NTSB National Transportation Safety Board

Office of Marine Safety

Actions of the Pilot and the Master

Captain R. A. Jones

Experience

- Pilot
  - Bar pilot for 26 years
  - Thousands of trips under Bay Bridge
  - Not uncommon to operate in fog
  - Recurrent training for ship-handling in simulators and manned scale model vessels

- Master
  - Master for 10 years
  - 2 weeks with company, vessel and crew
  - 1st time in San Francisco Harbor
  - 1st time under way on *Cosco Busan* without company supervisors

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Vessel Safety Management System

- Berth to Berth Passage Planning
- Master/Pilot Information Exchange
  - Both required
  - Neither fully complied with

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Navigation Bridge

- Bridge Team
  - Master
  - 3rd Officer
  - Helmsman
- Pilot

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Master's Responsibilities

- International Regulations:
  - *Despite the duties and obligations of Pilots, their presence on board does not relieve the master or officer in charge of the navigational watch from their duties and obligations for the safety of the ship.*
  - *The Master and the Pilot shall exchange information regarding navigation procedures, local conditions and the ship's characteristics. The master and/or the officer in charge of the navigational watch shall co-operate closely with the Pilot and maintain an accurate check of the ship's position and movement."*

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Pilot's Responsibilities

- American Pilots' Association (APA)
  - Each pilotage assignment should begin with a conference
  - Subject matter should be determined by specific navigation demands of the operation
  - Pilot card a supplement, not substitute
  - Information about the vessel
    - Radio channels to be monitored
    - Crew to fix position of vessel
    - Only English to be spoken on bridge

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American Pilots' Association

- "The typical state-licensed pilot in the U.S. is the most highly trained mariner in the world."

- Continual training in
  - Bridge Resource Management
  - Emergency ship-handling
  - New navigation technology
  - Bridge simulators

- "Each state pilot is expected to be comfortable with the latest in navigation technology and ships' systems."

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American Pilots' Association

- In the United States, compulsory pilotage is considered navigation safety regulation.
- Although the state pilot is not an employee of the government or the port, the pilot performs a public service in which the pilot is expected to protect the waters where he or she operates by preventing ships from engaging in unsafe operations.

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San Francisco Bar Pilots

- "Protecting the Bay since 1850."
  - "Despite narrow channels and rivers, shallow shoals and sand bars, shifting currents and tides, the San Francisco Bar Pilots expertly and efficiently navigate them, along with thick fog, high winds and winter storms. We possess the experience, ship handling skills and local knowledge that enable us to move seagoing vessels in one of the most dangerous pilotage areas in the country."

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Master/Pilot Information Exchange

- Master and Bridge Team
  - Knowledge of own vessel and equipment status
  - Vessel handling characteristics
  - Crew and language considerations
  - Ship's passage plan

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Master/Pilot Information Exchange

- Pilot
  - Local knowledge
  - Local conditions (harbor regulations)
  - Local language (radio calls)
  - Local weather (fog)
  - Local tides and currents
  - Expert ship-handling abilities
  - Pilot’s intended route

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Common Goal

- The common goal is the safe handling of the ship in confined waters from the berth out to sea or from sea to the berth.

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This Accident – Opportunity Missed

- Discussion during master/pilot conference
  - Passage plan (outbound course)
  - Slowest possible speed to maintain safe transit due to visibility conditions
  - Use of the assist tug and when it was to be released
  - Use of Variable Range Marker (VRM) to maintain distance off Yerba Buena Island to pass safely through D and E span

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Integration Barriers

- Examples:
  - Language difficulties
  - Cultural differences and expectations
  - Misunderstanding
  - Assumptions
  - Ego clashes
  - Human error or misjudgment
  - Lack of monitoring of the pilot
  - Not monitoring the ship’s progress
  - No shared mental model
  - Reluctance to clarify doubt with the pilot
  - Lack of support from the bridge team
  - Not using all available resources

