PREVENTION OF AIR POLLUTION FROM SHIPS

Report of the correspondence group

Submitted by the United States

SUMMARY

Executive summary: This document summarizes the work of the correspondence group established by MEPC 55 and provides comments and proposals for consideration in the development of criteria for washwater discharge from exhaust gas SOx cleaning systems.

Action to be taken: Paragraph 9

Related documents: MEPC 55/23, paragraph 4.46, MEPC 55/4/5, MEPC 55/4/7 and MEPC.130(53)

1 The Marine Environment Protection Committee agreed at its 55th session to establish a correspondence group to further consider the development of criteria for washwater discharge from exhaust gas SOx cleaning systems following initial discussion by the Working Group on Prevention of Air Pollution from Ships. The correspondence group functioned under the following terms of reference:

   .1 taking into account documents MEPC 55/4/5 (United Kingdom) and MEPC 55/4/7 (Finland and Norway), develop washwater discharge criteria for exhaust gas SOx cleaning systems in accordance with resolution MEPC.130(53) Guidelines for Exhaust Gas-SOx Cleaning Systems – MARPOL Annex VI, regulation 14(4)(b), including:

   – washwater assessment – reference method;
   – washwater monitoring in service;

   .2 in light of the above, identify any inconsistencies with MEPC.130(53); and

   .3 submit a written report to MEPC 56.
2 The following countries and organizations participated in the correspondence group: Canada, China, Denmark, Finland, France, Germany, India, Iran, Japan, Republic of Korea, Malta, Marshall Islands, the Netherlands, Norway, Panama, Spain, the United Kingdom, the United States, the European Commission (EC), the Baltic and International Maritime Council (BIMCO), the European Association of Internal Combustion Engine Manufacturers (EUROMOT), the International Association of Classification Societies (IACS), the International Association of Independent Tanker Owners (INTERTANKO) and the Oil Companies International Marine Forum (OCIMF).

3 To initiate the correspondence group’s effort, members were requested to submit proposals and comments responding to issues and specific questions raised in an initial discussion document drafted by the United States. This initial discussion document also offered a brief summary of two documents, MEPC 55/4/5 and MEPC 55/4/7, which the correspondence group was instructed to take into account. A range of comments were received on those areas as well as some specific proposals for developing draft washwater discharge criteria. Those areas identified in the initial discussion document and the responding comments are presented as a collation and are attached as annex.

4 Additionally, two reports were submitted to the correspondence group by some members. One report was conducted by Norway (MARINTEK) on “Washwater Criteria for Seawater Exhaust Gas SOx Scrubbers” dated October 2006. The other report was conducted by Finland (VTT Technical Research Center) on “Environmental Effects of Caustic Soda and Seawater Scrubbers” dated 23 November 2006. The MARINTEK report developed a set of possible washwater discharge criteria based on data from trials of two ships using exhaust gas seawater scrubbers conducted in Norway in the early 1990s and up-to-date toxicity data and discharge modeling tools. The proposed criteria from this report were reported in MEPC 55/4/7.

5 The report by VTT Technical Research Center of Finland contains a study of the environmental effects of scrubbers by two manufacturers. One scrubber was a caustic soda (NaOH) scrubber. This scrubber could remove 90% of SO2 from exhaust gases produced by a heavy fuel oil driven diesel engine. Of the PM, approximately 35% is captured by the washwater, including heavy metals. When the vessel is in part, oil can be removed by means of a system similar to oil separation from bilge. The chemical oxygen demand (COD) caused by the washwater can be reduced by connecting an oxygenation stage into the process, with a recommended minimum retention time of 6 hours. The scrubbing process does not produce any solids, but the reactions take place in an aqueous solution. The effluent contains impurities such as oil, lubricant and heavy metals. The other scrubber could operate with a seawater mode and a caustic soda mode. In seawater mode, the natural alkalinity of seawater is used for SOx abatement. In caustic soda mode, a solution of NaOH and water works as a scrubbing liquid. This scrubber can be operated in either a closed-loop or open-loop washwater circulation.

6 Open-loop washwater circulation consists of washwater enters into the exhaust gas scrubbing and then is discharged into the environment. Closed loop washwater circulation consists of washwater being re-circulated, for the most part, through the scrubber. Seawater can be used in the open-loop mode when the seawater alkalinity is sufficient. At decreasing alkalinity, the open-loop mode is boosted with slight NaOH addition. Soda is injected upstream of the scrubber and is injected only if there is pH limitation in washwater flow or high efficiency has to be reached. In closed-loop mode, the scrubber works with a solution of caustic soda and sea or fresh water. The washwater flow is significantly smaller than in the open-loop mode. In the closed-loop soda mode, the quantity of NaOH is stoichiometric. In the open-loop mode, when NaOH must be added, more than stoichiometric amounts of NaOH are needed. In the closed-loop soda mode, maker “B” utilizes a heat exchanger in the washwater circuit of the
scrubber. In the heat exchanger, the washwater is cooled. The heat exchanger also reduces consumption of make-up water drastically. The bleed-off from the washwater is directed through a possible water treatment unit (WTU) and then diluted, optionally twice, with seawater before sending it into the sea. It is still unclear, however, whether this kind of dilution is permissible or not.

7 There are a number of large issues which the correspondence group could not fully resolve and should be further taken up at MEPC 56. There is clearly a need to establish the overall structure of the criteria both in terms of how compliance may be demonstrated and the actual means in detail by which compliance is demonstrated. There were other issues identified that need to be addressed and are interrelated such that how one issue is resolved will impact how other issues are resolved. Issues to be addressed include the following:

.1 **Criteria for washwater discharge:** Some members have proposed there be one set of criteria for washwater discharge from an Exhaust Gas SOx Cleaning System (EGCS) and that such criteria be applicable regardless of where an EGCS is used (please see MEPC 55/4/5). Other members have proposed two sets of criteria for washwater discharge from EGCS. In this case, one set of criteria would be for ships moving, while the other set of criteria would be for ships stationary (at berth or at anchor);

.2 **Criteria development:** Some members have proposed a two tier process in the development or introduction of criteria in order to facilitate the development of data on washwater discharge and allow for a period of research and development to take place and washwater discharge criteria to be updated. “Tier I” washwater discharge criteria would be reasonably easy to achieve, and applicable for ships constructed before a date to be determined. “Tier II” washwater discharge criteria would be updated by IMO after a date to be determined. These members maintain that such a two tier arrangement would facilitate shipowners volunteering to invest early in pioneering technology and facilitate the introduction of this technology;

.3 **Environmental Impact Assessment (EIA):** There are several issues under this topic: Some members have proposed that an independent EIA should be conducted for the washwater discharge from each type of EGCS and that such an EIA be reviewed by three other independent groups. Other members have indicated such an approach is impractical and that no EIA should be required, and that it would be difficult for a port State control Officer to verify that a scrubber assessed by an EIA satisfies the local need unless: 1) the port State has clear criteria for what is acceptable, and 2) the ship has documentation relating to discharge level of harmful substances of the scrubber system in use. Still another member proposed that each port State should conduct their own EIA. It was noted that MARPOL Annex VI, regulation 14 currently states that it be thoroughly documented by the ship that such waste streams have no adverse impact on the ecosystems of such enclosed ports, harbors and estuaries, based upon criteria communicated by the authorities of the port State to the Organization. Other members proposed that one general EIA, perhaps developed through an international research program, be conducted based on a unified worst case scenario according to target sea areas or harbors and then use this to establish a single criterion; and

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Parameters to be monitored on board: Most members seem to agree that the two key performance parameters are pH values in the outlet water and oil concentration. Regarding pH, most comments received seem to feel that monitoring under way is not necessary but support the monitoring of pH values in outlet water, and note that this is especially important in narrow waterways, harbors, and shallow archipelago areas. Regarding oil content, some members have expressed the view that the limits could be similar as those in MEPC.107(49), namely 15 ppm. Other members suggested that 15 ppm could be the limit for a ship when moving, while 5 ppm could be the limit when a ship is stationary.

