



MAX1 CHRONOLOGY

February 8, 2017

The following table organizes documents and events related to shipboard MARPOL Annex I waste stream management in chronological fashion, in order to provide a comprehensive resource for historical issues on this subject. Links to original documentation are also included in this document.

Date	Title	Publisher	Description	Keywords
1954	OILPOL convention of 1954		This is the first effort at reducing operational oil pollution. It limits oil discharge over 100 ppm within 50 miles from land. It also promotes the development of shore based reception facilities.	100 ppm
1955	No Activities Recorded			
1956				
1957				
1958				
1/13/1959	First IMO assembly			IMO
1960	No Activities Recorded			
1961				
1962	OILPOL amendment of 1962		The OILPOL convention was amended to extend the limits for dumping oily wastes.	100 ppm
1963	No Activities Recorded			
1964				
1965				
1966				
1967				
1968				
1969	OILPOL amendment of 1969		The OILPOL convention was amended to introduce the "load on top" procedure.	100 ppm
1969	IMO Marine Environmental Protection Committee (MEPC) created			IMO, MEPC
1970	No Activities Recorded			
1971	OILPOL amendment of 1971		The OILPOL convention was amended to limit the size of cargo tanks in tankers built after 1972 (in an effort to limit potential spills).	100 ppm



Date	Title	Publisher	Description	Keywords
10/1/1971	Resolution A.233(VII) is adopted	IMO	100 ppm OWS that should require the minimum of attention to bring them into operation.	MARPOL, OWS, OCM
1972	No Activities Recorded			
11/1/1973	MARPOL First adopted by IMO			IMO, MEPC, MARPOL
1974	No Activities Recorded			
1975				
1976				
11/14/1977	Resolution A.393(X) is adopted	IMO	15 ppm OWS/OCM is now required for new ships.	MARPOL, OWS, OCM
2/1/1978	MARPOL Modified		MARPOL was renamed MARPOL 73/78, and contained five Annexes of which ANNEX I part 1 covers OWS.	IMO, MEPC, MARPOL
11/15/1979	Resolution A.444(XI) is adopted	IMO	Uniform requirements for OWS/OCM units installed on or before January 20, 1979 all must comply with A.393(X).	MARPOL, OWS, OCM
1980	No Activities Recorded			
1981				
1982				
10/2/1983	MARPOL Annex I comes into force		Prevention of pollution by oil & oily water.	IMO, MEPC, MARPOL
1984	No Activities Recorded			
1985				
1986	General Engineering Knowledge for Marine Engineers, Volume 8, pages 380-388	Reeds Marine Engineers Series, Jackson and Morton, 4th edition	One of the few technical textbook descriptions of OWS. Useful, but barely up to date in 1986. There is no mention of OCM.	OCM, OWS
4/6/1987	MARPOL Annex II comes into force		Control of pollution by noxious liquid substances in bulk.	IMO, MEPC, MARPOL
12/31/1988	MARPOL Annex V comes into force		Prevention of pollution by garbage from ships.	IMO, MEPC, MARPOL
1989	No Activities Recorded			
12/13/1990	MEPC/Circ.235	IMO	Guidelines for systems for handling oily wastes in machinery spaces of ships.	OWS, IMO, MEPC, MARPOL
1991	1st edition consolidated MARPOL book is published	IMO	This is the 1st consolidated edition of MARPOL regulations. The most recent edition was published in 2011.	IMO, MARPOL
7/1/1992	MARPOL Annex III comes into force		Prevention of pollution by harmful substances carried by sea in packaged form.	IMO, MEPC, MARPOL



Date	Title	Publisher	Description	Keywords
10/30/1992	MEPC.60(33) Adopted by Resolution	IMO	This is the date that the 60(33) regulations were adopted by IMO and came into force. This is the beginning of the 60(33) implementation process.	OWS, OCM, 60(33)
1993	First cruise ship OWS investigation		Led to prosecution and guilty plea in 1994. Cruise ships identified by USCG overflight.	OWS, criminal
1994	No Activities Recorded			
4/17/1995	Purification of Oily Waste Water by Ultrafiltration	Elsevier	A study of membrane and reverse osmosis waste water treatment. Includes a large list of filtration references.	RO, membrane
1996	No Activities Recorded			
1997	Annex VI is added to MARPOL		Prevention of air pollution from ships.	IMO, MEPC, MARPOL
1997	2nd edition consolidated MARPOL book is published	IMO	This is the 2nd consolidated edition of MARPOL regulations. The most recent edition was published in 2011.	IMO, MARPOL
9/25/1997	IMO Resolution MEPC.76(40) Standard Specification for Shipboard Incinerators	IMO, MEPC	Adoption of the MEPC.59(33) incinerator standard specification in Annex V of MARPOL. Regulations for incineration of sludge are part of Annex I, but Annex VI specifies regulations for operation of incinerator equipment.	Incinerators, IMO, MEPC, Annex V
1998	Assistant engineer awarded \$500,000 whistleblower award		One of the earliest whistleblower awards and one of the earliest million dollar fines.	Whistleblower
6/2/1998	Cruise ship company pays a \$9 million penalty and pleads guilty to a fleet-wide conspiracy of dumping oil into the ocean and lying to the U.S. Coast Guard to cover up the crimes		One of the earliest shipping company plea deals and fines.	Criminal, cruise
11/20/1998	Interim Guidelines for the Application of Human Element Analysing Process (HEAP) to the IMO Rule Making Process	IMO, MEPC/Circ. 346	Initiates a trial period where rule making will take into consideration the human element. Also provides a process that will allow rule making review.	Human factors
1998	Marine Auxiliary Machinery, 7th edition	Elsevier, H.D. McGeorge	This paperback edition of this licensed preparatory textbook indicates that 100 ppm OWS is the strictest standard. Bilge diagram does not show OCM. OCM operational theory is incorrect.	Training
1999	General Engineering Knowledge for Marine Engineers, Volume 8, pages 380-388	Reeds Marine Engineers Series, Jackson and Morton, 4th edition	A 1986 textbook technical description of OWS was reprinted in 1999, but no longer correct.	OCM, OWS



