Background Material on the subject of On-Shore Treatment of Ballast Water

This document provides a summary of background material on the topic of on-shore treatment of ballast water. These documents were recommended by Andrew Cohen, a member of the EPA’s SAB’s Ecological Processes and Effects Committee, as augmented for Ballast Water.

For this document:
- **Document citations** are provided in bold font.
- **Content summaries** were provided by Andrew Cohen.
- Availability information is as noted.


*Content*: This is the earliest report that I'm aware of that attempted to compare different ballast water management approaches including both shipboard and onshore treatment. On-shore treatment ranked 2nd out of 25 treatment and management approaches analyzed in the report.

*Availability*: Copyright by Pollutech Group of Companies [www.pollutechgroup.com](http://www.pollutechgroup.com).


*Content*: Compares the cost and effectiveness of shipboard, port-based (=on a treatment ship) and onshore approaches, and concluded that shipboard treatment would be less effective and more expensive than port-based or onshore treatment.


*Content*: Includes a brief discussion of ballast treatment at p. 63 (shipboard) and pp. 66-68 (onshore and port-based).

Aquatic Sciences. 1996. *Examination of Aquatic Nuisance Species Introductions to the Great Lakes through Commercial Shipping Ballast Water and Assessment of Control Options Phase II. Final Report*. A report for the Canadian Coast Guard. Aquatic Sciences Inc., St. Catharines, Ontario. (60 pages)

*Content*: Compares shipboard treatment to "pump-off" treatment (either on onshore or on a treatment ship, the latter sometimes confusingly referred to as "ship based") and "external source" treatment (heated water or other biocide pumped into a ship's ballast tank from an onshore facility or treatment ship). It concluded that shipboard treatment is "logistically, economically, and particularly from the aspect of control, the least attractive method of ballast water treatment" and that "ship based [=treatment ship] or centralized treatment facilities may offer the most economical and practical external treatment option (Conclusions, p. 52)."

*Availability*: May be available from Aquatic Sciences, Inc. (now known as ASI Group [www.asi-group.com](http://www.asi-group.com)).


*Content*: Discusses onshore treatment at pp. 38-40, noting advantages and disadvantages, and concluding that onshore treatment "remains an option within the amalgam of currently available options for treating ballast water, provided the criteria for safety, environmental acceptability, technical feasibility, practicable operation, and cost effectiveness are met."

*Availability*: Copyrighted material, at [www.nap.edu/catalog/5294.html](http://www.nap.edu/catalog/5294.html).

Gauthier, D. and D.A. Steel. 1996. *A Synopsis of the Situation Regarding the Introduction of Nonindigenous Species by Ship-Transporting Ballast Water in Canada and Selected Countries*. Canadian Manuscript Report of Fisheries and Aquatic Sciences No. 2380. Marine Environmental Sciences Division, Department of Fisheries and Oceans, Maurice Lamontagne Institute, Mont-Joli (Quebec), Canada. (57 pages)

*Content*: Briefly discusses shipboard, onshore and port-based (=on a treatment ship) treatment at pp. 37 and 42.


*Content:* Brief discussion of onshore treatment at pp. 113-114, with the statement that "the Committee considers that the large scale construction of such facilities in Victoria is likely to be cost prohibitive, however, smaller installations may provide viable options..."

*Availability:* May be available from the Victorian Government Printer.


*Content:* Student report commissioned by the USCG. Largely reprises the onshore treatment analysis of Gutheridge, Haskins and Davey Pty Ltd (1993), along with brief discussion of some issues at several U.S. ports.

*Availability:* At [www.sgnis.org/publicat/cfriese.htm](http://www.sgnis.org/publicat/cfriese.htm).


*Content:* Brief discussion of advantages and disadvantages of onshore relative to shipboard treatment at pp 27-28.


*Content:* Brief onshore treatment discussion at pp. 50-51, which notes that it “allows for the use of media filtration and settling tanks which cannot be fitted aboard vessels.”