One member proposed that the only parameter that could be appropriate for monitoring in fresh water scrubbing was oil content of the discharge water, and that this was not necessary for seawater scrubbing due to the low level of oil content. This member also proposed that monitoring of other parameters should not be required.

Some members have proposed that additional key parameters to be monitored on board in addition to washwater pH and oil concentrations are any other parameters identified by the EIA. Some members have proposed that a basis and legal requirement behind the selection of other criteria (substances) within the European Union countries is the list of hazardous priority substances listed under the EU Water Framework Directive, WFD 2000/60/EC, Annex X indicating that this directive stipulates the EU Member States identify and monitor emissions, discharges and losses of all hazardous priority substances and pollutants to surface waters (for each river basin district including transitional, coastal and territorial waters). Such hazardous priority substances are e.g., Ni, Pb, Hg, Cd and certain PAH compounds.

Some members proposed that the monitoring parameters should be limited to those that can only be conducted inside the ship, and that these include the volumetric flow rate of discharged water, Total Hydrocarbon (THC), some heavy metals content, and pH change from inlet to outlet.

One member has proposed that, in lieu of continuous monitoring, there be a periodic survey of limits by sampling (simultaneously for inlet and outlet) and laboratory analysis. Other members proposed that it is not necessary to continuously monitor those established parameters, and that checking parameters periodically for compliance with the criteria established by the port State is sufficient.

Given that this correspondence group has identified a number of issues related to the development of a draft set of criteria for washwater discharge along with a number of comments, and that there are areas that need to be resolved, it is strongly recommended that a working group or drafting group be established at MEPC 56 in order to finalize a set of criteria.

Action requested of the Committee

The Committee is invited to consider the above comments as well as the collated comments and proposals in the annex and take action as appropriate.
### ANNEX

#### CORRESPONDENCE GROUP – WASHWATER DISCHARGE CRITERIA

**Collation of Comments**

<table>
<thead>
<tr>
<th>General Comments</th>
<th>Finland (1st Iteration)</th>
<th>Japan (1st Iteration)</th>
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<tr>
<td></td>
<td>In any general discussions we should use a wording like “exhaust gas scrubbing” or “SOx-scrubbing” or “EGCS-SOx”. This is because “seawater scrubbing” is only one type of potential systems, “fresh water scrubbing” is another type, etc.</td>
<td>Our basic idea is as follows:</td>
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<td>Finland (1st Iteration)</td>
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<td>Japan (1st Iteration)</td>
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<td>- It is necessary to make up the emission criteria based on environmental impact assessment in general.</td>
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<td>Japan (1st Iteration)</td>
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<td>- The candidates for the washwater discharge criteria are pH, hydrocarbons (including PAHs), heavy metals, SS and DO (or COD). In some case, total amount discharged is influencing factor. Therefore, we should pay attention to the water flow rate, as well as concentrations.</td>
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<tr>
<td>Japan (1st Iteration)</td>
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<td>- The emission criteria should be selected based on the EIA, and we suppose DO and SS are not necessary to include. Some others may be eliminated.</td>
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<td>Japan (1st Iteration)</td>
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<td>- The monitoring will be limited by the practicability. The effect of pH is identified as delta pH (pH change between the inlet and outlet of EGCS).</td>
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<td>Japan (1st Iteration)</td>
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<td>- A little more studies are necessary to set up the allowable emission values.</td>
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<tr>
<td>Japan (1st Iteration)</td>
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<td>This water discharge criteria is to be applied only to EGCS which is operated in SECA. The North Sea and the Baltic Sea, which are designated as SECA, are sensitive to inter-media effects from air pollution. They are also sensitive against pollutants in the washwater, because of their shallowness and closed geometry, and low salinity (may be low alkalinity). Recently, some pH decrease of their surface water is reported. It should be require special care to determine the washwater criteria on such sensitivity.</td>
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## Reference:


B. EU Directive 2005/33/EC, 6 July 2005

C. Resolution MEPC.130(53) Guidelines for On-Board Exhaust Gas-SOx Cleaning Systems

D. MEPC 55/4/7 Washwater discharge criteria for EGCS-SOx units, submitted by Norway and Finland, 4 Aug 2006

E. MEPC 55/4/5 Washwater Criteria Guidelines for Exhaust Gas Cleaning Systems-SOx (EGCS-SOx) Units, 7 July 2006

Consideration needs to be given to the difference in the effect of washwater from propulsion engines and the discharge from auxiliary engines in use while the vessel is tied up alongside.

As the Marintek report states the washwater from scrubbers while the vessel is underway or manoeuvring poses and insignificant threat to the environment. Any effort that provides to removal of the soot, ash or oils is an additional benefit that occurs above and beyond the removal of the SOx from the atmosphere. If vessels with scrubbers are to be burdened with removal of PM from the discharge, then logic would dictate every ship burning residual fuel should be required to do so.

At the April meeting MEPC should promulgate Table 7 of MEPC 55/4/7 as the criteria for washwater from EGCS’s on auxiliary engines and boilers to be operated “at berth”. MEPC should at the same time ask that member states wishing to impose more stringent criteria should first demonstrate the need for such criteria by EIA, and should not apply the more stringent standards to any existing system that has been proven to meet the criteria in Table 7.
**France (2nd Iteration)**

We insist on the necessity to fix two steps of criteria:

- The “Tier I” with criteria enough reasonable to be without adverse effect on the eco systems and enough reasonable to test the EGCS-SOx technologies on board on real vessels.

- The “Tier II” based on the experimentation of the EGCS-SOx in test and on a general EIA.

We agree with OCIMF, Finland and Norway that these 2 steps of criteria will differentiate the 2 following ship situations: ship moving and ship stationary. We would like to fix the 2 following situations:

- at sea and moving
- at berth or at anchor (stationary ship with propeller rotating or not rotating)

We insist also on the necessity not to impose monitoring of too many pollutants. The monitoring of the running parameters of the EGCS-SOX would be as sure as the pollutants themselves and largely more practical if the proposed below procedure is respected:

- 2 types of criteria and limit values (at sea and moving; at berth and at anchor)

- a type approval for each EGCS (SCC: type approval and EGCS-Sox Technical Manual). The type examination would prove that under the range of defined running parameters, the criteria are respected.

- a continuous monitoring of running parameters (for example, water-flow and electrical intensity…. ) in order to control compliance with the authorized range of running parameters defined in the ETM.

Finally, we would like to highlight the fact that the issue of water discharge from ship must be tackle with a global approach. Indeed, The scrubbers from EGCS-SOx represent an insignificant part of the polluted water rejected from ships, they are not
the only source of potential polluted water discharge, here is a rapid list of discharge of potential polluted water from the ship: oily bilge water after treatment with an oil filtering equipment (any ship), oily mixture from cargo area after treatment with an ODME (Oil discharge Monitoring equipment in oil tanker), water mixed with residues of noxious liquid substances after prewash of the tank (chemical tankers), water ballast (any ship), sewage of annex IV of MARPOL (any ship).