Date	Title	Publisher	Description	Keywords
7/1/1999	IMO Resolution MEPC.78(43) Amendments to the Annex of the Protocol of 1978 relating to the Prevention of Pollution from Ships, 1973	IMO, MEPC	Lays out an updated IOPP certificate and provides amendments to Annex I of MARPOL 73/78 Regulations 13G and 26.	IOPP, MARPOL
7/21/1999	Cruise ship company pays record \$18 million criminal fine		Fined for dumping oil and hazardous chemicals, making false statements; faces 21 felony counts in 6 different U.S. courts.	Criminal
3/1/2000	Technical Report: Novel Oil/Water Separator for Treatment of Oily Bilgewater	SNAME, Marine Technology Spring 2000, Caplan et al	Description of PetroLimator bioremediation bilge water treatment process. System received IMO and USCG type approval in January 2000.	OWS, bioremediation
3/17/2000	Enhanced MARPOL Oil Pollution Prevention Holland America Line Case Study	Dixon, Doug, presented at SNAME Pacific Northwest Section Meeting	Abstract: "Presented in this paper are a review of the current oil pollution prevention regulations and status of MARPOL Annex authorization. Also discussed are the efforts of Holland America Line to comply with the oil pollution regulations and a review of their bilge waste management equipment, procedures and internal reporting in excess of the regulations."	Case study, waste stream management, MARPOL
9/1/2000	Environmental Criminal Liability in the United States, a Handbook for the Marine Industry	Chamber of Shipping of America	This is a 122-page book published by the Chamber of Shipping of America that provided detailed legal discussion of the subject. It does not appear it has been updated.	Criminal
10/5/2000	Resolution MEPC.93(45)	IMO	Amendments to the standard specification for shipboard incinerators.	Incinerators
11/27/2000	Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues	European Parliament and Council	EU countries had to incorporate this directive into national law by 28 Dec 2002. It aimed to enhance the availability and use of PRFs for ship-generated waste and cargo residues, and set out a regime of enforcement. Includes a requirement that at least 30% of waste disposal costs are incorporated into the port cost for all vessels ("cost recovery system"). Summary of directive available here .	PRF, enforcement
12/31/2000	First non-passenger vessel OWS plea		The first non-passenger shipping company enters a plea agreement with the U.S. Department of Justice for OWS violations.	OWS, criminal
2001	No Activities Recorded			
2002	3rd edition consolidated MARPOL book is published	IMO	This is the 3rd consolidated edition of MARPOL regulations. The most recent edition was published in 2011.	IMO, MARPOL



Date	Title	Publisher	Description	Keywords
2002	Oil in the Sea: Inputs, Fates and Effects	U.S. National Research Council NRC	This study estimates that 98% of oil discharges are caused by MARPOL non-compliance. It estimates that ships discharged 255,700 tonnes of sludge in 1999, thereby saving these shipowners a total of \$12.8M per year.	Sludge, discharge costs
4/19/2002	Cruise ship company guilty plea requires implementation of corporation-wide Environmental Compliance Plan (ECP), 5 year probation, and pays \$18 million fine		This led to creation of Corporate and Operating Company Environmental Compliance departments, appointment of VP-level environmental executives and Environmental Officers on each cruise ship.	ECP, environmental officer
5/16/2002	Guidance on the Use of Human Element Analysing Process (HEAP) and Formal Safety Assessment (FSA) in the IMO Rule Making Process	IMO, MEPC/Circ. 391	Compares HEAP and FSA in the rules making process.	Human factors
7/31/2002	Cruise ship company signs plea agreement with the U.S. felony violation of APPS and agrees to pay a \$1 million criminal fine		Last large cruise ship company plea agreement with regard to OWS. Lower penalty because company turned itself in and cooperated with prosecutors.	OWS
12/1/2002	Deckma Hamburg OCM test liquid instructions and MSDS	Deckma	OCM's can be tested with a test liquid. This is the instruction as provided by Deckma, and provides the Material Safety Data Sheet for the test liquid.	OCM, Deckma, calibration
12/31/2002	5 shipping company OWS pleas		In 2002, 5 shipping companies enter plea agreements with the U.S. Department of Justice for OWS violations.	OWS, criminal
2003	Cost Savings Stemming from Non-Compliance with International Environmental Regulations in the Maritime Sector	Organization for Economic Co-operation and Development (OECD/OCDE), Marine Transport Committee, Philippe Christ	This lengthy paper provides significant background on environmental compliance. It opines that some shipowners make conscious economic decisions to ignore environmental regulations to save money.	Economics, Annex I, waste water management, discharge costs
4/1/2003	Carnival Corporation & plc installs white boxes on all cruise ships	Carnival Corporation & plc	White boxes are more complete overboard discharge monitoring devices for bilge water discharge. Regarded as an additional monitoring device beyond the statutory (MARPOL) OCM, this equipment was developed to help enhance the reliability of conventional overboard discharge controls and related recordkeeping.	White box



Date	Title	Publisher	Description	Keywords
7/18/2003	MEPC.107(49) Revised Guidelines and Specifications for Pollution Prevention Equipment for Machinery Space Bilges of Ships adopted by resolution	IMO, MEPC	This is the beginning of the 107(49) implementation process, and supersedes MEPC.60(33). It requires OWS to treat more complex bilge liquids (emulsions) and often it adds post treatment to the 60(33) type OWS, and requires a more sophisticated OCM that records alarms (storing data for 18 months).	IMO, MEPC, OWS, OCM, 107(49), emulsion
9/27/2003	MARPOL Annex IV enters into force		Prevention of pollution by sewage from ships.	IMO, MEPC, MARPOL
11/10/2003	IMO MEPC Circ.406 Guidelines for Application of MARPOL Annex I Requirements to FPSOs and FSUs	IMO, MEPC	MARPOL Annex I also applies to FPSOs (Floating Production Storage and Offloading Units) and FSUs (Floating Storage Units). This circular discusses the application of Annex I to FPSOs and FSUs.	IMO, MEPC, FPSO, FSU, Annex I, IOPP
12/31/2003	2 shipping company OWS pleas		In 2003, 2 shipping companies enter plea agreements with the U.S. Department of Justice for OWS violations.	OWS, criminal
5/1/2004	A Guide for Correct Entries in the Oil Record Book, Part I Machinery Space Operations, Edition 1, May 2004	Intertanko	This is a guide published by Intertanko to provide crews with assistance in filling out Oil Record Books. It was a valiant effort at trying to provide crews with real guidance, but in its production and attempts at standardized procedures incurred its own problems and inaccuracies. (This is a marked up copy.)	ORB, sludge production, residue production
10/15/2004	Resolution MEPC.117(52)	IMO	Amendments to the annex of the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from ships, 1973. This is the full text of MARPOL Annex I on this date.	Annex I
11/2/2004	Revised Guidelines and specifications for pollution prevention equipment for machinery space bilges of ships MEPC/Circ.420	IMO	This circular provides guidance on implementation dates for MEPC.107(49).	107(49)
11/17/2004	Practical Guide in Regard to Marine Bilge Water Properties and Treatment Technologies	SNAME NY section, IMarEST, SMPE, Hal Alpert	This is a practical discussion of issues that occur during bilge oil water separation and methods to deal with them.	OWS, centrifuge, flocculation, adsorbents, emulsions
12/1/2004	Bilge Water Treatment - the need for advanced technology	The Motor Ship	This is Coffin's description of their MEPC.107(49) approach.	OWS, 107(49)
12/31/2004	6 shipping company OWS pleas		In 2004, 6 shipping companies enter plea agreements with the U.S. Department of Justice for OWS violations.	OWS, criminal



