 2 represent the largest scale chart data available.

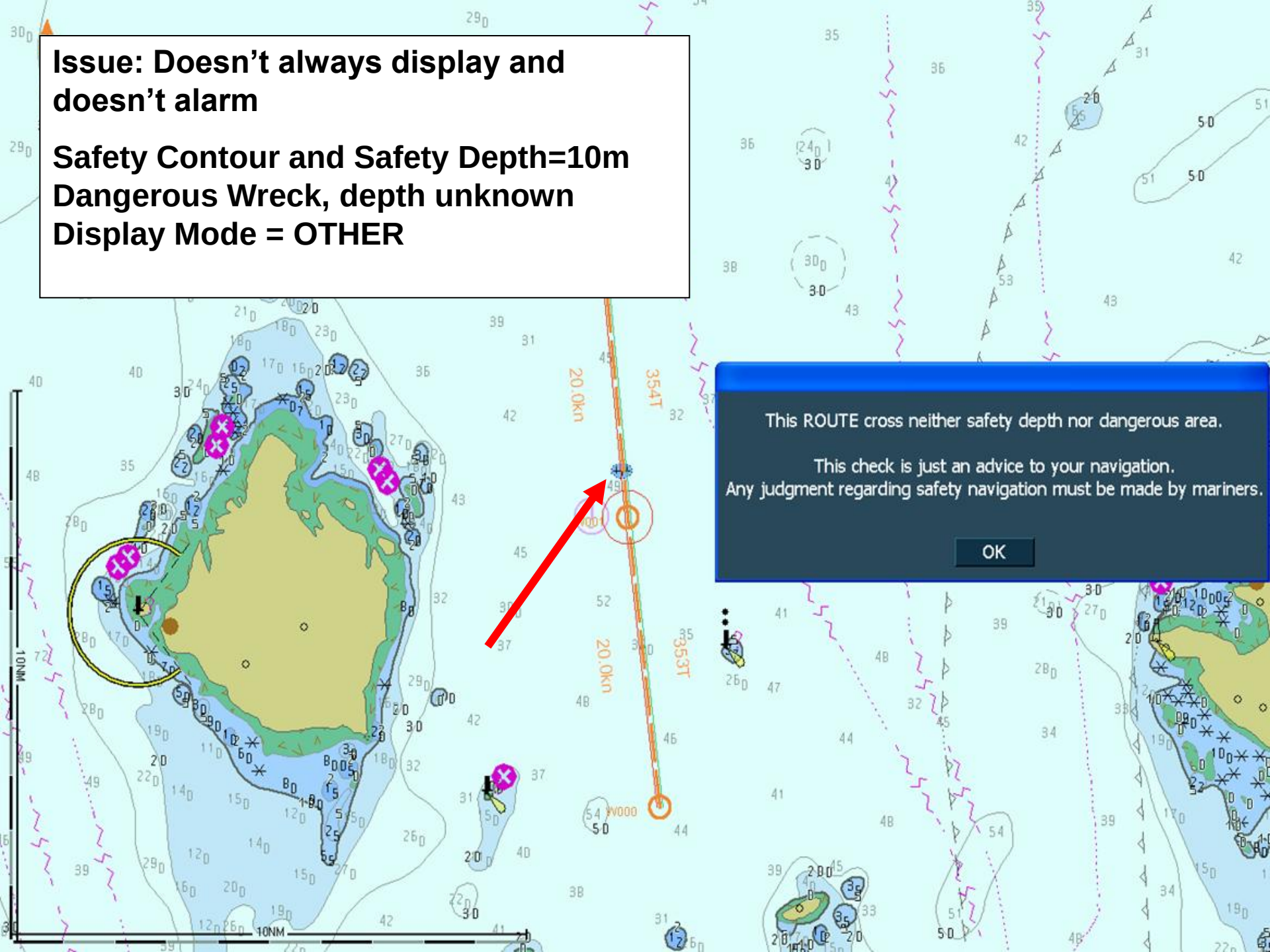

144 00.000E
146 00.000E
01 00.000S
02 00.000S
03
WP_003
WP_004
WP_005
WP_002
WP_001
WP_006
Route is safe
Safety depth: 10.00
Safety height: 2.00
Alarm
Lat
Lon
Leg
No alarms
N/A
N/A
N/A
Check route
Settings
Highlight all alarms
Close
Checking of geometric correctness and ship dependent limits
Alarm
Leg
No alarms
N/A