<table>
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<tr>
<th>EUROMOT (2nd Iteration)</th>
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<tr>
<td>We agree with Finland that in any general discussions we should use a wording like “exhaust gas scrubbing” or “SOx-scrubbing” or “EGCS-SOx”. This is because “seawater scrubbing” is only one type of potential systems, “fresh water scrubbing” another type, etc.</td>
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<td>The shipping industry is presently facing a clear introduction dilemma of exhaust gas scrubbing technology. The main reason for this appears to be the uncertainty of compliance with washwater regulations, in combination with high price and technical challenges of this technology. Until now no ships have been made SECA Compliant with scrubbers, and such equipment have not even been ordered. SOx-scrubbing has been tested onboard ships, but apparently there is presently only one unit in operation in the whole world. In land-based power plants corresponding technology has been used for years, also in combination with diesel engines.</td>
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<td>The ability of exhaust gas scrubbing systems to reduce SOx is clear. In the prevailing situation this opportunity will continue to be lost unless an appropriate way to handle the introduction is found. In doing some studies about the environmental impact of the washwater the present chicken-and-egg situation has become obvious. It is difficult to find data of the washwater because potential suppliers are still very rare, and experience is very limited. Instead, suppliers expect the legislator to clarify the situation, to obtain design targets. The only way to open this locked situation is to get such equipment onboard and permit research.</td>
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Therefore we agree with France that this target is achieved by a gradual introduction of washwater discharge criteria based on the following principles:

- The first set of criteria (“Tier I”) should be reasonably easy to achieve, and applicable for ships constructed before [1.1.2013].
- This period will allow some R&D to take place on newbuildings starting maybe 2010 (and hopefully some retrofits before that), and washwater discharge criteria to be updated by IMO in 2011 and 2012.
- Updated criteria (“Tier II”) should not be applied on ships constructed before this date, as OCIMF correctly points out. Shipowners volunteering to invest early in pioneering technology should not later be punished by having to modify the equipment. Without this confidence potential pioneers will not invest and the introduction dilemma will continue.

During “Tier I” the amount of pioneering ships will remain low, and the environmental impact of the washwater will therefore remain insignificant regardless of the requirement. The number of such ships will remain significantly smaller than the number of tankers regularly discharging similar washwater from their inert gas scrubbers while lying stationary in oil terminals discharging their cargo.

This stepwise approach would also allow a logical way forward for potential equipment designers. In contrast, the present situation or future ambitious washwater requirements will encourage designers to specify scrubbing principles with a minimum reduction of particles, to keep the washwater as clean as possible, and any treatment plant as cheap as possible. While such principles would be a prerequisite for commercial success for equipment vendors, particles will continue to be emitted into the atmosphere. A variety of scrubbing technologies exist, some good in reducing gaseous SOx, but less efficient in reducing particles, and legislation will dictate the choice. As long as particles and hydrocarbons are permitted to be emitted from any ship to the atmosphere and distributed over land and sea, any
potential of SOx-scrubbers to reduce such emissions will remain hypothetical as long as the use is perceived too challenging by the industry.

As long as legislation is perceived controversial, designers do not have logical design targets, and even the design work of the scrubbing unit itself, in addition to the washwater treatment plant, cannot really start.

We agree with OCIMF, Finland and Norway on the following issue: Recent reports from Norway and Finland highlight the need for different legislation with “enclosed ports, harbours and estuaries” for two significantly different categories of equipment as well as ship operating modes:

1. Ship moving and propeller rotating.
   - This mode is relevant for all HFO combustion units, including main engines.
   - In this mode effluent dilution is efficient, and there is no obvious need for regulations.

2. Alongside, ship stationary and propeller not rotating.
   - This mode is relevant for generator engines and oil-fired boilers.
   - In this mode effluent dilution is less efficient, and some regulations could be considered.

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<th>Question 1</th>
<th>Is it necessary that seawater scrubbing systems be subject to an EIA?</th>
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**Finland (1st Iteration)**

The EIA assesses the environmental impact and concludes whether or not the scrubber represents harm to the environment. It is difficult for a port State Control officer to verify that a scrubber assessed by an EIA satisfies the local need unless:

1) The port State has clear criteria for what is acceptable.

2) The ship has documentation relating to discharge level of harmful substances of the scrubber system in use.
Reg. 14 specifically calls for documentation that waste streams have no adverse impact based on criteria communicated by the Port State. In light of the above, we would argue that a list of discharge water criteria is a much more practical approach than an EIA.

| **France (1st Iteration)** | As far as there is no list of parameters and emission limit values, prescribed by any regulation, which permit to consider the seawater of a scrubbing system as having “no adverse impacts on the eco-systems”, any EIA could be contested, including legal proceedings, by Port authorities or by any group, based on parameters which haven’t been assessed, or which has led to inadequate conclusions.  

We propose that no EIA should be required if the following procedure (or equivalent) is adopted:  

- The list of the criteria of the seawater of the scrubber and the limit values of these criteria should be established by IMO.  
  
- Based on this list, designers/manufacturers should provide a “Washwater Technical Manual” (as part of ETM as defined in MEPC.130(53)) describing operating range and performances of their system. This manual would permit to define the running range of the system in which the compliance of the seawater with the limits fixed by IMO is insured. This manual should contain the type approval certificate of the system which has been tested.  
  
- WWTM should be approved by Administration.  
  
- The SCC should be delivered by administration after having checked the compliance of the system installed on board of the vessel with the running range of the WWTM. |
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<tr>
<th><strong>Japan (1st Iteration)</strong></th>
<th>In general, it is desirable to develop the washwater criteria for EGCS based on environmental impact assessment (EIA). However, single criterion is desirable, which is derived on EIA based on the worst case scenario. EIA requires the development of unified scenario document according to target sea areas or harbors. But varieties in water flow, number of ships, and operating rate of EGCS in each sea area may lead different conclusion in their EIA. Plural standard criterions are not desirable for unification and practical simplicity of the criteria. It requires development of reasonably realistic worst case scenario to avoid that, and it requires great deal of time and effort.</th>
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<td><strong>Netherlands (1st Iteration)</strong></td>
<td>The Netherlands suggests an EIA for every system for 3 standard port environments to keep it simple. For instance: flow through, little flow through and stationary situations. In these standard scenario’s predicted no effect concentrations for some key-affect organisms used in standardized toxicological test, at least representing the planctonic as well as the meiofauna, should be used or compared with. The starting point for the EIA is a good performing installation.</td>
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<td><strong>Norway (1st Iteration)</strong></td>
<td>The EIA assesses the environmental impact and concludes whether or not the scrubber represents “no harm” in the eyes of the experts performing the EIA.</td>
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<td>It is difficult for a Port State Control officer to verify that a scrubber assessed by a EIA satisfies the local need unless:</td>
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<td></td>
<td>1) The port State has defined clear criteria for what is acceptable</td>
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<td>2) The ship has documentation relating specifically to the given criteria</td>
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<td>Reg. 14 specifically calls for documentation that waste streams have no adverse impact based on criteria communicated by the port State. In light of the above, we would argue that a list of discharge water criteria is a more practical approach than an EIA.</td>
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<tr>
<td><strong>OCIMF (1st Iteration)</strong></td>
<td>The scrubbing systems themselves should not be subject to an EIA. Port states should be requested to show by EIA the justification for imposing</td>
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extraordinary washwater criteria, i.e. criteria other than proposed in Table 23 of the Marintek report (the same as Table 7 in MEPC 55/4/7).