Date	Title	Publisher	Description	Keywords
2005	Factors Affecting Bilge Water Properties and Oily Water Separator Performance	Hal Alper, MYCELX	Discussion of emulsions and 107(49) emulsion treatment strategies.	107(49), emulsions
2005	Draft Environmental Compliance Plan	U.S. Department of Justice	When a shipowner entered a guilty plea with the USDOJ, a significant portion of the plea agreement would be the shipowner's implementation of an Environmental Compliance Plan with regard to MARPOL and other regulations. These plans are quite extensive and this is a draft of a typical plan in 2005. Compliance is far from a trivial task.	ECP, DOJ
2005	Human Factors in Classification and Certification	American Bureau of Shipping	A technical discussion of human factors failures aboard ships not related to OWS, but noting the following main causes: • Inadequate situation assessment and awareness • Task omissions • Risk taking / risk tolerance / risk perception often associated with fatigue.	Human factors
1/1/2005	MEPC.107(49) on new construction	IMO	On this date only 107(49) OWS equipment can be installed on newly constructed vessels. The actual implementation of 107(49) is a little more complicated than just this date.	107(49), OWS, OCM
1/1/2005	SNAME forms T&R Ad Hoc Panel 14 to study OWS issues	SNAME	SNAME budgeted \$10,000 start-up funding hoping other organizations and shipowners would join in financing a clearinghouse. No additional funding was provided. Ad Hoc 14 functioned as a pro bono project.	SNAME
2/17/2005	Cruise Ship Pollution Prevention. What Works and What Doesn't?	American Association of Port Authorities	Environmental training was most difficult part of ECP. When in doubt report. Don't shoot the messenger. Transparency. Provides incident numbers (300, with 147 equipment failures). Notes white box helps.	Passenger vessels, OWS, ECP
3/24/2005	Guidelines for the Inspection of Oily Water Monitor and Separator Systems	USCG, MOC Policy Letter No. 04-13, Rev1	This is a USCG policy letter that discusses inspection issues with 107(49) systems. It discusses OCM calibration procedures (at least once every five years at IOPP renewal).	107(49), OWS, OCM
5/1/2005	Treatment of Bilge Water Using a Combination of Ultrafiltration and Reverse Osmosis	Conference on Desalination and the Environment, Santa Margherita, Italy, Tomaszewska et al	Study investigating the possibility of bilge water treatment using integrated ultrafiltration/reverse osmosis (UF/RO) systems. Involved system testing with model oily waste water and collected bilge water. Considered feed concentration, transmembrane pressure.	OWS, ultrafiltration, reverse osmosis
5/19/2005	MARPOL VI enters into force		Prevention of air pollution from ships.	IMO, MEPC, MARPOL



Date	Title	Publisher	Description	Keywords
7/22/2005	Resolution MEPC.139(53)	IMO	Guidelines for the application of the revised MARPOL Annex I requirements to floating production, storage and offloading facilities (FPSOs) and floating storage units (FSUs).	FPSO
8/31/2005	Pollution Prevention Equipment required by MARPOL 73/78 MEPC.5/Circ.9	IMO	This circular is the last MEPC.5 circular to provide an international listing of approved equipment for various MARPOL regulations before IMO moved to an electronic register of equipment in GISIS. It lists a large number of 60(33) OWS and OCM manufacturers and a smaller list of the newer 107(49) OWS and OCM manufacturers. (This version of the document has deleted the other approved MARPOL equipment such as incinerators and sewage systems.)	OWS, OCM, GISIS
9/26/2005	MSC-MEPC.4/Circ.1: Retention of original records/documents on board ships	IMO	Circular outlining the actions to be taken with regard to removal of the ORB from the vessel.	ORB
9/30/2005	Ship Source Pollution & Criminalisation of Seafarers - A Shipowner's View	Robert Ho, President Fairmont Shipping, at Maritime Cyprus	Ho discusses being part of an OWS criminal investigation and requests that industry starts a think tank on the subject.	Criminal, whistleblower
11/3/2005	USCG Notice of Proposed Rule Making for Pollution Prevention Equipment	Federal Register USCG	The USCG provides notice for the inclusion of MEPC.107(49) into the CFR. The USCG estimates that the cost to install MEPC.107(49) equipment is \$13,000 higher than for MEPC.60(33) equipment for large oceangoing vessels. There is no estimate for increases in operational costs, such as filter materials and OCM calibration.	OCM, costs, OWS 107(49)
11/13/2005	Bypassing the Oily Water Separator is a Shortcut to Jail!	Part of American Club Circular No. 25/05	This poster was produced and communicated to American Club Members in 2005, and led at least one shipowner to conduct a large scale bilge management initiative within their company.	OWS, magic pipe, criminal
12/1/2005	USCG approves Alfa Laval EcoStream 107(49) OWS	Alfa Laval	This is approval of a centrifugal OWS system. These systems need a filter for emulsion separation.	OWS, centrifugal
12/31/2005	6 shipping company OWS pleas		6 shipping companies enter plea agreements with the U.S. Department of Justice for OWS violations this year.	OWS, criminal
2006	NAVSEA Warfare Center Environmental Quality Systems Brochure	U.S. Navy	The U.S. Navy also has researched OWS technology solutions. This brochure mentions the VS-50 OWS and OCM tested aboard the USS WASP LHD-1.	OWS, OCM, U.S. Navy



