Santa Barbara County
Air Pollution Control District

Our Vision Clean Air

Agenda Date: August 17, 2006
Agenda Placement: Regular
Estimated Time: 15 minutes
Continued Item: No

# Board Agenda Item

TO: Air Pollution Control District Board

FROM: Terry Dressler, Air Pollution Control Officer

CONTACT: Tom Murphy (961-8857)

SUBJECT: Marine Shipping Retrofit Project – Emissions Testing

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RECOMMENDATION:

1. Authorize the APCO to execute a Memorandum of Agreement (MOA) to allow APCD to act as collector and distributor of emissions testing funds for a project retrofitting an ocean going vessel with emissions control equipment.
2. Approve the attached budget revision request to allow APCD to accept this role as recipients and distributors of emissions testing funds for this project.
3. Authorize the APCO to enter into agreements with the emissions testing contractors selected for this project using partner contributions and up to $22,500 of APCD Innovative Technology Group funds.

SUMMARY:

The Santa Barbara County Air Pollution Control District's (APCD) 2001 and 2004 Clean Air Plans identified emissions from ocean-going vessels as a significant threat to local air quality. To try and reduce this large source of emissions, the APCD has been participating in a multi-agency collaborative to demonstrate retrofit emission control technologies on ocean-going vessels. The group has successfully identified an interested shipping company and vessel for participation, selected and secured funding for the emission control hardware, and is in the process of organizing funding arrangements and priorities for emissions testing. Staff

recommends that your Board authorize the APCO to execute an MOA to act as collector and distributor of testing funds for this project, approve the attached FY06/07 Budget Revision Request, and authorize the APCO to enter into agreements with the emissions testing contractors for this project.

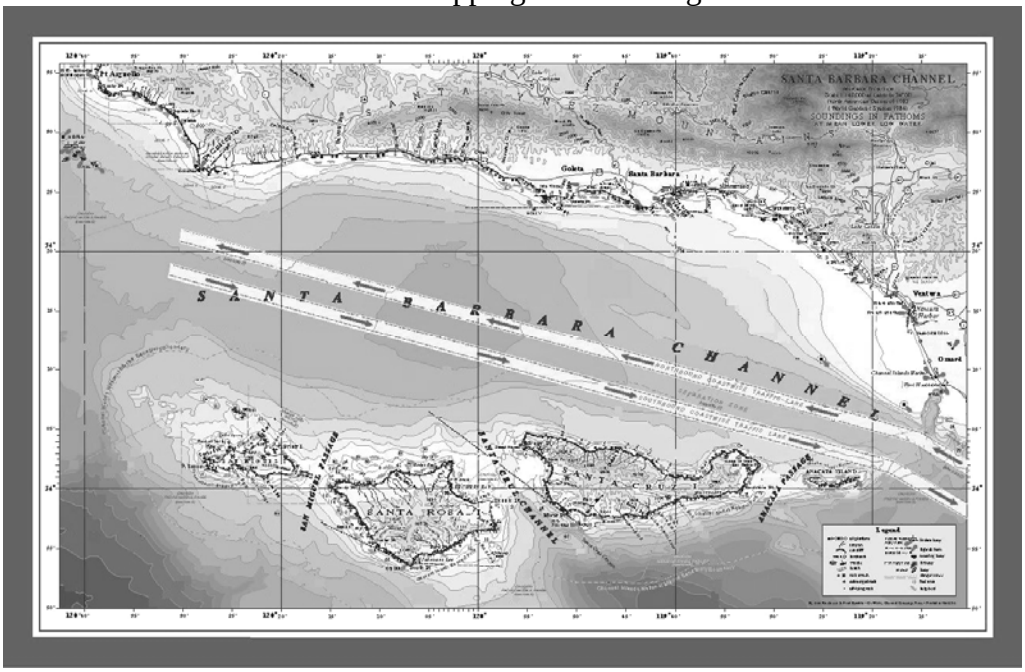
DISCUSSION:

Both the 2001 and 2004 Clean Air Plans identified marine shipping as a significant contributor to our existing emissions and as an emission source that is anticipated to grow substantially in future years, and your Board directed staff to "take aggressive actions to influence the United States Environmental Protection Agency (EPA) to reduce the air quality impacts of emissions from marine shipping." In an update to your Board in April 2002, we discussed the fact that much of the effort to reduce emissions from marine shipping is focused on new ships and emissions at ports. Therefore, we presented our plan to reduce emissions from the existing fleet by participating in and promoting ship retrofit programs. In October 2003 your Board received another update on marine shipping activities and approved APCD participation in a Marine Shipping Retrofit Program (MSRP) using up to $100,000 in Innovative Technology Group (ITG) Funds.