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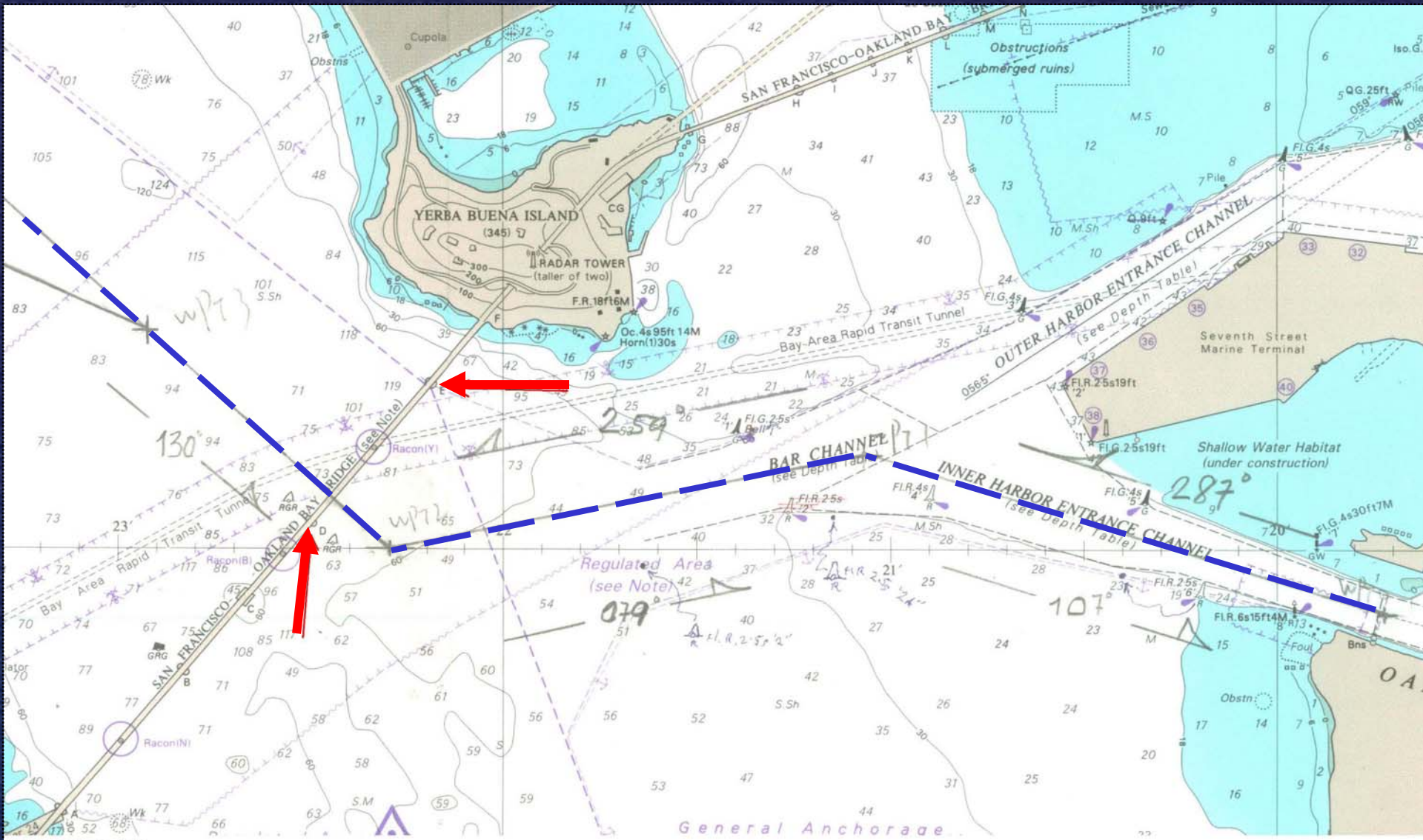
Outbound Transit