Date	Title	Publisher	Description	Keywords
2006	Shipping Industry Guidance on the Use of Oily Water Separators Ensuring Compliance with MARPOL	Maritime International Secretariat	This is an extensive list of recommendations that appears to be a compendium of all recommendations that have been made to date. Full compliance would require a full time crew member. This is the First Edition. No further editions are known to have been developed.	OWS, SMS, ISM
2006	4th edition consolidated MARPOL book is published	IMO	This is the 4th consolidated edition of MARPOL regulations. The most recent edition was published in 2011.	IMO, MARPOL
2006	Pollution Prevention Equipment under MARPOL 2006 Edition	IMO	This is a small book that contains the MEPC specifications for MARPOL equipment required aboard ships in 2006. It basically republished 107(49) and 76(40) (incinerators) but also provides some background. This is the latest IMO book format MARPOL equipment publication by IMO, and as such does not cover later developments. OCM is still identified as "bilge alarm."	OWS, OCM, bilge alarm
1/17/2006	Docket USCG-2004-18939 Pollution Prevention Equipment Comment	Gulf Coast Mariners Association	The USCG issued a request for comment and this is a lengthy response by the GCMA, representing smaller oceangoing vessels such as supply vessels. Request mandated training on OWS. Consider just holding tanks on smaller vessels.	USCG, OWS, MARPOL
1/20/2006	Guidance for the Enforcement of MARPOL ANNEX I During PSC Examinations	USCG, G-PCV Policy Letter 06-01	This is a USCG policy letter that provides instruction to PSC officers with regard to ORB, OWS and OCM inspections during PSC visits. It provides substantial additional references.	PSC, OWS, OCM, ORB
1/30/2006	Carnival Corporation Environmental Management Report Fiscal Year 2005	Carnival Corporation & plc	Carnival Corporation issues first annual public environmental management report, which includes data on OWS failure issues.	OWS, white boxes
2/1/2006	Initial Recommendations for Bilge Oily Water Separator System Design and Operation	Presented Feb 2006, ASNE MEETS Symposium, Hendrik van Hemmen	This paper is the result of a SNAME Ad Hoc panel effort over five years, with input provided by dozens of engineers on the subject. It includes a detailed description of the OWS system and problems and has been reprinted in slightly modified formats in various journals.	OWS, OCM
2/1/2006	A Guide for Correct Entries in the Oil Record Book, Part I Machinery Operations, Edition 1, revision February 2006	Intertanko	This was an updated revision of the May 2004 guide.	ORB, sludge production, residue production



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2/13/2006	A Separate Society	Lloyd's List, Michael Pryce	Mentions "for the public systems" and environmental officers.	For the public, environmental officer
3/1/2006	Polishing up Bilge Water	Marine Log, Gennaro A. D'Alterio, Met-pro.com	An article that describes U.S. Navy problems with MEPC.60(33) type OWS and describes a U.S. Navy solution using polisher filters.	OWS, U.S. Navy
3/1/2006	GISIS Database	IMO	Port Reception Facility Database goes on line through IMO's Global Integrated Shipping Database (GISIS).	PRFD, GISIS
3/2/2006	MEPC 54/10/6 Reports of Subcommittee	IMO MEPC	This report contains a discussion of OWS issues that starts in the latter half of the report. In this report mention is made of IBTS (Integrated Bilge Treatment Systems) and provides a complex proposed diagram. This approach attempts to capture all engine room drainage to the bilges and proposes treatment methods. This is a first attempt at IBTS.	OWS, IBTS
3/24/2006	IMO Equipment Data Base in GISIS	IMO	The Global Integrated Shipping Information System (GISIS) allows users to identify IMO approved antipollution equipment.	GISIS
3/24/2006	Resolution MEPC.142(54)	IMO	Amendments to the guidelines for the application of the revised MARPOL Annex I requirements to floating production, storage and offloading facilities (FPSOs) and floating storage units (FSUs).	FPSO
3/30/2006	Vessel Pollution & Solutions	Richard Udell, Senior Trial Attorney U.S. DOJ, Intertanko	A PowerPoint presentation by an attorney of the U.S. Department of Justice on the cause, extent and possible solutions to MARPOL violations.	MARPOL
4/18/2006	MEPC.1/Circ.511	IMO	Revised guidelines for systems for handling oily wastes in machinery spaces of ships incorporating guidance notes for an integrated bilge water treatment system.	IBTS
5/2/2006	The USCG starts an investigation based on a report that one of their own cutter men illegally discharged oily water on March 8, 2006	USCG	This matter was publicly reported by the USCG and resulted in criminal prosecution of the violator and USCG procedural review and modification. This matter indicates that motivation for violation does not automatically rest with vessel owner economic motivations.	Criminal, USCG
5/22/2006	Checklist for Considering Human Element Issues by IMO Bodies	IMO, MSC-MEPC.7/Circ.1	A restatement of the HEAP process in a checklist form.	Human factors



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6/1/2006	MER Letter to the Editor	IMarEST	In an anonymous letter to the editor an engineer questions why the crew made such a fancy magic pipe. The engineer suggests that MER provides an anonymous forum.	Magic pipe
8/10/2006	MEPC 55/INF.8 Incinerators for Disposal of Oil Residues	Denmark delegation to IMO	There have been problems with vessels incinerating more oil than the rated capacity of the incinerator. This document explains that larger incineration rates than the rated capacity are not at all unusual.	Incinerator, ORB
9/1/2006	Oily Waste Management Onboard of Vessels	AFCAN, Capt. Le Calvez	Summary of a lecture to European law enforcement personnel. Talks about sludge discharge ports and small sludge pumps.	PSC, sludge pump sizing, PRF
9/5/2006	Solving the Oily Water Separator Puzzle	Naval Automation Group	This case study describes issues with a light scatter OCM (false positive) and the installation of a fluorescence oil detection meter.	OCM, fluorescence
10/2/2006	An Improved IBTS Diagram	Martin & Ottaway	The proposed IBTS diagram as shown in IMO MEPC 54/10/6 had some weaknesses that are addressed in this document. Overall and in retrospect this approach may have been too complex.	IMO, MEPC, IBTS
12/31/2006	6 shipping company OWS pleas		In 2006 6 shipping companies enter plea agreements with the U.S. Department of Justice for OWS violations.	OWS, criminal
2007	Marine Auxiliary Machinery, 7th edition	Elsevier, H.D. McGeorge	This 2007 printing of the 1998 paperback edition of this licensed preparatory textbook still indicates that 100 ppm OWS is the strictest standard. Bilge diagram does not show OCM. OCM operational theory is incorrect.	Training
1/1/2007	U.S. Oil Record Book (Rev. 01-07)	USCG	The United States Coast Guard releases a new version of the U.S. Flag Oil Record Book, and directs vessel owners to cease use of the older version, since the old one no longer conforms to current MARPOL requirements.	ORB
3/9/2007	BIMCO Discusses Oily Water at IMO	BIMCO bulletin #2 2007	A summary report on efforts by IMO to perform a comprehensive overhaul of MARPOL Annex I regulations by Denmark.	OWS, IMO, MARPOL
3/16/2007	Carnival Corporation Environmental Management Report Fiscal Year 2006	Carnival Corporation & plc	Carnival Corporation continues to issue annual public environmental reports with data on OWS failure issues.	OWS, white boxes, cruise



