

**Maritime Air Quality Technical Working Group Meeting
Use of Low Sulfur Distillate Fuels in Ocean-Going Vessels**

**Overview of Data Gathering on Ocean-Going Ship
Operational Experiences**



**April 28, 2010
Oakland, CA**



Overview

- ◆ **Background**
- ◆ **ARB Ocean-Going Vessel
Operational Experience Survey**
- ◆ **U.S. Coast Guard Tracking**
- ◆ **Pilot reports**
- ◆ **Summary**

Purpose

- ◆ Collect information on operational experiences from available sources (operators, pilots, U.S. Coast Guard)
- ◆ Compile a central list of information and recommendations
- ◆ Provide information to maritime industry
- ◆ Identify primary areas of concern to aid in implementation

3

Examined Three Sources of Information

- ◆ ARB Ocean-Going Vessel Operational Experience Survey (2009)
- ◆ U.S. Coast Guard fuel switching-related loss of propulsion incidents (LOPs)
- ◆ Pilot reports
 - Long Beach Pilots
 - SF Bar Pilots



4

ARB Ocean-Going Vessel Operational Experience Survey (2009)



5

OGV Survey Purpose and Timing

- ◆ Survey conducted Fall 2009
- ◆ Designed to collect information on operational experience with the use of low sulfur distillate fuels in response to OGV Clean Fuel Rule
- ◆ Sent to ARB listserve (2400 members)
- ◆ Survey included two parts
 - survey of ship operators
 - overall experience
 - specific operational issues
 - survey fleet manager
 - overall experience with a fleet

6

OGV Survey Compilation of Survey Data

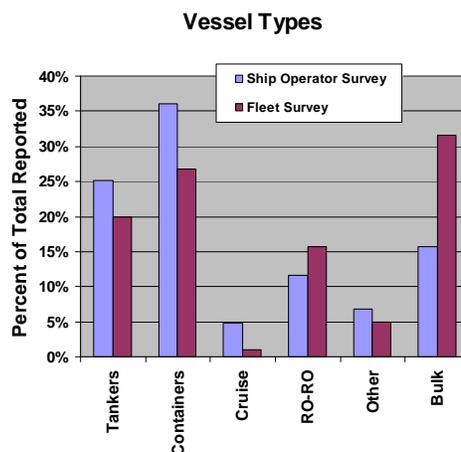
- ◆ **ARB survey analysis**
 - responses were tallied and reported
 - comment fields were categorized into five areas to identify main areas of concern
 - operational changes made in response to rule
 - transiting or maneuvering issues
 - main engine start issues
 - equipment issues
 - fuel properties comments

7

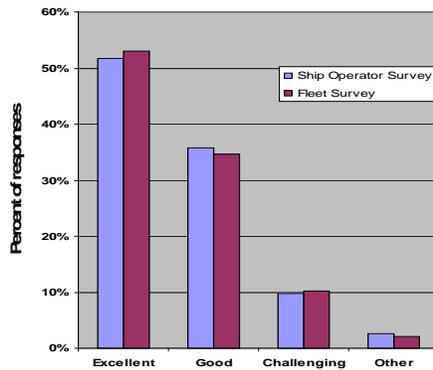
OGV Survey Number of Survey Participants

Ship operator responses:
51 operators reported
information on 148
vessels

Fleet operator responses:
58 fleet managers
responded
(representing 1723
vessels)



OGV Survey Overall Experiences with the Use of Distillate Since Implementation of the Rule*



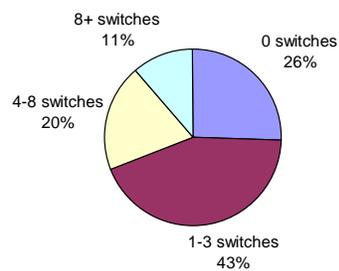
	Ship Operator Survey		Fleet Survey	
Excellent	58	51.8%	26	53.1%
Good	40	35.7%	17	34.7%
Challenging	11	9.8%	5	10.2%
Other	3	2.7%	1	2.0%
Total Responses	112		49	

*Based on 112 responses to the operator survey and 49 responses to the fleet survey