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<th><strong>France (2nd Iteration)</strong></th>
<th>A general EIA must be run to evaluate impact on Environment of different pollutants. Such an EIA could be developed by an International Research program in order to propose a unified and realistic selection of criteria and limit values. But without any position from IMO, with clear definition of criteria and emission limits, no EGCS technology could be developed. As a consequence, it would be appropriate to fix as soon as possible a first set of criteria during an interim period (“Tier I”), in order to allow technical development of EGCS These limits should be fixed at technically and environmentally realistic levels. The respect of those criteria and emission limits will lead industry to develop adequate equipments in order to demonstrate compliance. During this interim period (“Tier I”), the working group could propose a temporary selection of simple and reasonable criteria for Washwater discharge in order to:</th>
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<td>- give industry clear target to work on, in developing EGCS technology on board</td>
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<td>- give time to organize and develop a general International EIA on water rejects (including all water rejects), the part of EIA concerning EGCS water reject could take into account the experimentations (measurements and assessment) carried out on the real installations running on board.</td>
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<td>Then, rather than an EIA for each system, we would prefer the following approach:</td>
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<tr>
<td>• a general EIA defining 2 sets of criteria and limit values (at sea and moving; at berth and anchoring)</td>
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<tr>
<td>• a type approval for each EGCS (SCC: type approval and EGCS-Sox Technical Manual)</td>
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- a continuous monitoring of running parameters (for example, water-flow and electrical intensity…) in order to control compliance with the authorized range of parameters defined in the ETM.

Global ship assessment of SECA compliance (to demonstrate the global compliance of the ship with the SOX emissions limits of annex VI of MARPOL).

**EUROMOT (2nd Iteration)**

Below is a short comment on some scrubber washwater parameters.

**Oil**

- We agree with Finland that in exhaust gas scrubbing only a small fraction of the hydrocarbons is captured. Therefore the oil content of the scrubber washwater is not so critical for the environment. This is evident from two different trials made in the early 1990’s.

- We support Finland and France with their proposed limit:

  a. 15 ppm when ship is moving.

  b. 5 ppm when ship is stationary.

  c. An allowance for temporary excursions as described in the UK paper.

**Heavy metals**

- As OCIMF points out, the emission of PM to the atmosphere should be minimised, and the industry should not be encouraged to develop and specify equipment with clean effluent by minimising the particle reduction in the scrubber. Therefore it is proposed that no discharge limits for heavy metals are included in “Tier I”.

- Within IMO it has proved difficult to regulate emission of particles of diesel engines. Furthermore, when considering the additional difficulty in assessing particle reduction of the scrubbing unit, and cleaning performance of a possible washwater treatment plant, it is premature to regulate the metal content of washwater. As Japan
points out, even fuel specification would have to be a part of the compliance scheme. In fact the whole chain of responsibilities (refinery – bunker supplier – charterer – owner – engine maker – fuel separator supplier – scrubber maker – washwater treatment supplier) would have to be clarified and contractually agreed upon, and the whole issue becomes impractical.

**pH**

- Seawater scrubbing: It is inevitable that the effluent has a lower pH than the water inlet. The higher the SOx-reduction in the scrubbing unit, the lower is the effluent pH. However, as per the Norwegian report there are no environmental concerns.

- Fresh water scrubbing: The pH of the effluent is not drastically different from the inlet, and the flow is small, and there are no environmental concerns.

- To ensure the industry is not encouraged to develop, specify and operate seawater scrubbing equipment with a high effluent pH by minimising the SOx reduction, and to avoid unnecessary technical complications and certification procedures, we agree with Norway that no discharge limits for pH should be included in “Tier I”.

**Chemical Oxygen Demand (COD)**

- Seawater scrubbing: No environmental concerns.

- Fresh water scrubbing: As per the Finnish report (page 21), any residual sulphite is rapidly converted into harmless sulphite under natural conditions, and therefore there are no major environmental concerns.

- As pointed out by France, the oxygen content of seawater is higher and natural oxidation occurs quickly in the area where the effluent is discharged, due to turbulence caused by propeller and sea waves.

- To avoid unnecessary technical complications and certification procedures, we agree with France that no discharge
<table>
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<th>Question 2</th>
<th>If an EIA is considered necessary, what parameters should be measured or are necessary to be measured? Is it necessary, for example, to measure the Chemical Oxygen Demand (COD)?</th>
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<tr>
<td><strong>France (1st Iteration)</strong></td>
<td>Even if EIA is not required, parameters to be measured have to be discussed and agreed on. We would like to draw your attention on the inert gas scrubbing systems which are largely used on board on tankers, mainly in ports, and for which neither washwater reject limits or assessment are required. Moreover, we would like to insist on the fact that the only limit fixed for the moment on washwater rejects is the limit of 15 ppm of oil content for bilge water and 15 ppm for oil cargo washing waters. This situation is obviously not satisfactory. If limits are to be fixed, they should be for all water rejects, and especially, for both inert gas and EGCS-SOx technologies. We need to impose such limits in order to preserve the maritime environment and also in order to help the development of new technologies. Once the parameters and their limits fixed, the manufacturers of the new technologies could developed their system based on these limits to comply.</td>
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For the moment, EGCS-SOx technology represents a very small part of overall washwater rejects (1 or 2 systems are todays experimented on board on real ships) that is why we propose to fix a first tier of limit criteria (“Tier I”), enough reasonable to be without adverse effect on the eco systems and enough reasonable to test the EGCS-SOx technologies on board on real vessels.

In a second time (maybe after 2 or 3 years), a second tier of limits could be imposed, based of the experimentation of these scrubbing technologies and based on environmental assessment.

This proposal would permit to develop EGCS-SOx scrubbing technology, while also protecting maritime environment.

We want also underline the fact that this technology offer not only to decrease the sulfur content of gas emission from ships but also is likely to decrease other pollutants such as PM or Nox. It seems to be more than a equivalent means to the use of low sulphur fuel, but tests must continue to be carried out to assess the real improvement.

Regarding our position, we propose at a first step (“Tier I”):

- To restrain the number of parameters to the most appropriate ones (see below).
- To adapt for each parameter the emission limit to both technically and environmentally realistic level.
- To limit the continuous monitoring to parameters which can insure that these limits are respected.
- To create a type approval certification for these scrubbers (as detailed in scheme A)

Below are some comments on parameters to be considered:

- **pH**: It seems environmentally (production, transport and distribution of basic reagent generate their own pollution) and economically inadequate to adjust pH in washwater rejects by alkalinity adjunction
(NaOH, or others), in order to keep a low delta-pH. Moreover, the presence of high quantity of NaOH or other chemicals additive on board on a ship is not a safe solution.

Indeed, from MARINTEK studies about dilution, it can be deduced that low pH area around ships is very narrow, and that washwater mixes in seawater increases rapidly the pH to values harmless for the environment. If this study is confirmed we consider that the dilution effect, for a seagoing condition ship, can be appropriate.