Addendum 58

Radar VRM Set to 0.33

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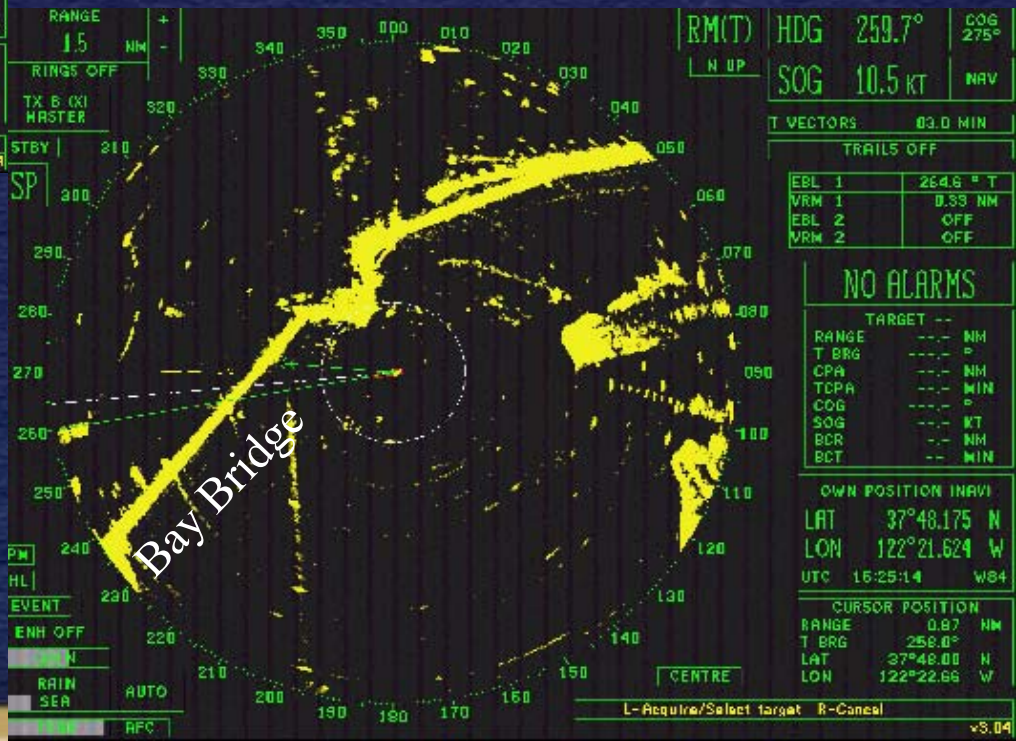
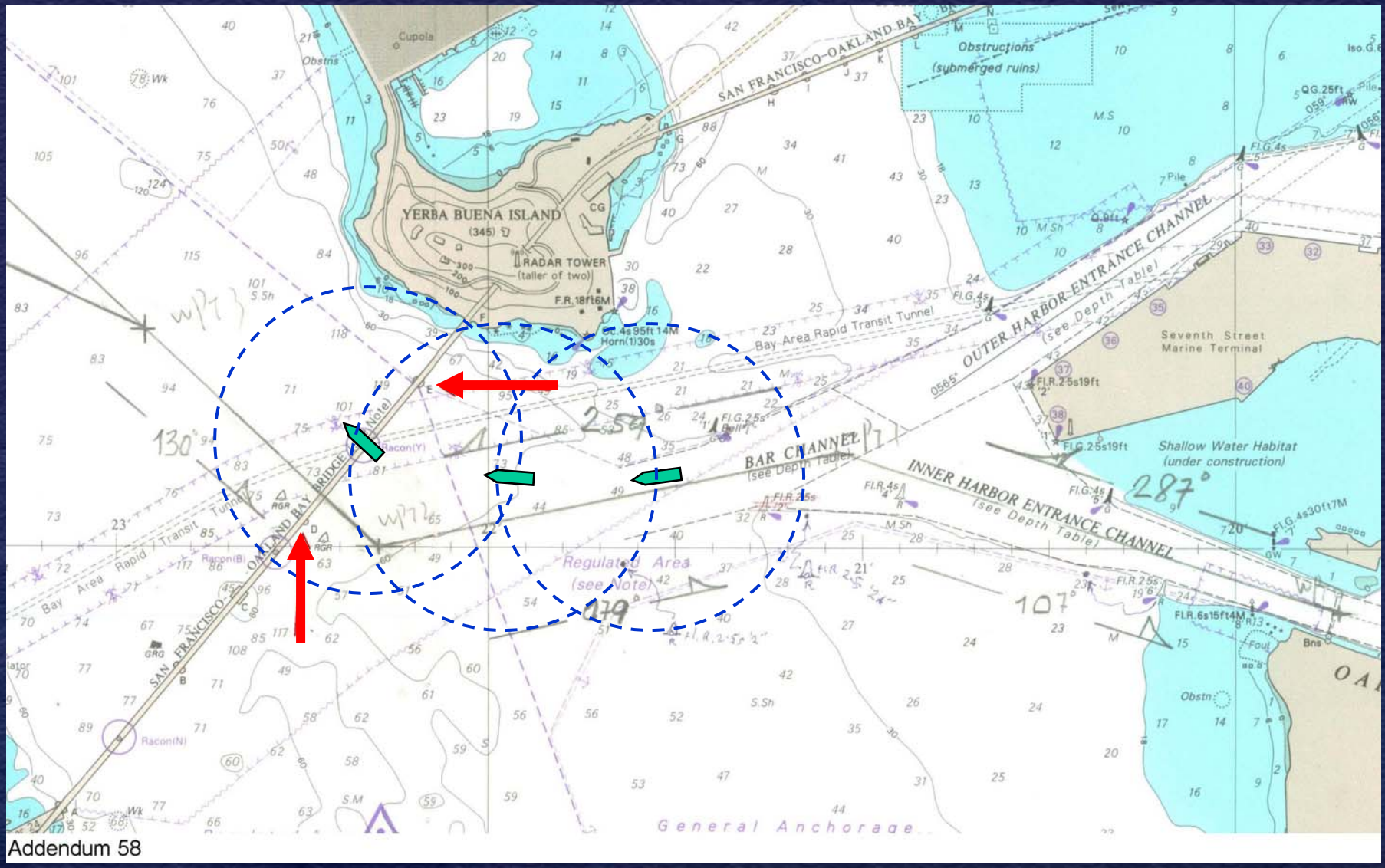
Radar VRM Use and Yerba Buena Island