The need for Systematic Analysis

- The previous examples came to light purely by chance.
- UKHO Safety & Quality and Operations Standards branches therefore carried out a more systematic analysis, but still limited just to:
  - display and alarm functionality
  - potentially hazardous underwater features (64 test cases)
  - on a small number of ECDIS systems representing some the main suppliers in the market

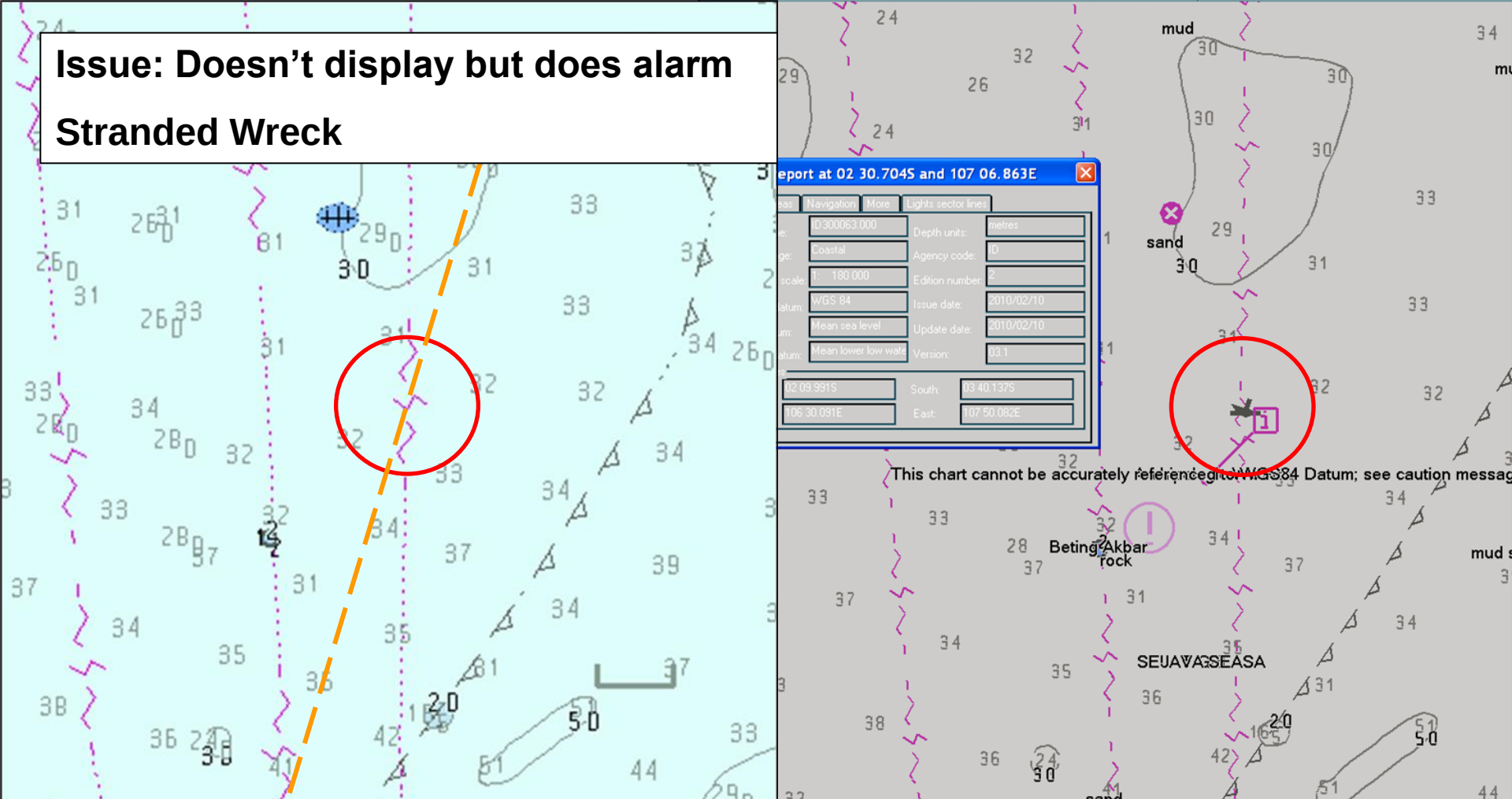
Issue: Doesn't always display and doesn't alarm