The cases of an anchored ship or a ship in port or in route in a special protected area must be studied more precisely.

We think that a pH limit has to be defined, but we do not know exactly what the appropriate value is. In any case this value should be fixed in order to be compatible with high scrubbing efficiency, sea-chest corrosion resistance, biological resistance of evolved species and above all maritime environment protection. This value should take into account different situations: seagoing condition, anchoring, in port, in a special protected area.

- **COD**: MARINTEK studies show that washwater are rejected close to the sea surface, where O2 content is naturally higher and natural oxidation occurs quickly, due to propeller wake and natural seawater turbulence. It is proposed to fix no limit on that parameter for the moment ("Tier I").

- **Vanadium**: Vanadium average concentration in washwater is lower than 150µg/l, which value is given in MEPC 55/4/7 as harmless for the environment with a security level scaled 3. It is proposed to fix no limit on that parameter for the moment ("Tier I").
- **Oil content**: oil content in exhaust gas depends on engine type, engine speed, engine lubricants in use, and engine combustion tuning.

Oil content in washwater, without any treatment, is expected to be close to the value given in MEPC55/4/7 as level 1 (4.5 ppm) and is to be compared to bilge water alarm level (15 ppm).

We propose to fix the oil content limit to 15 ppm for the ship in route and to 5 ppm for the ship in port, in a special protected area (in anchor?). But a clear definition of the oil content must be elaborate (can it be similar to the PAH value?)

Regarding these above comments, we propose to fix for the moment (“Tier I”) 2 criterias:

1. pH reject value (level to be discussed)
2. oil content (level: 15 ppm/5 ppm depending on ship in route/ship in port – special protected area)

In a second time other parameters could be determined and lower limits could be reduced. This could be reasonably done only after a trial period still to be determined (“Tier I”: 5 years?).

This period must be considered taking into account the investment of the technology, the adequate period to have an experiment feedback of this technology.

<table>
<thead>
<tr>
<th><strong>Japan (1st Iteration)</strong></th>
</tr>
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<tbody>
<tr>
<td><strong>In general</strong>, environmental impact of pH, heavy metals, SS(solid suspension), DO(dissolved oxygen), oil and PAHs concentration should be taken into consideration.</td>
</tr>
<tr>
<td>However, it may not necessary to develop the criteria on DO, because DO is recovered easily by mixing with and dissolving of air. DO is parameter for recognizing environmental soundness, and DO is not applied as discharge criteria even for large on-land emission sources.</td>
</tr>
<tr>
<td>If THC concentration represents the PAHs concentration, measurement of PAHs can be substituted by measurement of THC, which is relatively easy.</td>
</tr>
</tbody>
</table>
The flow rate of discharged water should be taken into consideration, because total amount of the pollutant, not only concentration, is the source of the impact.

**Netherlands (1st Iteration)**

The Netherlands consider the following parameters relevant for the EIA:

- NOx
- SOx
- COD
- pH
- one or two metals, e.g. Cupper, Nickel, Vanadium or Pb.
- suspended particles
- THC
- Temperature (°C)

The difference between the in- and out flux of the scrubbing water should be determined in order to present the amount of substances added by the system. The concentrations of relevant substances in the out flux should be compared to known predicted no effect concentrations as well as being used as input for at least a test model of an enclosed harbour – basin.

**OCIMF (1st Iteration)**

The necessity to consider COD should be established during the EIA based on the particular circumstances of the port in question.

**France (2nd Iteration)**

We agree with Japan that the flow rate of discharged water should be taken into consideration, because total amount of the pollutant, not only concentration, is the source of the impact.

The first set of criteria could be based on Correspondence Group proposal (“Tier I”).

Further set of parameters will be based on International EIA conclusions and “Tier I” assessment.

But we would like to make difference between parameters assessment, and continuous measurement and monitoring.
We think that it is necessary to limit the parameters to be monitored, and even suppress all pollutant monitoring, to be replaced by equipment monitoring (pumps, valves, filters…..) and demonstration of compliance.

We propose that:

- running of EGCS must be demonstrated by some parameters to be monitored (pumps running, electrical intensity, water pressure or flow….). These parameters to be determined by EGCS industry.

- initial assessment of the system: the SCC will assess the parameters chosen by industry to be monitored in order to demonstrate compliance. The authorized range of these parameters would be indicated in the Technical Manual (ETM).

- Intermediate survey (periodicity to be determined): evaluation of good efficiency of the system by control of monitored parameters, and sampling and laboratory analysis on gas and washwater.

**Netherlands** (2nd Iteration)  
The first comment of the Netherlands was ambitious and complete. Simpler criteria for the most important parameters, e.g. as proposed by France, are acceptable.

**EUROMOT** (2nd Iteration)  
It is proposed that the only permanent measurement required onboard is oil content. Even that is not really necessary in case of seawater scrubbers, as the actual values anyway will be below the proposed limits.

**Question 3**  
MEPC 55/4/5 proposes also that seawater scrubber systems employ a washwater treatment system in order to minimize discharge of contaminants in the washwater. Is this necessary, or are the amounts of contaminants sufficiently minimal as to not require any additional washwater treatment system?

**Finland** (1st Iteration)  
For fresh water scrubbers a treatment plant to control discharge of oil would probably be required. The need for additional treatment systems depends on the adopted criteria level and on the technical performance of the specific scrubber system.
<table>
<thead>
<tr>
<th>Country</th>
<th>(1st Iteration)</th>
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</thead>
<tbody>
<tr>
<td><strong>France</strong></td>
<td>Regarding the MEPC 55/4/7, there is no need for a washwater system if the EGCS-SOx is in open loop without basic reagent. Indeed, all the parameters considered in this document have lower emission values than those defined in level 1, and except THC, all parameters have average emission level lower than level 3 (based on “average fuel” as defined in VTT report R08868-06). In closed loop scrubbing technology, with alkaline reagent: it seems necessary to provide a washwater treatment in any configuration, because the concentration in pollutant in the water is significantly higher. Regarding our proposal of fixed parameters (PH and Oil content), there is no need for a washwater system (except dilution) if the technology is in open loop without basic reagent. For a closed loop system, a washwater technology should be installed.</td>
</tr>
<tr>
<td><strong>Japan</strong></td>
<td>Additional washwater treatment system, such as sludge or oil separator, may be required, if large amount of soot is generated by engine, depending on fuel quality and combustion conditions. However, those systems will be very large scale and expensive, considering the volumetric flow rate of the washwater. This Correspondence Group’s work should concentrate on the development of the washwater discharge criteria, taking into account above practicability. Once it is established, any additional treatment system will be installed for the compliance, if necessary.</td>
</tr>
<tr>
<td><strong>Netherlands</strong></td>
<td>It is difficult to answer this question. Depending on the results from the EIA the answer can be given.</td>
</tr>
<tr>
<td><strong>Norway</strong></td>
<td>If washwater criteria are specified, there will be no need to specify whether or not a certain treatment system would have to be installed.</td>
</tr>
<tr>
<td><strong>OCIMF</strong></td>
<td>WGAP should differentiate between scrubbers systems that are used when the ship is under way and those that are used when the ship is “at berth”, e.g. as defined in EU Directive 2005/33/EC. The MARINTEK report credibly predicts that the...</td>
</tr>
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</table>
washwater discharge from propulsion engines scrubbers would be acceptable after mixing outside the ship when the ship is underway at service speed, entering and leaving port, and manoeuvring to and from berth. Arguably, the washwater from auxiliary engine or boiler scrubbers would be adequately mixed under the same circumstances.