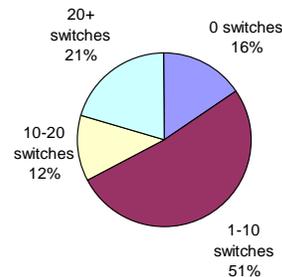
9

OGV Survey Number of Fuel Switches*

Ship Operator Survey
(number of times the vessel has fuel switched)



Fleet Survey
(number of times the fleet has fuel switched)



*As of date of survey (November, 2009)

10

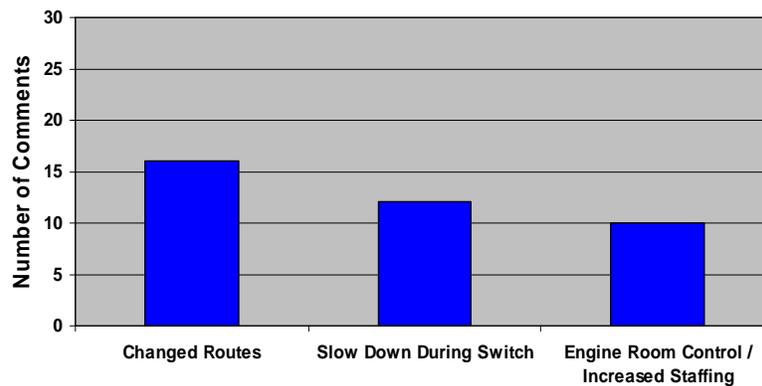
OGV Survey Summary of Responses to Survey Questions

	Ship Operator Survey		Fleet Survey	
	Yes Responses	Percent	Yes Responses	Fleet survey
Did you test your vessels on distillate prior to CA visit?	57	39%	21	36%
Have you made equipment changes to operate on distillate?	7	5%	4	7%
Do you have on board fuel switching procedures for crew members?	105	71%	36	62%
Have you had to modify the fuel switching procedures based on in-use experience?	12	8%	5	9%
Do you have documented training procedures for fuel switching?	85	57%	37	64%
Problems finding fuel?	10	7%	3	5%
Have you made operational changes due to fuel switching?	36	24%	9	16%

*Positive responses reported. Percentage based on total number of records (148 operator records, 58 fleet manager records)

11

OGV Survey Types of Operational Changes Made Due to Fuel Switching

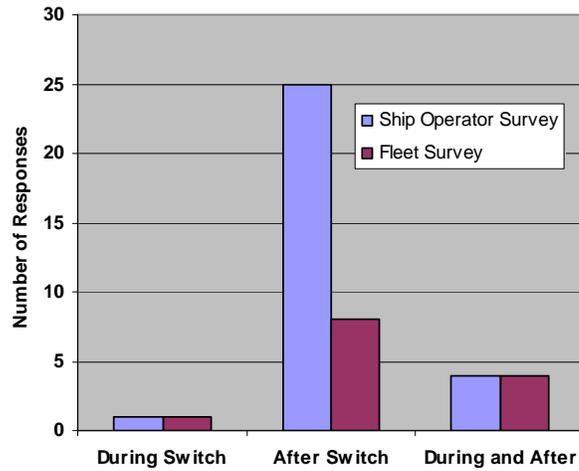


*This information was compiled by categorizing the survey comment fields

12

OGV Survey

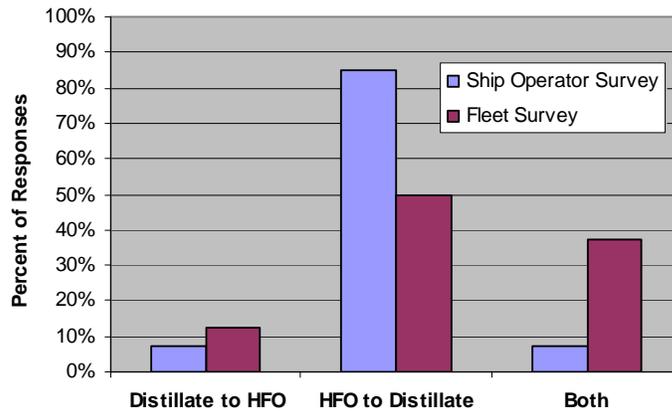
If you had problems, did the problem occur during fuel switching, after fuel switching or both?