*Availability:* At [http://digitalcommons.unl.edu/lawwater/7](http://digitalcommons.unl.edu/lawwater/7).

**Content:** Onshore treatment is discussed on pp. 47-49 with a discussion of advantages and disadvantages, concluding that it is "clearly feasible" in some parts of the industry, such as VLCCs.

**Availability:** The report may be available from the Ports Corporation of Queensland.

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**Content:** Brief discussion of onshore treatment at pp. 67-68 states that onshore treatment systems "are considered to be less favorable than on-board treatment options," though it doesn’t say who considers it so, or what the reasons are.

**Availability:** from CA State Lands Commission.

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**Content:** Onshore treatment is addressed on pp. 12-13 with a discussion of advantages and disadvantages relative to shipboard treatment.


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**Content:** Very brief discussion of onshore treatment (pp. 89-90) stating that "costs, limited availability, treatment quality control and practical difficulties" would prevent development of this option, but that it might be suitable for tankers already designed to discharge oily ballast to shore facilities.

**Availability:** Copyrighted material available from the journal.

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Content: As far as I know, EPA never issued a final version of this report. There is a brief mention of onshore treatment in a paragraph on page 11, at the end of section on existing onshore reception facilities for oil-contaminated ballast.

Availability: This is an EPA public document, which can be downloaded at www.epa.gov/npdes/pubs/ballast_report_attch5.pdf.


Content: This study estimates upper-bound retrofitting costs for modifying vessels to discharge ballast water to onshore facilities, for five types of vessels that call on Puget Sound.

Availability: This document has been posted, with permission, on the EPA SAB website.


and


Content: These two reports developed design plans and costs estimates for treating the ballast water from overseas vessels discharging at the Port of Milwaukee in treatment plants built onshore and on a barge. They concluded that either approach would be feasible, and that the on-barge system would be less expensive.


(note that second link may not be active).

http://dnr.wi.gov/org/invasives/pdfs/ReportMilwaukeeBallastWaterTreatmentPhase2FINAL.pdf

and


Content: These two reports contain generally similar discussions of onshore treatment at pp. 23-24 and 26-28, respectively, mentioning some advantages and disadvantages, and stating that onshore treatment might be suitable for terminals with regular vessel calls such as cruise ships or, citing a recent study, in the Port of Milwaukee. The 2010 report notes (at p. 73) that "there has been recent interest by several entities in developing this option for vessels operating in California and along the West Coast."

Availability: At [www.slc.ca.gov/spec_pub/mfd/ballast/final_techreport_revised.pdf](http://www.slc.ca.gov/spec_pub/mfd/ballast/final_techreport_revised.pdf). The 2009 report was provided to the committee earlier as one of the Group 1 reports.

The 2010 report is in draft status and not yet available on the CASLC website.


Content: This report is generally not concerned with the capabilities of ballast water treatment systems, but notes on p.19 that in regard to "a true zero discharge of all size groups" that "perfect compliance and no failure is practically, if not theoretically, impossible, particularly for microbiological organisms unless ballast water is discharged into a land-based treatment facility or ships are redesigned to eliminate the need to discharge ballast water."

Availability: This is an EPA document. Some excerpts were previously provided to the committee.

The excerpts from the Lee et al. 2010 report ("Density Matters") that were also in the Group 1 documents include a description and analysis of the California ballast discharge standards. Several aspects of that description are incorrect. The best source on the basis for the California standards is the report of the advisory panel that developed the standards (which A. Cohen was a member of). This document may be available on the CSLC website at [www.slc.ca.gov/Spec_Pub/MFD/Ballast_Water/Documents/Appendix_A.pdf](http://www.slc.ca.gov/Spec_Pub/MFD/Ballast_Water/Documents/Appendix_A.pdf).
Content: The only mention of onshore treatment is on p. 15: “Treatment of ships’ ballast water can take place either on the vessel or off the vessel following discharge of the ballast to a reception/treatment vessel (where the water would no longer be considered ballast water) or to a land-based reception facility.”

Availability: This is an EPA document that was previously provided to the committee.