Date	Title	Publisher	Description	Keywords
4/6/2007	MEPC 56/6/2 Phase out of existing pollution prevention equipment complying with Resolutions MEPC.60(33) and A.586(14)	IMO Submitted by the USCG	With 107(49) in place the USCG recommends phase out of 60(33) and earlier equipment. Eventually this recommendation was rejected by IMO and 60(33) equipment, when installed aboard a vessel prior to 107(49), can operate until the vessel is scrapped as long as it remains operational.	OWS, 107(49), 60(33)
4/6/2007	MEPC 56/19/2 Work Programme of the Committee and Subsidiary Bodies. Proposed amendments to the revised MARPOL Annex I (Electronic means to control oil discharge from ships)	IMO Submitted by Dominica	A proposal to use electronic reporting of OWS use.	OWS, GPS
9/1/2007	KGJS's Environmental Compliance Programme	Kristian Gerhard Jebsen Skipsrederi A/S	This is a PowerPoint presentation printout that discusses OWS operational issues and upgrades by a shipowner starting in 2004. It provides actual crew comments and many other specifics.	OWS, OCM, tank, seals
11/14/2007	Appendix V Environmental Crimes Voluntary Disclosure Policy	USCG Maritime Law Enforcement Manual	This document establishes a legal process where under certain conditions shipowners can self declare environmental violations and the USCG will not recommend criminal prosecution.	Criminal
12/1/2007	Draft Cruise Ship Discharge Assessment Report	Prepared by U.S. EPA	Considers five waste streams: sewage, gray water, bilge water, solid waste, hazardous waste. Discusses nature/volume of waste stream, applicable federal regulations, shipboard attempts at env management, potential env impacts, and federal steps taken toward management.	Waste stream management, cruise ship, regulations
3/31/2008	The Coast Guard's Environmental Crimes Voluntary Disclosure Policy - What It Does and What It Doesn't Do	Benedict's Maritime Bulletin, David Dickman, et al	This legal paper discusses the USCG Voluntary Disclosure Policy, which was issued on November 14, 2007. It is cautious about recommending its use by shipowners.	Criminal
4/15/2008	Carnival Corporation Environmental Management Report Fiscal Year 2007	Carnival Corporation & plc	Carnival continues to make their Environmental Management review publicly available. This report records the installation of white boxes on all of Carnival's fleets. It reports 9 OWS failures resulting in an estimated discharge of oil of 1744 liters in 2007.	OWS, white boxes, cruise
4/22/2008	USCG Office of Port and Facility Activity Organization	Homeland Security & U.S. Coast Guard	A PowerPoint that describes the activities and organization of this office. This is the office that deals with U.S. port reception facilities.	PRF, GISIS



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5/1/2008	Britannia: Oily Water Separator Violations	Britannia	Very comprehensive report on the state of enforcement of MARPOL regulations.	Criminal
9/1/2008	The Need for Additional Human Factors Considerations in Ship Operations	Hendrik F. van Hemmen, SNAME 2nd International Symposium on Ship Operations, Management & Economics in Athens, Greece	This paper discusses workload changes aboard ships, and suggests that the time for an environmental officer aboard oceangoing vessels may have arrived.	Environmental officer, human factors
10/7/2008	Ferry Oily Wastewater Treatment	Elsevier	A study of membrane filtration for wastewater treatment.	Membrane
10/10/2008	MEPC.176(58)	IMO	Modifies Annex VI incinerators, which are used under Annex I.	MARPOL
11/4/2008	MEPC.1/Circ.640	IMO	Interim guidance on the use of the oil record book concerning voluntary declaration of quantities retained on board in oily bilge water holding tanks and heating of oil residue (sludge).	ORB, evaporation
11/12/2008	2008 Revised Guidelines for Systems Handling Oily Wastes in Machinery Spaces of Ships Incorporating Guidance Notes for an Integrated Bilge Water Treatment System (IBTS) MEPC.1/Circ.642	IMO	This IMO circular addresses drainage of oil residue (sludge) service tanks, often called incinerator tanks and Integrated Bilge Treatment Systems (IBTS).	Incinerator, tank naming, IBTS
11/30/2008	Report on Performance of Separators operated by a shipowner	Marinfloc	Some OWS manufacturers are deeply committed to getting OWS to work right. This may involve a lot of technical work, but it provides a large amount of generally not well distributed information. This report refers to review of close to 100 emails, three ship visits, crew interviews and chemical analysis to work through some operational issues with OWS, and makes some interesting observations about real life bilge liquid compositions.	OWS, Flocculent
12/19/2008	MSC-MEPC.4_Circ3.pdf	IMO	Blanking of bilge discharge piping in port.	OWS
12/28/2008	Cruise Ship Discharge Assessment Report (final)	U.S. Environmental Protection Agency	Refers to California's Cruise Ship Environmental Task Force Report (2003) that identified a number of potential problems associated with OWS systems. Discusses environmental impacts of oil discharges (one of the few publications to do so). Summarizes typical problems identified by vessel inspections.	OWS, OCM, environmental impact, enforcement
12/31/2008	Royal Caribbean Cruises Ltd. 2008 Stewardship Report	Royal Caribbean Cruises Ltd.	Royal Caribbean issues first annual Stewardship Report.	Cruise