The MARINTEK report does not address the case of a ship “at berth”, where such mixing can not be guaranteed. Washwater discharge treatment should therefore be required for scrubbers on auxiliary engines and boilers operating “at berth”. The criteria to be met by the treatment system should be promulgated by the port State, preferably using only the criteria from Table 23 in the MARINTEK report. The use of criteria other than in Table 23 should be supported by EIA.

<table>
<thead>
<tr>
<th><strong>France</strong> (2nd Iteration)</th>
<th>We agree with Norway that if washwater criteria are specified, there will be no need to specify whether or not a certain treatment system would have to be installed.</th>
</tr>
</thead>
</table>
| **EUROMOT** (2nd Iteration) | • We agree with Norway. In principle, requiring a treatment system is a too prescriptive regulation. Legislation should be goal-setting, setting certain standards, in this case discharge criteria.  
  • For fresh water scrubbing, criteria proposed under question #1 would in any case (indirectly) necessitate a treatment plant. |
| **Question 4**             | MEPC 55/4/5 proposes that on board monitoring of washwater discharge from seawater scrubbing systems include the pH, oil concentration (as measured in PAH), and other parameters as established from the EIA. MEPC 55/4/5 also proposes limits of 30 ppb PAH.  
  Are these parameters sufficient?  
  What additional parameters should be monitored?  
  Conversely, are there parameters listed that are not necessary to be monitored?  
  Is the proposed discharge limit of 30 ppb PAH an adequate limit? |
<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
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<tbody>
<tr>
<td>What would be appropriate limits for other contaminants?</td>
<td>We would like to bring the following views to the attention of the CG:</td>
</tr>
<tr>
<td></td>
<td><strong>PAH</strong></td>
</tr>
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<td></td>
<td>In general, it would be very useful process to decrease total environmental load of particulate matter and PAHs by exhaust gas scrubbing, even if some release through washwaters can not be completely avoided. PAH compounds are predominantly associated to particulate matter of washwaters. First of all, the number of PAHs accounted should be specified (Bornef-4, 6, 10 or EPA-16 PAHs). It is not clear to us, if the proposed discharge limit of 30 ppb PAH given in MEPC 55/4/5 refers to the total or dissolved concentration.</td>
</tr>
<tr>
<td></td>
<td><strong>pH</strong></td>
</tr>
<tr>
<td></td>
<td>A protective approach should be taken regarding pH values in outlet water (as is proposed in MEPC 55/4/5). Motivation for this is that very acidic outlet water may have even instantly lethal effect to several aquatic species and depending on pH value and duration of exposure be lethal/harmful to several marine organisms especially in narrow waterways, harbours and shallow archipelago areas.</td>
</tr>
<tr>
<td></td>
<td><strong>Oil</strong></td>
</tr>
<tr>
<td></td>
<td>• In exhaust gas scrubbing only a small fraction of the hydrocarbons is captured.</td>
</tr>
<tr>
<td></td>
<td>• Seawater scrubbing: Recorded oil content of the washwater in two different trials made in the early 1990’s was 0.045 and 1.7 ppm.</td>
</tr>
<tr>
<td></td>
<td>• Fresh water scrubbing: Oil concentrations of untreated bleed-off water may be much higher, but flows are much smaller (typically by a factor of 300 compared with seawater scrubbing). Bilge water separators can be used for cleaning.</td>
</tr>
</tbody>
</table>
IMO resolution MEPC.107(49) (for oily water equipment) requires an accuracy of ±5 ppm for 15 ppm Bilge Alarms.

- The following parameters could be considered for discharges of oil (regardless of scrubbing technology):
  
  a. 15 ppm when ship is moving.
  
  b. 5 ppm when ship is stationary.

An allowance for temporary excursions as described in the United Kingdom paper.

**Other substances, which need not be monitored, but which should be measured and documented for information to the flag State.**

One basis and legal requirement behind the selection of further criteria (substances) within the EU countries is the list of hazardous priority substances listed under the EU Water framework directive ("WFD" 2000/60/EC, annex X (Directive 2455/2001/EC)). The WFD stipulates the EU Member States to identify and monitor of emissions, discharges and losses of all hazardous priority substances and pollutants to surface waters (for each river basin district including transitional, coastal and territorial waters). Such hazardous priority substances are e.g. Ni, Pb, Hg, Cd and certain PAH compounds (fluoranthene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene).

<table>
<thead>
<tr>
<th>Country</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>France (1st Iteration)</td>
<td>See comment to §2</td>
</tr>
<tr>
<td>Japan (1st Iteration)</td>
<td>The on board monitoring of discharge water is necessary to make sure its compliance. But it is not practically possible to take ambient seawater sample, for example 2m from ship’s side. The monitoring parameters should be limited to those can be conducted inside ship. Therefore, Japan would like to propose the discharge washwater criteria as follows; volumetric flow rate of discharged water, THC and some heavy metals content and pH change from inlet to outlet, as described in the paragraph 6. The</td>
</tr>
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</table>
on board monitoring parameters should be selected from the above proposed criteria, based on technical availability and effectiveness to the environmental protection.

<table>
<thead>
<tr>
<th><strong>Netherlands (1st Iteration)</strong></th>
<th>We will try to give comments on this question the next iteration.</th>
</tr>
</thead>
</table>

**Norway (1st Iteration)**

The pH of the discharge water drops as a consequence of removing SO$_2$ from the exhaust gas (similar to acid rain). If the pH of the discharge is limited, the scrubber must either:

- remove less SO$_2$ (i.e. scrub as little as possible, no more than required).
- dilute the waste stream with seawater prior to discharge (costly with little benefit).
- add chemicals to the waste stream (costly with little benefit, side effects possible).

In most cases, the pH is rapidly neutralized and is not harmful to the ecosystem. It would be preferable that the use of scrubbers is not permitted in those ports, harbours and estuaries where pH is a concern, than restrictions be given to pH.

**OCIMF (1st Iteration)**

Discharge from required treatment systems (see response to item 3 above) should be checked periodically (not continuously monitored) for compliance with the criteria promulgated by the Port State. Such checks should be conducted by extracting comparative samples of clean seawater and washwater discharge when the ship is operating in open water and then analyzing the samples at an approved laboratory ashore. This approach would reduce uncertainty about the source of pollutant and the accuracy of the analytic processes, yet still be adequate to show that the treatment system will perform adequately when actually operating in port. Continuous monitoring is not justified considering the remote likelihood of any sudden catastrophic emission of pollutant from the engine/boiler. The pH of washwater discharge should be measured when the ship is at berth. This is in addition to the on board monitoring of pH of the effluent from each scrubber that is already required by Resolution MEPC.130(55). The “difference in pH” limit for washwater discharge
when “at berth” should be “not greater than 2” or the limit established by the Port State EIA. PAH need not be “monitored” and should only be checked if required by extraordinary port State washwater criteria.

**France (2nd Iteration)**

Technical difficulties in measurement evaluation and equipment maintenance on-board as well as new competences and high level of proficiency for crew must be taken into account.

Even pH measurement could be complicated on-board (pH meters calibration and maintenance).

MEPC 55/4/5 and 55/4/7 propose concentration limits for a given flow rate, (which is equivalent to evaluate the total amount of pollutants).