**Marine Shipping Emissions in Santa Barbara Waters**

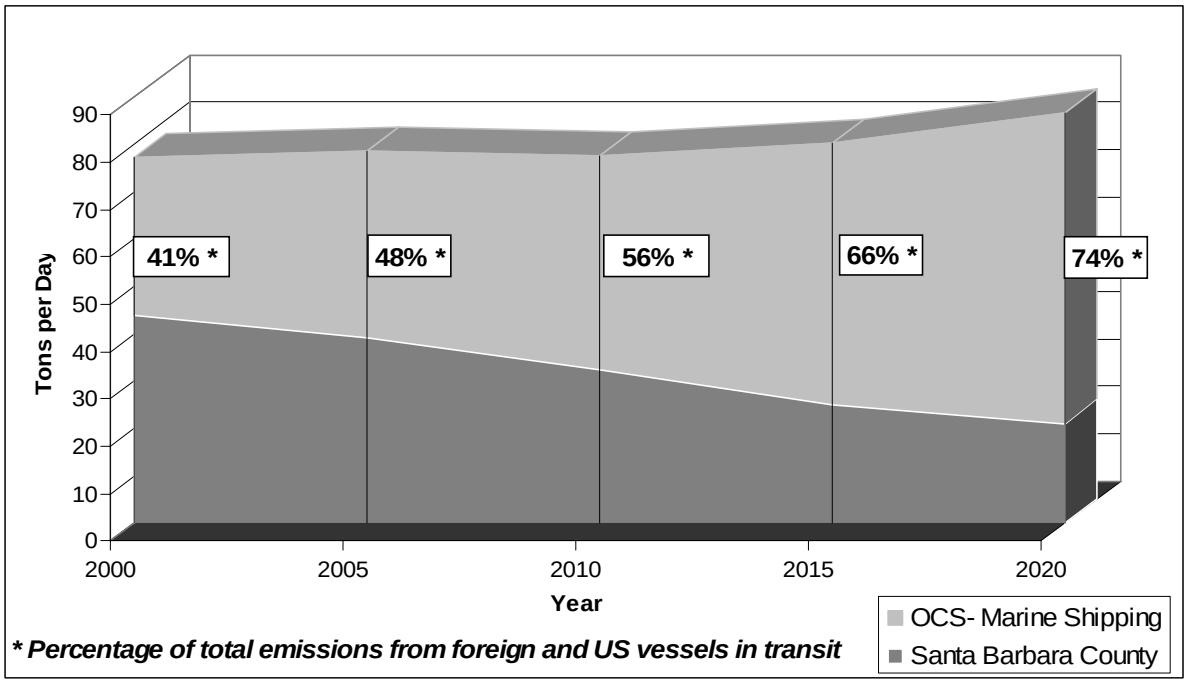
Santa Barbara County has 130 miles of coastline that are heavily traveled (about 19 transits per day in 2005) by ocean-going vessels. Given the location of the Channel Islands and the activity at the ports of Southern California, large ships are often traveling and emitting pollutants along the North and South bound shipping lanes just ten to fifteen miles off our coastline (See Figure 1).

**Figure 1:** North and South Bound Shipping Lanes through the Santa Barbara Channel



As documented in our 2004 Clean Air Plan, large ships going through the Santa Barbara Channel produce almost one-third of the precursors to ozone air pollution in Santa Barbara County, almost as much as all the on-road oxides of nitrogen (NOx) and reactive organic compounds (ROC) emitted from cars, trucks and buses combined. By 2020, these emissions are projected to make up close to three-quarters of the emissions of NOx emissions in the County (see Figure 2). While some of the air pollution from ships is dispersed before it reaches shore, the magnitude of these emissions is of concern for onshore air quality.