Date	Title	Publisher	Description	Keywords
2009	SNAME T&R Bulletin 6-1 Guide to Diagnosing Contaminants in Oily Bilge Water to maintain, operate and troubleshoot Bilge Water Treatment Systems	SNAME, T&R Panel EC-3	Through its Technology and Research Panel EC-3, SNAME developed a step by step guide to troubleshoot OWS/OCM problems.	OWS, OCM, troubleshooting
1/6/2009	USCG Interim Rule	USCG	On this date the USCG issued the Interim Rule for Pollution Prevention Equipment, and seeks public comment. It relates to implementation and installation of 107(49) equipment on vessels built before Jan 1, 2005.	107(49), OWS, OCM
4/1/2009	A Guide for Correct Entries in the Oil Record Book, Part I Machinery Operations, Edition 2, April 2009	Intertanko	This guide was quickly superseded by the November 2009 revision.	ORB, sludge production, residue production
5/7/2009	Carnival Corporation Environmental Management Report Fiscal Year 2008	Carnival Corporation & plc	Carnival Corporation continues to issue annual public environmental reports with data on OWS failure issues.	OWS, white boxes
5/8/2009	Discussion of USCG interim rule on Pollution Prevention Equipment	Blank Rome, Jeanne Grasso	Grasso discusses the issue of having to install MEPC.107(49) OCM's on MEPC.60(33) OWS equipment when the OCM is replaced.	60(33) 107(49) OCM
7/17/2009	Amendments to regulations 1, 12, 13, 17 and 38 of MARPOL Annex I, Supplement to the IOPP Certificate and Oil Record Book Parts I and II MEPC.187(59)	IMO	This IMO circular provides tank name definitions and IOPP discussions. It also notes that sludge tanks cannot be connected to the bilge system. This caused various confusion with regard to the water drainage arrangements from sludge tanks.	Tank naming, sludge piping
7/20/2009	Guide to Good Practice for Port Reception Facilities Providers and Users. MEPC.1/Circ.671	IMO	Describes the steps that need to be taken in order to effectively dispose of waste by ships at port reception facilities.	OWS, PRF, PSC
7/22/2009	MEPC.1/Circ.677 Guide to Diagnosing Contaminants in Oily Bilge Water to maintain, operate and troubleshoot Bilge Water Treatment Systems	IMO, IMarEST	IMO apparently word-for-word took the SNAME guide to OWS trouble shooting and credited the development to IMarEST. They recommend further work and recommend the guide be disseminated to all parties at interest through member governments.	OWS, OCM, troubleshooting
7/31/2009	Amendment to the 2008 Revised Guidelines for Handling Oily Wastes in Machinery Spaces of Ships Incorporating Guidance Notes for an Integrated Bilge Water Treatment System (IBTS) MEPC.1/Circ.676	IMO	This IMO circular resolves confusion between MEPC.197(59) and MEPC.1/Circ.642.	Tank naming, incinerator
11/1/2009	A Guide for Correct Entries in the Oil Record Book, Part I Machinery Operations, Edition 2, November 2009	Intertanko	This guide provides assistance to crew members in ORB record keeping. This guide is somewhat in conflict with IMO guidelines.	ORB, sludge production, residue production



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12/31/2009	Royal Caribbean Cruises Ltd. 2009 Stewardship Report	Royal Caribbean Cruises Ltd.	Royal Caribbean issues second annual Stewardship Report.	Cruise
11/8/2010	MEPC.1/Circ.736	IMO	Circular that provides guidelines for the Recording of Operations in the Oil Record Book Part I - Machinery Space Operations. These guidelines have some inconsistencies.	MARPOL, ORB
12/31/2010	Royal Caribbean Cruises Ltd. 2010 Stewardship Report	Royal Caribbean Cruises Ltd.	Royal Caribbean issues third annual Stewardship Report.	Cruise
2011	Consolidated MARPOL book is published	IMO	This is the current (as of June 2015) most up to date MARPOL book incorporating MEPC resolutions up to MEPC.208(62).	MARPOL
2011	MEPC.205(62)	IMO	Guidelines and specifications for add-on equipment for upgrading resolution MEPC.60(33)-compliant oil filtering equipment.	MARPOL
2011	Report on Environmental Attitudes Survey Performed by SNAME T&R Panel EC-7	Edward Schembor (Horizon Lines SNAME T&R EC-7 Intern) et al	Results of a one-year survey on maritime environmental attitudes (including OWS systems), which ran from 2010-2011.	Survey, OWS
1/1/2011	Oil Record Book Entries: Machinery Space Operations (Part I)	UK P&I Club, number 35, revised from Bulletin 24	In November 2010 IMO issued MEPC Circ. 736, and this came into force under MEPC.187(59) on January 1, 2011. This dealt mostly with ORB entry formats and the Club provided these instructions to its members.	ORB
4/9/2011	Carnival Corporation Sustainability Summary Report Fiscal Year 2009	Carnival Corporation & plc	Carnival Corporation continues to issue annual public environmental reports with data on OWS failure issues. This is the first year where Carnival combines public environmental and sustainability reporting, and when all of Carnival's subsidiary Operating Companies issue their own GRI-based FY2009 Sustainability Reports.	OWS, white boxes, cruise
5/1/2011	Guidance for the Environmental Class Notations, Clean and Clean Design	Det Norske Veritas	DNV guidance for Clean and Clean design classification designation. The bilge water section required 5 ppm treatment.	5 ppm
8/25/2011	MEPC.1/Circ.760	IMO	Amendments to the 2008 revised guidelines for systems for handling oily wastes in machinery spaces of ships incorporating guidance notes for an integrated bilge water treatment system.	IBTS
8/25/2011	MEPC.1/Circ.736/Rev.1	IMO	Guidance for recording of operations in the Oil Record Book Part I – Machinery space operations. This was the first revision, which revoked MEPC.1/Circ.736, and was superseded less than two months later.	ORB



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10/6/2011	MEPC.1/Circ.736/Rev.2	IMO	Guidance for the recording of operations in the Oil Record Book Part I - Machinery Space Operations (All Ships). This is the current version, which revokes MEPC.1/Circ.736/Rev.1	ORB
11/1/2011	Oily Bilgewater Separators	U.S. EPA	OWS technology descriptions and evaluation of OWS effectiveness based on their ability to achieve low effluent oil concentrations.	OWS, OWS effectiveness
11/3/2011	Carnival Corporation Sustainability Report Fiscal Year 2010	Carnival Corporation & plc	Carnival Corporation issues first annual public GRI-based corporate-level sustainability report with data on OWS failure issues.	Cruise
12/31/2011	Royal Caribbean Cruises Ltd. 2011 Stewardship Report	Royal Caribbean Cruises Ltd.	Royal Caribbean issues fourth annual Stewardship Report.	Cruise
2012	MARPOL International Convention for the Prevention of Pollution from Ships	NAMEPA	This booklet was originally distributed to seafarers in Massachusetts and North Carolina. The booklet was produced by NAMEPA through grant money from NFWF.	MARPOL, awareness
2012	Systems Design for Meeting New and Existing International Regulations	SNAME 2012 Annual Meeting, Hendrik van Hemmen; Martin & Ottaway	This paper discusses systematic approaches to international regulation implementation and argues that only integrated approaches can result in eventual successful implementation.	SMS, QESTH
5/1/2012	Accuracy Considerations in Tank Soundings and ORB Volume Recording	Martin & Ottaway	This technical memo discusses accuracy considerations and sets a reasonable standard for ORB volume recording. Developed for a shipowner based on results of a company-wide MARPOL compliance investigation conducted by M&O.	Tank volume accuracy, ORB
5/1/2012	Bilge and Sludge Tank Naming Convention	Martin & Ottaway	This technical memo discusses the importance of bilge and waste oil tank naming convention. Developed for a shipowner based on results of a company-wide MARPOL compliance investigation conducted by M&O.	Tank naming, ORB
5/1/2012	Production Capacity of OWS Equipment	Martin & Ottaway	Technical memo developed for a shipowner based on results of a company-wide MARPOL compliance investigation conducted by M&O. This memo discusses various factors that affect actual OWS production rates as compared to their rated capacities.	OWS
5/1/2012	Incinerator Use Considerations in Specific Trade	Martin & Ottaway	This technical memo relates to fuel regeneration in the composite boiler and sludge incineration. Developed for a ship owner based on results of a company-wide MARPOL compliance investigation conducted by M&O.	Incinerator