Safety Contour and Safety Depth=10m
Dangerous Wreck, depth unknown
Display Mode = OTHER

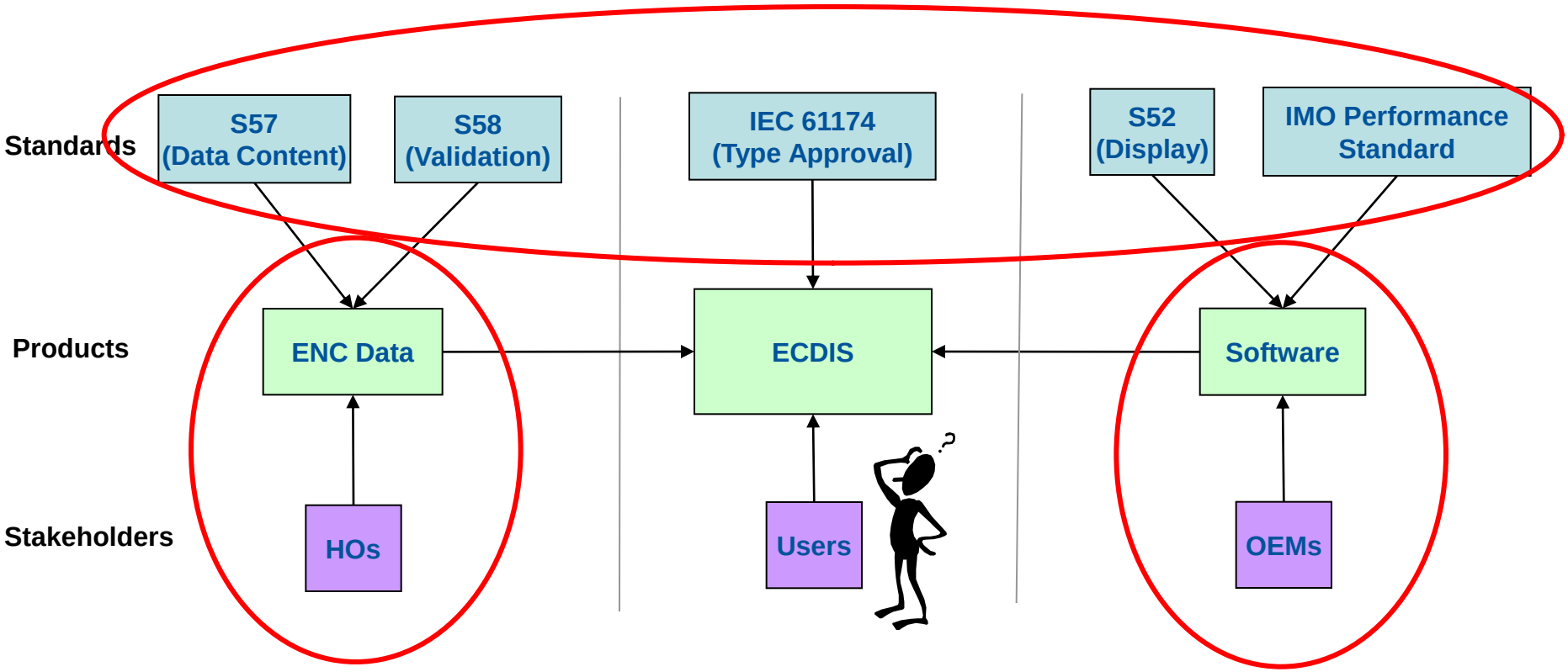


Issue: Doesn't display but does alarm

Stranded Wreck



UKHO has some influence over the development of these standards



UKHO has full control over UKHO-produced ENCs; only limited control over FGHO-produced ENCs

UKHO has little or no influence over the development of ECDIS software

Summary of actions

- MCA and IHO informed as and when issues were first discovered
- RNWs issued (Navarea I warnings 37/10, 230/10, 317/10)
- Papers submitted to IMO MSC88 (Dec 2010) and MSC89 (May 2011)
- Dec 2010: IMO MSC circular on “ECDIS Anomalies” issued (MSC.1/Circ.1391)
- Feb 2011: MCA Marine Information Note on “Reporting Operating Anomalies Identified within ECDIS” issued (MIN 406 M+F)
- Oct 2011: Simple ENC check dataset issued by IHO