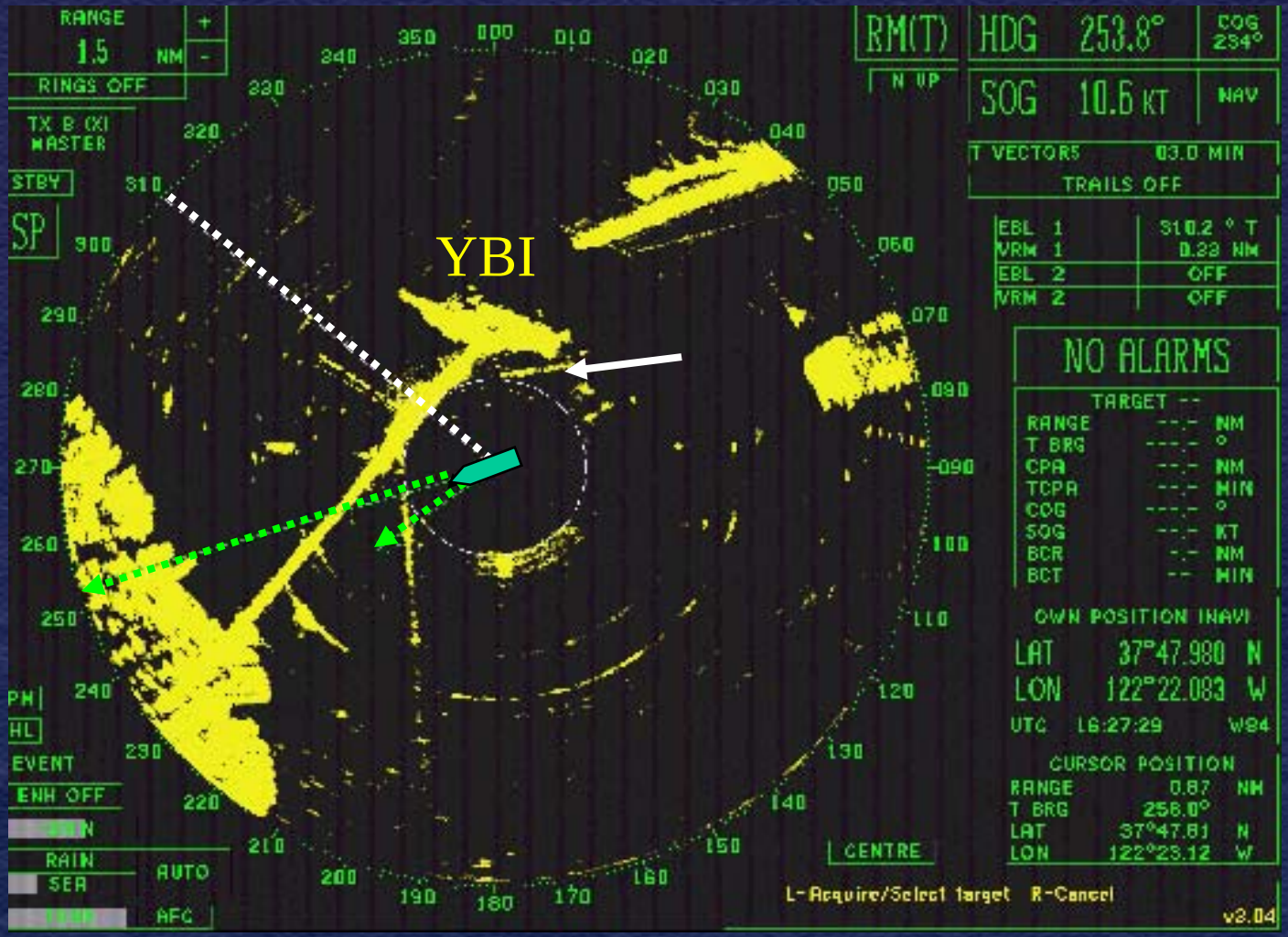
Pilot's Intended Use of VRM



Addendum 58

RACON (RAdar beaCON)

Vessel's Actual Position