Sniffer Buoy – a solution for Remote Monitoring of SOx emissions
Seppo Virtanen, SeaHow (Meritaito Ltd)
Meritaito Ltd (SeaHow) merged with Arctia Corporation 1.1.2019

Together we are stronger in Maritime Engineering and Marine Environment Protection

100 % of the shares are owned by the Finnish State
Contents

1) The law enforcement challenge
2) AirNow technology
3) AirNow setup in Finland
4) Benefits for Authorities
Today 0.1% limit in existing SECA’s today. In 2020 global sulphur cap drop from 3,5% to 0.5% demand for authority law enforcement globally.

- How to maximize number of monitored ships and optimize authority fuel sampling onboard?

⇒ Focus to be set on potentially non-compliant ships
⇒ Demand for advisory support for PSC officers
Non-compliance is not an option anymore

**SNIFFER BUOY**

- Continuous monitoring for far out locations as well
- All passed vessels are identified and traced
- Can be configured to monitor any sulphur limit
- No need for additional people to operate.
✓ **Cloud based service**
  - Access anytime
  - Access anywhere
  - Desktop and mobile
  - Modular and scalable

✓ **Online and History Data Access**
  - Web Site / Reports
  - Automatic email reporting
  - Automatic SMS reporting
  - Exports: PDF, CSV, XML

Pic: AirNow system setup
Case FINLAND:

Ships remote sulphur monitoring system in Finland including Northern Baltic Sea coastal areas (0.1% SECA region)
- 6pcs fixed sniffer stations,
- 1pc mobile sniffer station,
Case FINLAND / Full year 2017 statistics:

✓ Successful records = 24078pcs

✓ Exceeding >0.10% records = 5.37%
  Reliability ranking = Good, Fair, Poor

✓ Exceeding >0.10% records = 0.44%
  Reliability ranking = Good

>0.1% FSC

106pcs
**User Interface displays full data of all passing ships**

<table>
<thead>
<tr>
<th>Colour codes</th>
<th>Measured FSC</th>
<th>Reliability Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Priority</td>
<td>&gt;0.1%</td>
<td>Good</td>
</tr>
<tr>
<td>Low Priority</td>
<td>(\ldots0.1%\ldots)</td>
<td>Fair, Good</td>
</tr>
<tr>
<td>No Action</td>
<td>&lt;0.1%</td>
<td>Poor, (Fair, Good)</td>
</tr>
</tbody>
</table>

Coloured flags are for PSC officer for fast identification and easy prioritizing

RED = Action Item!

<table>
<thead>
<tr>
<th>Time</th>
<th>MMSI</th>
<th>FSC Reliability Uncertainty</th>
<th>Destination ETA</th>
<th>Nationality Type</th>
<th>Wind Speed</th>
<th>Wind Direction Distance</th>
<th>Fuel Sample FSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.10.2017 05:49</td>
<td>239099100</td>
<td>0.48%</td>
<td>ABC 10:11T08.30.</td>
<td></td>
<td>5 m/s</td>
<td>90 m</td>
<td>0.240 %</td>
</tr>
</tbody>
</table>
Reliability tells us how well the measurement matches what AirNow observes a good measurement in the given ambient and traffic conditions.

The reliability formula consists of a base measurement (SO2/CO2) and additional parameters as follows:

- Wind direction and speed
- Directional error (exhaust plume prediction model)
- NOx (indicator of strong plume)
- Measuring distance and presence of multiple vessels
Sniffer Buoys for remote emission monitoring

✔ Extremely durable and maintenance free superstructure
✔ Designed for High Sea locations
✔ High quality product with minimum need for maintenance
Sniffer Buoy

Solar Panels as energy source

Robust PE-buoy as floating station

Electronics in "cooled" chamber below the surface
Smart Buoy technology for remote Oil Spill Monitoring

- Can easily be used in normal navigation buoys
- Creates early-bird warning system 24/7
- System maintenance simultaneously with the AtoN

Smart Buoy concept by Meritaito (SeaHow)

The Finnish company Meritaito Ltd manufactures polyethylene navigation buoys. The company has developed Smart Buoy which combines regular navigation buoy with modern monitoring sensors and remote communication technology, enabling remote on-line monitoring stations in off shore locations.

GRACE grant no 679266
Vessel with scrubber, malfunction / system not in operation

- Earlier history data & trends normal
- Random peak measured
- PSC officer made clarification request to vessel by phone
- Confirmation of scrubber system ‘Under maintenance’ received from the vessel’s chief engineer by email.

⇒ No need to visit always onboard
Vessel measured high air emissions, but given Green flag

✓ Multiple ships (A+B) in vicinity
✓ High uncertainty – no red flag

=> PSC officers own judgement
Operational Efficiency

Traffic example = 300 Ships / Day / Fairway

Real-Time monitoring is the most efficient way

Pic: Information based on statistics in Finland
Benefits for the Authorities

Time
- Random spot checking is slow and resource intensive
- Online SMS/emails from sea to shore
- Number of visits onboard reduced
- Proactive, online advisory support
- Existing organization is typically enough

Money
- Less work
- Less manpower
- Ease of resource management
- Time saved to be used elsewhere
- No need for more personnel
- Pay-per-use service

Hit Rate
- All vessels monitored and traced
- Priority on non-compliant vessels
- No need to disturb compliant vessels
- Continuous threat
- Works in wind, hot, cold, dark, fog, ...
- Increased efficiency

Comfort
- Automatic 24/7
- Continuous online monitoring, analysing and reporting
- Ease of management & control
- Access anytime
- Access anywhere
- Enhanced law enforcement

Data
- Real time reporting
- Instant access to online records and history
- 100% owned by client
- Easy tasking
- Easy follow-up
- All measurements in one database
- Secure with backups
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