13

OGV Survey

If you had problems, did problem occur from the switch: Distillate to HFO, HFO to Distillate or Both*?

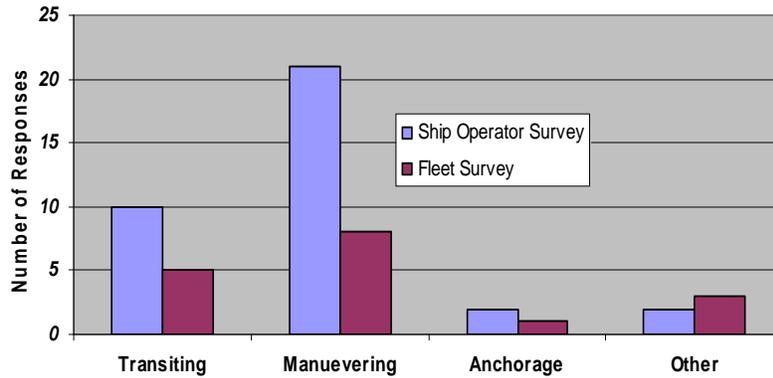


*Based on 27 operator responses and 8 fleet responses

14

OGV Survey

If you had problems, did the problem occur during transiting, maneuvering, anchorage or other*?

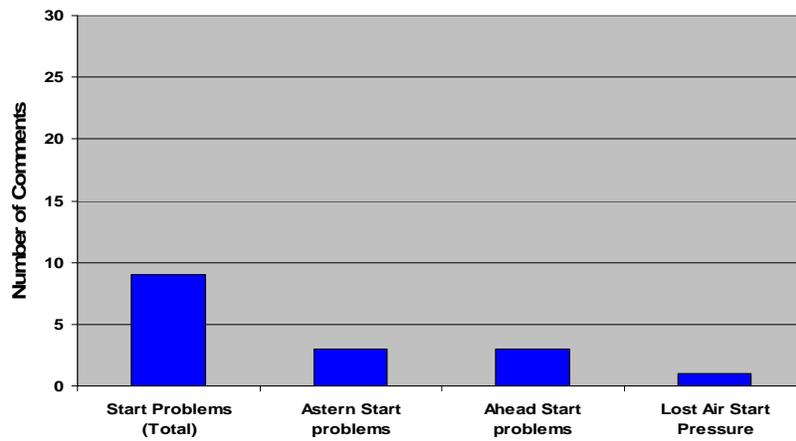


*Some operators reported for more than one category

15

OGV Survey

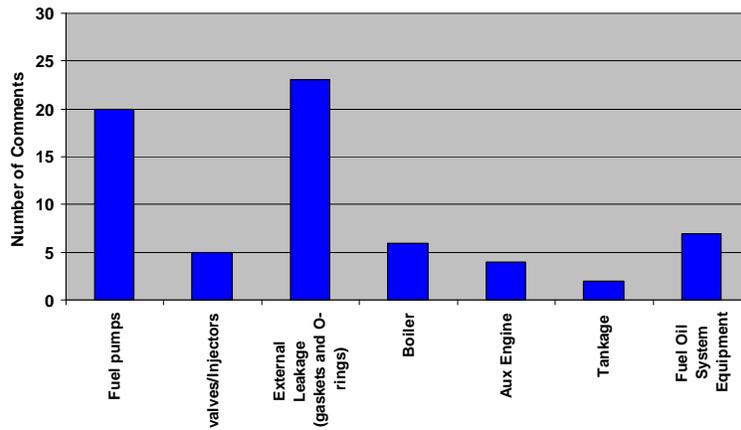
Reported Main Engine Start Problems*



*This information was compiled by categorizing the survey comment fields

16

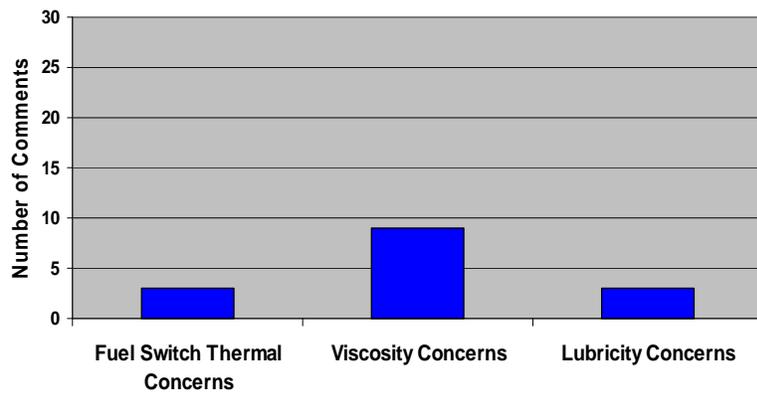
OGV Survey Equipment Problems Reported*



*This information was compiled by categorizing the survey comment fields

17

OGV Survey Fuel Property Concerns*



*This information was compiled by categorizing the survey comment fields

18

OGV Survey Summary

- ◆ **85 percent of operators that had fuel switched had excellent or good experience**
- ◆ **Some operators have reported operational changes**
 - changing routes
 - slowing down during switch
 - increased staffing/engine room control
- ◆ **Most operators reported that the fuel was available**

19

OGV Survey Summary Continued

- ◆ **Fuel switching related problems were primarily noted for the following**
 - **after switching from HFO to distillate**
 - **equipment problems**
 - fuel pumps
 - leakage (o-rings and gaskets)
 - **maneuvering operations**
 - higher number of problems reported during maneuvering compared to transiting
 - **fuel properties**
 - higher number of comments were for viscosity concerns

20