Contrary to Pilot's Intentions



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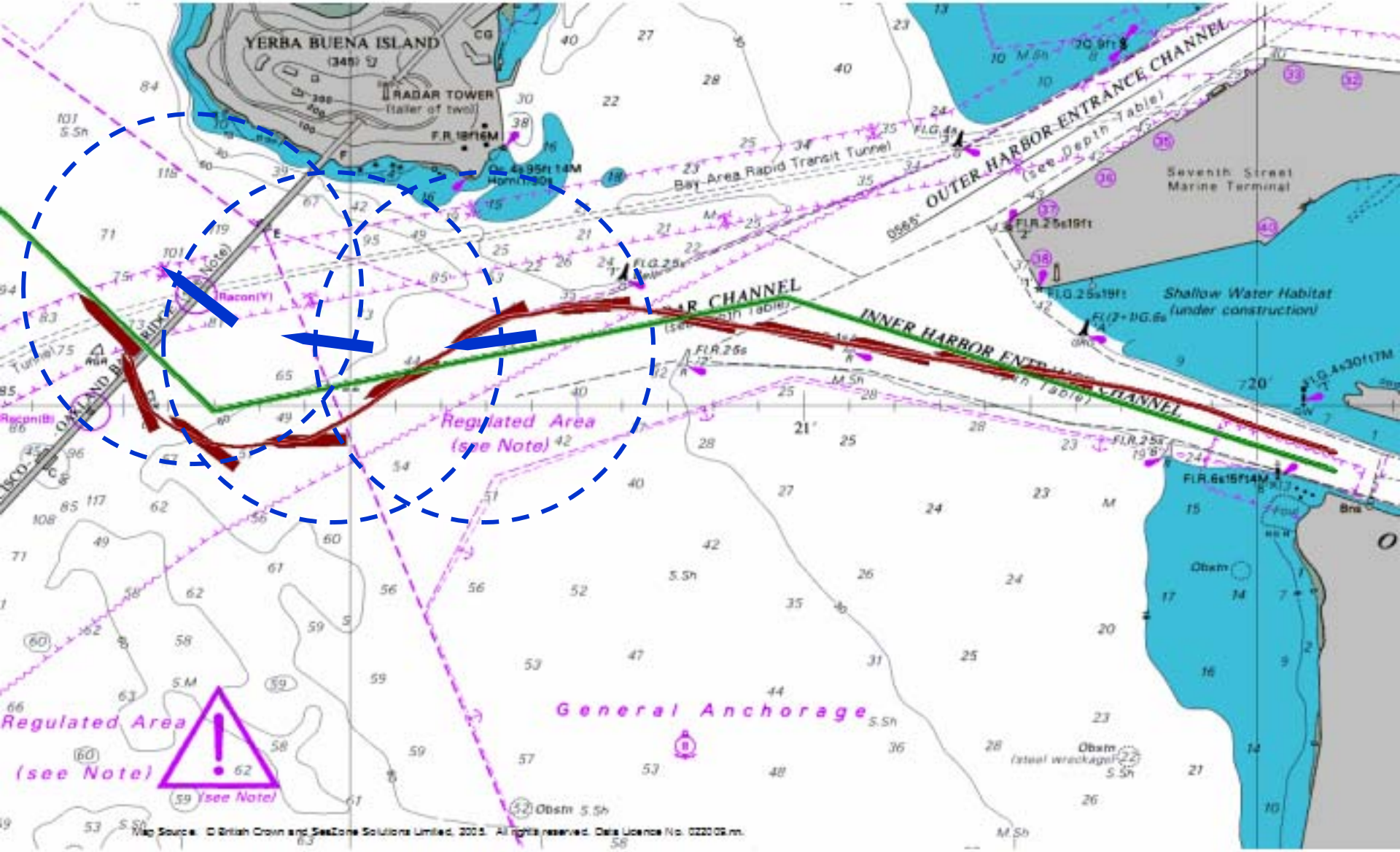