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5/1/2012	Use of Unified Format Stamps in ORB Recording	Martin & Ottaway	This technical memo suggests that ship based custom stamps may improve ORB record keeping tasks. The USCG has tacitly approved this approach. Developed for a shipowner based on results of a company-wide MARPOL compliance investigation conducted by M&O.	ORB
5/1/2012	Use of Excel Spreadsheets for ORB Recording	Martin & Ottaway	This technical memo proposes future development to work towards a spreadsheet approach to ORB entries. Developed for a shipowner based on results of a company-wide MARPOL compliance investigation conducted by M&O.	Reception facilities, MARPOL
5/24/2012	MARPOL Requirements for Port Reception Facilities	IMO	Lists the requirements for port reception facilities to ensure that waste can be discharged without undue delay. Discusses long standing lack of PRFs and under reporting. Port Reception Facility Database (PRFD).	OWS, PRF, PRFD
6/1/2012	Standard Specification for Shipboard Oil Pollution Abatement System	ASTM F2283-12	This is a very extensive ASTM standard for shipboard OWS systems. It addresses many issues that are associated with the design of OWS systems such as power requirements, materials, etc. In effect, it is a very extensive checklist for those involved in the design and installation of OWS systems. This is the most recent version of this standard.	OWS
12/31/2012	Royal Caribbean Cruises Stewardship Report 2012	Royal Caribbean Cruises	Royal Caribbean issues fifth annual Stewardship Report.	Cruise
2013	General Engineering Knowledge for Marine Engineers, Volume 8, pages 389-398	Reeds Marine Engineers Series, Russell, Jackson and Morton, 5th edition	This is the 5th edition of this textbook. The section on OWS starts on page 389, and makes mention of the so called magic pipe. It also mentions an ORB, but makes no mention of 107(49) or even an OCM.	OCM, OWS, magic pipe
3/6/2013	Norwegian Cruise Line introduces Eco-Smart Cruising program	Norwegian Cruise Line	Norwegian Cruise Line's public statement of environmental approach and policy.	Cruise
4/1/2013	Opex must be considered in bilge choices	The Motorship, Wendy Larsen	Article on operational and cost issues with regard to bilge water management. Provides narrative on 10/21/2014 Cleanship presentation.	OWS, operating expenses



Date	Title	Publisher	Description	Keywords
4/9/2013	KGJS's MARPOL Annex I Compliance PowerPoint presentation	Kristian Gerhard Jebsen Skipsrederi A/S	This is an updated version of a 2007 presentation by a shipowner that discusses OWS operational issues and upgrades starting in 2004. SKS reports as follows: "As our bilge management drive evolved, we received a steady stream of proposals and suggestions from the vessels. Each proposal that was found valid was tested on one or two vessels before being rolled out on the fleet. We were very concerned about not to overdoing it, questionnaires were sent to the fleet several times asking for their opinions after installations had been in use for some time. If we should point at one thing that started the momentum, it was a poster issued by the American Club warning about criminal prosecution consequences to which we added a warning that we should make sure that bad habits from incoming engineers do not spoil our progress."	OWS 107(49), OCM, tank, seals
4/24/2013	Sustainable Ocean Summit	World Ocean Council	Reviews ways to preserve oceans and also discusses the legalities of properly disposing of oily waste. Summarizes development and evolution of PRFs.	OWS, EU legislation, PRF
5/17/2013	Resolution MEPC.240(65)	IMO	2013 amendments to the revised guidelines and specifications for oil discharge monitoring and control systems for oil tankers.	ODME
5/24/2013	Cruise Ship Industry's Environmental Record: Not Triumphant	Outside magazine, Mary Catherine O'Connor	Not atypical assessment of ship operations by a partially informed author. Contains links to listings of alleged cruise ship environmental violations. Listings are unclear as to how the violations were reported (self-reported or not).	Cruise
6/27/2013	Revised Consolidated Format for Reporting Alleged Inadequacies of Port Reception Facilities. MEPC.1/Circ.469/Rev.2	IMO	This is the latest revision of a form that allows a ship master to report inadequacies in port reception facilities. This form should be submitted to the Flag State and also the Port State if possible.	PRF, inadequacy reporting
7/1/2013	Guide to Good Practice for Port Reception Facilities Providers and Users. MEPC.1/Circ.671/Rev.1	IMO	Updates the steps that need to be taken in order to effectively dispose of waste by ships at port reception facilities by including additional MARPOL IV and V developments.	OWS, PRF, PSC
7/1/2013	Standard Format for the Advanced Notification Form for Waste Delivery to Port Reception Facilities. MEPC.1/Circ.644/Rev. 1	IMO	Details the standard format for notification by the ship to a port facility for acceptance of shipboard waste. This form should be submitted 24 hours prior to arrival.	PRF, advanced notification

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Date	Title	Publisher	Description	Keywords
7/1/2013	Standard Format for the Waste Delivery Receipt Following a Ship's Use of Port Reception Facilities. MEPC.1/Circ.645/Rev.1	IMO	Details the layout of what the receipt following a ship's use of a port reception facility should look like.	PRF, waste delivery receipt
9/23/2013	Carnival Corporation Sustainability Report Fiscal Year 2011	Carnival Corporation & plc	Carnival Corporation issues second annual public GRI-based corporate-level sustainability report with data on OWS failure issues.	OWS, white boxes
12/17/2013	2013 Ocean Ranger Season Report		This is a running report that is updated annually and contains a large amount of information. It shows improvement trends and no recent OWS problems in Alaskan waters. The technical description of the OWS/bilge systems has some minor errors.	Ocean Ranger
12/18/2013	MARPOL Reception Facility Inadequacies	USCG Sector Houston-Galveston MSIB 11-13	In this bulletin the USCG draws attention to some waterfront facilities' unwillingness to accept residue and waste from vessels, which in certain circumstances can be a finable legal violation.	Reception facilities, MARPOL
12/19/2013	Vessel General Permit for Discharges Incidental to the Normal Operation of Vessels	EPA	This study addresses discharges of oil, including oily mixtures, from ships subject to MARPOL. It also includes technology-based effluent limits and related requirements for specific discharge categories, including bilge water discharges.	VGP
12/31/2013	2013 Final Issuance of National Pollutant Discharge Elimination System (NPDES) Vessel General Permit (VGP) for Discharges Incidental to the Normal Operation of Vessels Fact Sheet	EPA	Exhaustive EPA review of VGP. On Page 62 it discusses bilge water requirements and discusses the possibility for requiring 5 ppm equipment.	5ppm, VGP
1/1/2014	MARPOL International Convention for the Prevention of Pollution from Ships	NAMEPA; updated in Jan 2014	Since the original printing NAMEPA has printed and distributed this MARPOL booklet to over 200,000 seafarers, port communities, recreational boaters and students throughout North America.	MARPOL, awareness
1/14/2014	Characterizing shipboard bilgewater effluent before and after treatment	Environmental Science and Pollution Research (2014) 21:5637-5652; McLaughlin et al	This study looked at the effectiveness of bilge water treatment systems. Includes land-based type approval data for 20 OWS systems and experimental data for three shipboard OWS systems. Very instructional paper with regard to actual OWS operations, although it only has a small shipboard sample. It notes that there are issues with false positives and false negatives for optical OCMs used aboard ships.	OWS, OCM