Moreover, continuous monitoring of oil content on-board is very difficult for high flow rates and low concentrations.

Pollutants in EGCS washwaters come from exhaust gas (and therefore from fuel), but also from pollutants which were already in seawater.

Ideally, all pollutants should be measured as delta values; difference in/out criteria should be established for each parameter rather than direct reject criteria. (In particular for ports and estuaries situation).

This will exclude continuous monitoring which would become too complicated, costly, and above all, an additional burden to the crew.

We prefer criteria and supervision on the running parameters of EGCS, defined by manufacturers, and assessed by SCC, which can prove the efficiency of the system.

For this type of parameters assessment, we propose periodical survey of emission limits by sampling measurement (simultaneously for inlet and outlet) and laboratory analysis.

Concerning PAH, we agree with Finland that a clear definition of THC and PAH must be given by legislation.
### EUROMOT (2nd Iteration)

- Oil content monitoring as per IMO resolution MEPC.107(49) (for 15 ppm Bilge Alarms) could be appropriate for fresh water scrubbing, but is not necessary for seawater scrubbing due to the low level.
- Monitoring of other parameters should not be required. Measuring heavy metals onboard is unrealistic.

### Question 5

MEPC 55/4/7 proposes establishing 3 default washwater discharge criteria that would represent typical situations (Level 1, 2, 3, etc. with Level 1 being the least stringent) in order to avoid a proliferation of criteria, ease verification of compliance, and provide design targets for EGCS-SOx manufacturers.

Will this arrangement accommodate ships traveling into port States that may have different Levels?

If such a scheme is adopted, i.e., default washwater criteria levels, what specific considerations should a port State take into account in order to select an appropriate level?

### Finland (1st Iteration)

We consider that our proposals given in MEPC 55/4/7 could be further simplified as follows:

We may distinguish two different modes of operation when a vessel enters and operates within “enclosed ports, harbours and estuaries”:

1. Ship is entering or leaving the port and the propeller is rotating.
   - This mode is relevant for all HFO combustion units, including main engines.
   - In this mode effluent dilution is rather efficient, and therefore less stringent regulations for washwater discharges could be used.
2. Ship is at berth, i.e. the ship is stationary at the quay and the propeller is not rotating.
   - This mode is relevant for generator engines and oil-fired boilers.
- In this mode effluent dilution is less efficient, and more stringent regulations for washwater discharges could be applied.

The idea is that all ships could enter or leave ports using exhaust gas scrubbers, which fulfil discharge criteria level 1. In order to allow ships to use their scrubbers while at berth, port States would have to identify the rate of water exchange and the anticipated discharge from the scrubbers in the area in question. Additionally, port States would need to consider both the extent of ship traffic, and natural dilution effects provided by wind, current and rivers when allowing ships to use their scrubbers, which fulfil discharge criteria level 2. The concentration of contaminants in the area can then be calculated assuming different discharge levels and compared with for example PNECs or other criteria as deemed necessary.

We therefore propose that two criteria levels could be defined for washwater, No. 1 when the ship is entering or leaving the port and the propeller is rotating and No. 2 when the ship is at berth. Appropriate criteria levels may be introduced at a later stage of the work of the CG, if there is support for this idea.

<table>
<thead>
<tr>
<th>Country</th>
<th>Note</th>
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</thead>
<tbody>
<tr>
<td>France</td>
<td>In any case, port States can fix its own levels in washwater rejects. In this case, the technology must be adapted.</td>
</tr>
<tr>
<td>Japan</td>
<td>Single level criteria is preferable than multi level criteria reflecting difference in the environmental and ship operation conditions in harbors. Ship operators and EGCS manufacturers will have difficulties to cope with the multi level criteria like proposed in MEPC 55/4/7.</td>
</tr>
<tr>
<td>Netherlands</td>
<td>This situation is unavoidable, but a manufacturer should develop a scrubber which can meet with the standards for all type of ports.</td>
</tr>
<tr>
<td>Norway</td>
<td>MEPC 55/4/7 proposes three limits where the difference is related to water exchange and ship traffic density. Subsequent to this work we have received information that local laws and regulations may be a more important reason a Port State to establish local criteria. We now believe that the best way forward is only one criteria level set by IMO.</td>
</tr>
</tbody>
</table>
Research from Norway and Finland which has been submitted to this correspondence group indicates that discharges occurring when the ship is in motion are very rapidly diluted and represents a very different situation than when the ship is at quay and the propeller is not moving (i.e. exhaust gas from auxiliary engines are scrubbed). It may thus be appropriate to have separate discharge water criteria for the ‘at quay’ situation and when the ship is moving.

The end result would then be one IMO criteria for when the ship is moving and one IMO criteria for the ‘at quay’ condition.

**OCIMF (1st Iteration)**

The selection of level 1, 2 or 3 would presumably be based on consideration of refresh rate of the enclosed port area and the proximity of any especially sensitive areas. It seems inevitable that most port States will select Level 3 and all ships will have to have a suitable treatment system, else use low sulphur fuel “at berth”.

**France (2nd Iteration)**

We agree with Finland and Norway, that 2 sets of criteria and limit values could be defined:

- At sea and moving
- At berth and at anchor BUT independently of the rotation or not of propeller

These 2 sets of criteria could lead to the development of different types of EGCS technology, for propulsion engine, and for auxiliary engines/ boilers. An alternative opportunity would thus also be given to ship operators, which is to operate main engines and auxiliary engines with different fuel oil.

That could give ship operators the choice to adjust and adapt their fuel-oil and EGCS strategy to their own specific ship profile.

**Netherlands (2nd Iteration)**

The proposal of Finland gives a practical and workable criterion.

**EUROMOT (2nd Iteration)**

One oil content limit for moving and another for stationary ships is sufficient.
| **Question 6** | MEPC 55/4/7 proposes that, based upon research studies, it is not necessary to establish limits on or establish in-service monitoring of oil content (using PAH) or pH.  

Are the levels in washwater discharge sufficiently low so as not to be necessary to be monitored? |
|---|---|
| **Finland (1st Iteration)** | For seawater scrubbers regulating and monitoring of oil content of washwater would probably not be needed due to the low concentration of oil in washwater, but for fresh water scrubbers a treatment plant and monitoring equipment would probably be required. Oil content monitoring as per IMO Resolution MEPC.107(49) (for 15 ppm Bilge Alarms) could be appropriate for fresh water scrubbers.  
We consider that the pH value should always to be monitored. |
| **France (1st Iteration)** | We agree with MEPC 55/4/7: no continuous monitoring of pH and PAH. |
| **Japan (1st Iteration)** | The in-service monitoring for THC or heavy metals concentration is not necessary.  

EGCS should be designed to fulfill the criteria under unified criteria based on connecting same scale engine, using same quality fuel and same combustion condition.  