Red – actual track

Green – charted course line drawn by 2nd mate

Blue – Pilot's intended track

ECS Buoy Symbol

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Moments Before the Allision

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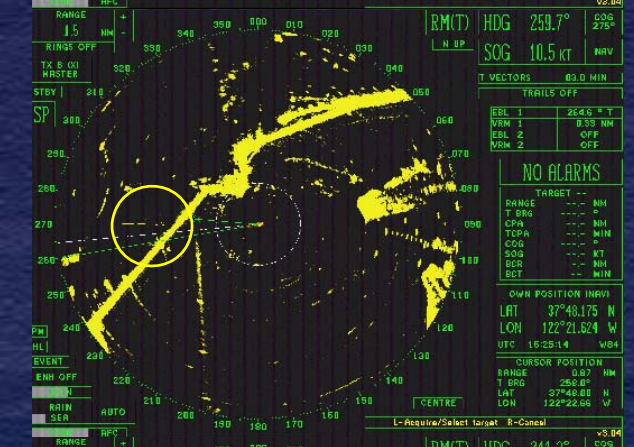
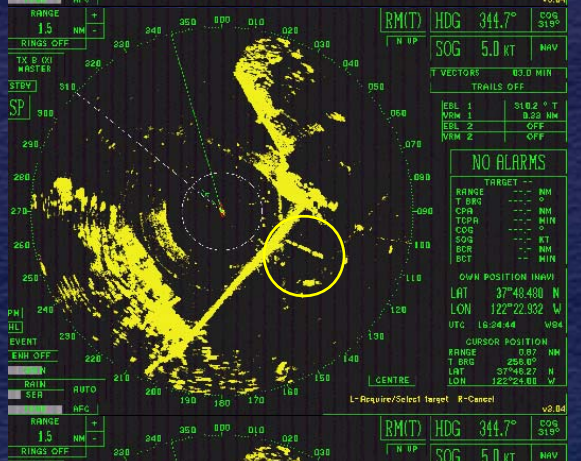
RACON (RAdar beaCON)





Confusing Information From VTS

- VTS – “235 heading”
- Pilot – “I’m steering 280 right now”
- Ship – Actual heading = 254 true

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Approaches – VTS Interaction

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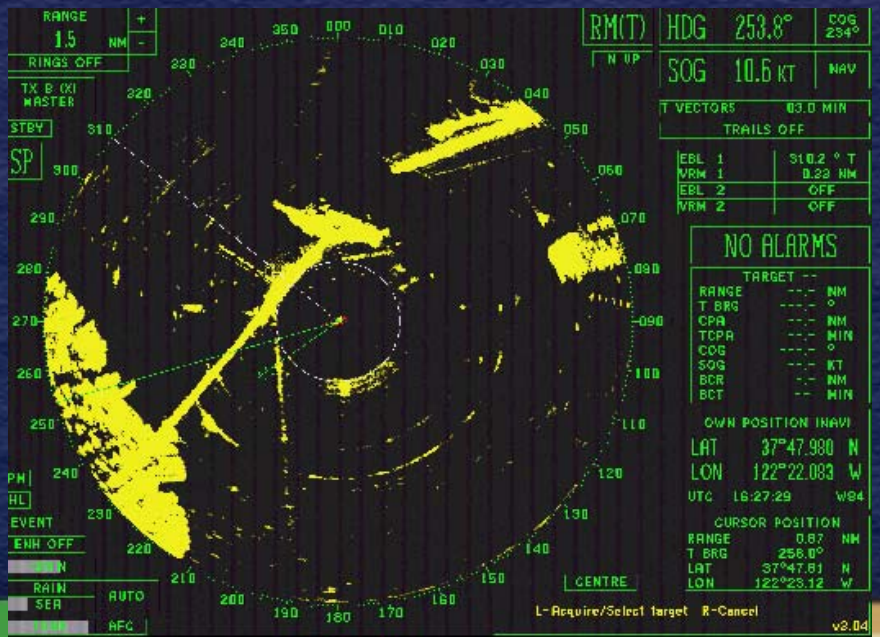
2

3



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