United State Coast Guard D11 Fuel Related Loss of Propulsion Incidents in California



21

Fuel Related LOPs* Addressing Operational Issues

- ◆ **About 7000 successful fuel switches during first nine months of implementation**
- ◆ **Operational issues and incidents have been managed with practices and procedures currently in place**
- ◆ **USCG is monitoring reported incidents that have been identified to be related to using distillate fuel**
- ◆ **ARB and U.S. Coast Guard coordinate to ensure vessel operators are aware of safety exemption provisions**

* (U.S. Coast Guard D11, LOPs where operation on distillate fuel was a causal factor. July 1, 2009 through March 31, 2010)

22

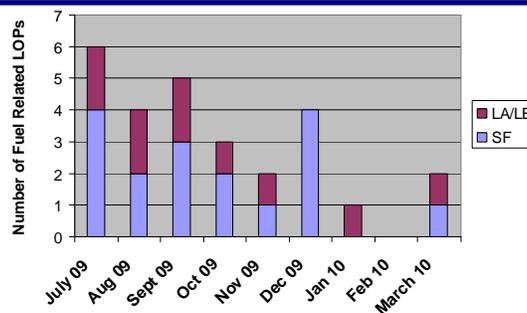
Fuel Related LOPs* Background on Reporting

- ◆ **U. S. Coast Guard D11**
 - identified LOPs where operation on distillate fuel was a causal factor
 - provided preliminary summary of fuel related incidents and investigative reports when finalized
- ◆ **ARB/California Maritime Academy**
 - analyzed fuel related LOP* reports to determine if there were trends or primary areas of concern
 - CMA, under contract to ARB, analyzed reported problems to determine possible underlying causes

* (U.S. Coast Guard D11, LOPs where operation on distillate fuel was a causal factor. July 1, 2009 through March 31, 2010)

23

Fuel Related LOPs* SF Bay and LA/LB LOPs* per Month



# LOPs*	July-09	Aug-09	Sept-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	March-10	July 09-March 10
SF	4	2	3	2	1	4	0	0	1	17
LA/LB	2	2	2	1	1	0	1	0	1	10
Total	6	4	5	3	2	4	1	0	2	27

* (U.S. Coast Guard D11, LOPs where operation on distillate fuel was a causal factor. July 1, 2009 through March 31, 2010)