According to MARINTEK report, the dilution of discharged water was rather rapid process and the environmental impact of low pH discharged water was not significant. However, considering the sensitiveness of aquatic environment in SECA, some regulatory means on pH of the discharged water may be required. It is reasonable to define the criteria for pH as the difference of pH in inlet and outlet water of EGCS, because the pH value of EGCS inlet water is changing depending on season and location. |
<p>| <strong>Netherlands (1st Iteration)</strong> | There should be a control system incorporated, which guarantees the proper functioning of the system, like for ballast water treatment systems. If this doesn’t give enough assurance, than monitoring can be a solution. |</p>
<table>
<thead>
<tr>
<th><strong>OCIMF (1st Iteration)</strong></th>
<th>Only when the ship is under way. The MARINTEK report which is the basis for MEPC 55/4/7 does not address ships at berth.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>France (2nd Iteration)</strong></td>
<td>See §3 and §4</td>
</tr>
<tr>
<td><strong>EUROMOT (2nd Iteration)</strong></td>
<td>Oil content monitoring is appropriate for fresh water scrubbing, but not necessary for seawater scrubbing due to the low level.</td>
</tr>
<tr>
<td><strong>Question 7</strong></td>
<td>Are the proposed parameters in Table 7 of MEPC 55/4/7 sufficient? Should there be other parameters also measured? Are the proposed limits in Table 7 of MEPC 55/4/7 sufficient?</td>
</tr>
<tr>
<td><strong>Finland (1st Iteration)</strong></td>
<td>See our answer to question No.5.</td>
</tr>
<tr>
<td><strong>France (1st Iteration)</strong></td>
<td>We agree with MEPC 55/4/7, with the following remarks: Heavy metals: periodical survey by sampling and laboratory analysis. Survey PAH (oil content) rather than THC (see §2), by sampling and laboratory analysis.</td>
</tr>
</tbody>
</table>
| **Japan (1st Iteration)** | The criteria should be the pH change from the inlet to outlet, THC and heavy metals concentration, as well as the volumetric flow rate. Although in MEPC.130(53) it is described “the washwater being discharged should be monitored, for pH and oil content together with other parameters which may have an adverse impact on ecosystem”, we do not think it is necessary to determine any “other parameters” at present, other than the water flow rate. The three level parameter for the criteria is complicated. It should be in single level, as mentioned earlier. As mentioned in the comments to the paragraph 5 above, pH change from the inlet to outlet should be included in the criteria. The permissive maximum value for the pH change would be [3.0, for example]. If additional devices
are installed to promote mixing and dilution of the discharged water in the sea, the pH change limit value would be as high as [4.0, for example]. The other parameters, such as THC and heavy metals, should be determined based on the worst case scenario study. The target heavy metal elements are also subjected to be examined based in EIA. The study on two ships is not sufficient enough yet to determine the criteria.

We would like to point out another difficulty concerning the THC and heavy metals. We should consider that the THC and heavy metals concentration in the washwater is determined by fuel quality and engine combustion condition and that there is no way to do with EGCS. When the violation to the criteria is found, the ship and EGCS have no option other than changing fuel, installing expensive after-treatment equipment or diluting with seawater.

<table>
<thead>
<tr>
<th>Netherlands (1st Iteration)</th>
<th>See answer 2.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCIMF (1st Iteration)</td>
<td>Yes, unless demonstrated otherwise by EIA for a ships at berth in a particular enclosed port.</td>
</tr>
<tr>
<td>EUROMOT (2nd Iteration)</td>
<td>One oil content limit for moving and another for stationary ships is sufficient.</td>
</tr>
<tr>
<td>Question 8</td>
<td>What inconsistencies would exist with MEPC.130(53) as a result of the development of washwater discharge criteria?</td>
</tr>
<tr>
<td></td>
<td>Section 7, Scheme A and Section 11, Scheme B regarding washwater monitoring, as well as Sections 17 and 18 regarding washwater and its residues should be reviewed and may need some revision. Correspondence group members are asked to review MEPC.130(53) and identify as specifically and clearly as currently possible any areas of potential inconsistencies and how they might be inconsistent with the development of these washwater discharge criteria and limits, or the assessment or in-service monitoring of washwater.</td>
</tr>
<tr>
<td>Finland (1st Iteration)</td>
<td>The most practical way would be to update the relevant Sections (at least 7, 8, 17 and 18) of MEPC.130(53) based on findings of this Correspondence Group, as these Sections anyway</td>
</tr>
</tbody>
</table>
cannot be left as they are, to avoid obvious inconsistency. This even more so, as a revision of MEPC.130(53) anyway is on the agenda of BLG 11 regarding other issues than washwater.

| **France (1st Iteration)** | We agree that MEPC.130(53) should be revised, based on Correspondence Group on Washwater discharge criteria conclusions.

Washwater treatment, if needed, can be assessed on an initial survey (with the delivery of a type approval certificate) and then on periodical survey basis, whatever scheme A or B is chosen for scrubber.

If a continuous monitoring is required, it could be the waterflow of the seawater pump or its electrical intensity. As the washwater treatment is insured to respect the limits if running in a specific range parameters (it has been demonstrated during the type approval test), these parameters could be monitored.

Another proposal would permit to let the manufacturer chose these parameters on condition that it is clearly proved that the monitoring of these parameters insure that the emission limits are respected (The justification would be part of the WWTM). |
|---|

| **Japan (1st Iteration)** | In addition, Japan would like to point out following two issues.

- The regulation on solid suspension (SS) and PAHs in the discharge water would be necessary. However, they are originally included and emitted in the exhaust gas, and most of them are transferred to aquatic environment in some way. The regulation on SS and PAHs in the discharge water should be introduced accordance with those for the exhaust gas.

- Another option for the design criteria would be dilution performance, regulating the dilution factor at [X]m behind the stern during port operation and at [Y]m distance downstream from the outlet at quay, for example. The EGCS manufacturer can design the discharging device to promote dilution. |
| OCIMF (1st Iteration) | MEPC.130(53) should be amended as recommended in BLG-WGAP 1/2/12 — Proposed amendments submitted by Finland and Norway. MES agrees with all of the recommendations. Furthermore, we recommend the following:

In the course of improving the document structure as recommended in item 15 in BLG-WGAP 1/2/12 the washwater related articles (7, 11, 17 and 18) should be rewritten as a separate part of the guidelines which would be applicable to all exhaust gas SOx cleaning systems irrespective of the approval scheme used for the actual scrubbers.

*Inter alia*, the requirements for monitoring washwater discharge should be clearly distinguished from the requirements for monitoring exhaust gas emissions. In lieu of existing articles 7 and 11 there should be a single article that requires periodic checking as described in our response to Q4 above. Periodicity should be quarterly for the first two years and annually thereafter. The checks should be carried out with the auxiliary engines and/or boilers operating at or as close as practical to the maximum load (fuel consumption rate) that they would experience at berth. The actual loads and the type of fuel being burned should be recorded. pH should be monitored and recorded continuously while at berth to prove that the system is being operated when required.

Article 17 should be replaced with an article requiring that, unless their published schedule says they will be at berth for less than two hours, ships at berth shall ensure that the washwater from EGCS SOx systems on auxiliary engines and/or boilers shall comply with the criteria in Table 7 of MEPC 55/4/7 at the level promulgated by the National Administration.

Article 18 should be replaced with an article requiring that sludge or residue extracted by a washwater treatment system that is being operated in order comply with [new article 17] shall not be discharged overboard or incinerated on board. |
| EUROMOT (2nd Iteration) | The most practical way would be to update the relevant Sections (at least 7, 8, 17 and 18) of MEPC.130(53) based on findings of this Correspondence Group, as these Sections anyway cannot be left as they are, to avoid obvious inconsistency. This even more so, as a revision of MEPC.130(53) anyway is on the agenda of BLG 11 regarding other issues than washwater. |