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2/3/2014	Carnival Corporation Sustainability Report Fiscal Year 2012	Carnival Corporation & plc	Carnival Corporation issues third annual public GRI-based corporate-level sustainability report with data on OWS failure issues.	Cruise
4/4/2014	Resolution MEPC.244(66)	IMO	2014 standard specification for shipboard incinerators.	Incinerators
6/20/2014	How to Comply with MARPOL Annex I	UK P&I Club	Pocket guide for ship owners on how to prevent improper discharges of oily water from their vessels, including recommendations for policy, training, procedures, equipment, maintenance, auditing, staff, and record keeping.	Training, record keeping
10/8/2014	Guidance on Detention and Action Taken	Paris MoU on Port State Control	Guidance regarding action taken by the PSCO if deficiencies (including MARPOL Annex I deficiencies) are found on board.	Enforcement
10/21/2014	Upgrading Bilge Water System on Vessels delivered 2010-2012	OSV Conference, Cleanship.se	Case study on OSV bilge water management. Customization of vessel for specific trade, while maintaining original functionality.	OWS
11/19/2014	Carnival Corporation Sustainability Report Fiscal Year 2013	Carnival Corporation & plc	Carnival Corporation issues fourth annual public GRI-based corporate-level sustainability.	Cruise
12/15/2014	Ocean Ranger Guidebook	Alaska Department of Environmental Conservation	Most recent version of the Ocean Ranger guidebook, which notes that Alaskan cruise ships generally do not use the OWS to discharge in Alaskan waters (p73). Book provides a lengthy discussion of OWS, but is not always correct or clear (strip chart on p. 77, definitions of OWS, oil filtering equipment and OCM).	Ocean ranger
1/1/2015	Oil Record Book for Dummies	John Wiley and Sons/Hornbeck Offshore by Todd Brock	Hornbeck Offshore worked with the "Instructions for Dummies" people to create a little pocket guide for ships' crews regarding ORB's. This is a very clever guide that clearly delineates what is cause for concern and what is simply shipboard life. It also explains ORB record keeping in lighter vein, which helps everybody feel a little better about the subject. The change in tone is a major innovation. Even if things are serious, it does not mean that humor in training is not allowed.	ORB, training
2/2015	OWS Tech Discussion: Pre/Post Treatment	Prepared by Martin & Ottaway for the MAX1 Studies	This informal discussion looks at the role of pre- and post- treatment for Flag State approved OWS systems.	Pre/post treatment
2/2015	A Failure to Communicate Case Study	Prepared by Martin & Ottaway for the MAX1 Studies	This case study was prepared as a thought exercise, based on an experience of oil contaminated water being drawn into a boiler.	Criminal



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4/2015	A discussion on data for OWS operations failures	Prepared by Martin & Ottaway for the MAX1 Studies	This informal discussion looks at the lack of data on OWS operations failures. It also asks for any data that would allow the industry to track the frequency of OWS failures more effectively.	Criminal
5/15/2015	MEPC.266(68)	IMO	This is the full MEPC.266(68) report that shows the regulatory activity that takes place in one IMO MEPC meeting. Only partially applies to OWS and shipboard waste, but interconnects with other topics. Shipboard exhaust gas scrubbers generate waste water, so how should this water be treated for disposal? The Polar code also requires amendments in MARPOL Annex I. This document also includes specific Amendments to MARPOL Annex I Chapter 3 Requirements for Machinery Spaces of All Ships Part A Construction Regulation 12 – Tanks for Oil Residues (sludge) Paragraphs 1-4.	Sludge tanks, sludge piping
5/28/2015	How to Fix a Broken Police Department	The Atlantic, Alana Samuels	Not an OWS or marine environmental management article, but in the Martin & Ottaway blog , Rik van Hemmen makes a case that this article has parallels to the human factors aspect of ECP implementation.	ECP, human factors, transparency
6/24/2015	MAX1 Conference in Wilmington, North Carolina	Martin & Ottaway	This conference, a component of the MAX1 studies, brought together a cross section of all stakeholders for OWS and Shipboard Waste Management. It also provided major input to the MAX1 studies final report. For presentations from the conference, go to this link .	OWS, training
9/1/2015	Conclusion of MAX1 Studies	Martin & Ottaway, National Fish & Wildlife Foundation	Documentation related to the MAX1 Studies, including the final report, survey results, and IMO recommendations can be found on the Martin & Ottaway website at this link .	
6/7/2016	Paperless oil record book attempts to cut ship detentions	Fairplay	This is the article about an electronic record book, called e-ORB, found by The Liberian Registry and Cyprus-based partner Prevention at Sea Ltd. This new advanced tool would prevent human administrative errors to happen and help mariners to fill out either traditional record books or replace it with an electronic version.	Oil Record Book, e-ORB
11/25/16	Technical Recommendations on the Implementation of Directive 2000/59/EC on Port Reception Facilities	European Maritime Safety Agency	Document providing guidance on best practices for compliance with the EU's directive on PRFs issued in 2000. Focuses on port Waste Reception and	PRF, enforcement

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			Handling Plans ("WRH Plans") and vessel waste offloading exemptions.	
12/1/16	Cruise company sentenced to record \$40 million penalty for oily waste pollution	Department of Justice	Largest ever criminal penalty involving deliberate vessel pollution. Sentence includes 8 vessels under an ECP for 5 years.	Criminal