24

Fuel Related LOPs* Summary

- ♦ Number of distillate fuel related LOPs* per month has decreased as regulation is in place longer
- ♦ Many fuel related LOPs* had failure to start issues
 - higher number of start issues in SF Bay region, dominated by astern starts problems
- ♦ More fuel related LOPs* occurred during maneuvering than transiting
- ♦ Low fuel pressure, possibly related to the condition of fuel pumps or fuel viscosity, were noted in 9 of the fuel related LOPs*

* (U.S. Coast Guard D11, LOPs where operation on distillate fuel was a causal factor. July 1, 2009 through March 31, 2010)

25

Pilot Reports of Fuel Related OGV Operational Problems



26

Pilot Reports Background

- ◆ **SF Bar Pilots and LB Pilots provided information on possible fuel related problems encountered by pilots**
- ◆ **SF Bar Pilots provided 42 reports between July-09 and Nov-09**
- ◆ **LB Pilots provided 63 reports between July-09 and Feb-10**
- ◆ **Reporting is voluntary and may not be all-encompassing**

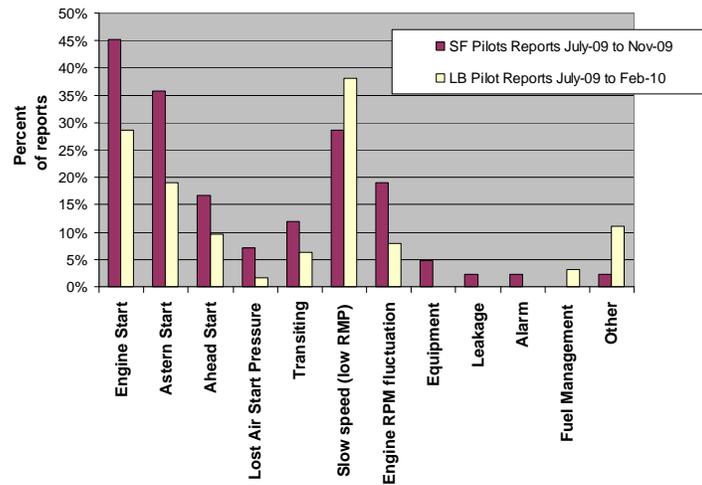
27

Pilot Reports Information Provided to ARB

- ◆ **Pilot reports provided information that typically (but not always) included**
 - date of incident
 - description of incident
 - vessel name
 - vessel type
 - location of incident
- ◆ **Type and detail of information varied**
- ◆ **ARB analyzed information by categorizing incidents to identify any specific areas of concern**

28

Pilot Reports OGV Operational Problems reported for SF Bay and LB



*Based on 42 SF Bar Pilot reports and 63 LB Pilot reports

29

Pilot Reports Summary

- ◆ **Majority of SF Bar Pilots reports**
 - main engine start problems
 - majority of the start problems were astern starts
 - problems operating at low speed/low RPM
- ◆ **Majority of LB Pilots reports**
 - problems operating at low speed/low RPM
 - included some main engine start problems



30

Data Gathering on OGV Operational Experiences- Summary



31

Data Gathering on OGV Operational Experiences Summary

- ◆ **With about 7000 successful vessel visits, small percentage of ships experience operational problems (about 0.5%)**
- ◆ **Fuel related LOPs are decreasing as rule is in place longer**
- ◆ **Data collected provides useful insights into operational experiences in using cleaner distillate fuel**

32

Data Gathering on OGV Operational Experiences Next Steps

- ♦ **Complete contracted program with California Maritime Academy to finalize root cause analysis and recommendations**
- ♦ **Continue with ongoing cooperative effort to fully address operational issues with**
 - United States Coast Guard
 - OSPR / Harbor Safety Committees / pilot groups
 - equipment/engine makers
 - ship owners/operators
 - marine engineers/architects
 - U.S. Navy
 - Ocean Protection Council

33

Contact Information

Bonnie Soriano
(916) 327-6888
bsoriano@arb.ca.gov

Layla Lenderman
(916) 324-0354
llenderm@arb.ca.gov

Dan Donohou
(Branch Chief)
(916) 322-6023
ddonohou@arb.ca.gov

Peggy Taricco
(Manager)
(916) 323-4882
ptaricco@arb.ca.gov

<http://www.arb.ca.gov/marine>

34