**Figure 2:** Santa Barbara County NOx Emissions Forecast




The APCD has been quantifying emissions from marine shipping activities in Santa Barbara waters since 2000. The most recent inventory showed that in 2005:

- 10% of the vessels transiting the Santa Barbara coastline were responsible for about 56% of the total NOx emissions from shipping activities
- 83% of all of the NOx emissions from shipping were emitted from containerships
- 92% of the NOx emissions from marine shipping activities were emitted by foreign-flagged vessels

A comparison of the APCD inventories for 2000 and 2005 show that marine shipping activities have resulted in the following:

- 8% increase in the annual number of vessels
- 10% increase in annual transits
- 35% increase in annual installed power
- 30% increase in annual NOx emissions

The increase in shipping activity is primarily due to the growing magnitude of trade volumes between the United States and Asia, and the resulting demand placed on the marine shipping industry to accommodate the increasing cargo levels. This demand is met by either increasing schedule frequency or increasing the size of the ships being put into service. This increase in activity and ship size leads to increasing engine sizes and emissions.

**Marine Shipping Retrofit Project**

The APCD has been participating in a multi-agency effort to demonstrate the feasibility and cost-effectiveness of retrofitting an in-service ocean-going vessel with emission control equipment. The collaborative includes; The U.S. Department of Transportation's Maritime Administration (MARAD), California Air Resources Board (ARB), U.S. Environmental Protection Agency, the ports of Los Angeles and Long Beach, and several air districts. The group has worked with several shipping companies and a major marine engine manufacturer, evaluated numerous potential vessels and control strategies and is ready to begin the first retrofit demonstration project. Specific information on the vessel that will be the subject of this demonstration project can be found in Table 1.

**Table 1**: Selected Vessel

| **Vessel Information** | |
|---|---|
| **Vessel** | APL Singapore |
| **Ship type** | Containership |
| **Flag** | United States |
| **Built** | 1995 |
| **Engine Information** | |
| **Engine** | MAN B&W |
| **Model** | 11K90MC-C |
| **Type** | 2-Stroke |
| **Engine power** | 66,398 hp |
| **2005 Santa Barbara Impact ( Source: SB Inventory)** | |
| **Transits** | 19 |
| **NOx rank** | 43 (out of 1,468 vessels) |
| **NOx emissions** | 67 Tons |
| **PM emissions** | 5 Tons |
| **SOx emissions** | 46 Tons |

***Emission Control Technologies***

Two emission control technologies will be installed on the vessel; a fuel/ water emulsion system and slide-valves. Water emulsion is the process of introducing water into the fuel prior to injection into the combustion cylinder. Introducing water into the combustion cylinder reduces the maximum peak combustion temperature and the formation of NOx. The in-cylinder evaporation of the water also improves the atomization of the fuel causing it to burn more completely. This system will be installed and connected to the ship's main engine and is expected to yield a 1% reduction in NOx for every 1% concentration of water in the emulsion.

Different concentrations of water will be tested to determine the emulsion level that best reduces emissions. NOx reductions up to 30% are expected from this control technology.

Particulate Matter (PM) is a product of incomplete combustion, and un-burnt fuel; therefore the optimization of the fuel injection system is expected to result in the reduction of fuel consumption and a reduction of PM emissions. Slide valves will be installed on the vessel's main engine and differ from conventional valves in their spray patterns that are designed to reduce the dripping of fuel from the injector into the combustion zone post injection. The slide valves are expected to reduce PM emissions by about 25%.

***Funding***

The funding for this project will come from a number of different agencies. In 2005, the APCD supported an application by the Bay Area Air Quality Management District (BAAQMD) for funding from the ARB Multi-district Carl Moyer funding program. The application was successful in securing $783,628 in grant funds. Grant funding will cover the purchase and installation of the control technology, allowing the other funds to be used to cover the emissions testing costs.

The emissions testing is an essential part of this project needed to determine the actual air pollution reduction benefits and the effectiveness of the control technologies. In an effort to expedite the testing coordination process, APCD staff volunteered to accept funding from project partners and contract with the emissions testing contractors selected for the project. Staff recommends that your board approve APCD's role as coordinator of testing funds for this project by authorizing the APCO to execute an MOA further defining the APCD's role. Due to the number of agencies (and their respective legal counsels) party to the MOA the review process was not completed at the time of docket, therefore the most current draft of the MOA is included for your review in Attachment 1. In order to begin accepting funds from the partner agencies, staff recommends that your Board approve the attached budget revision request (Attachment 2). Finally, staff recommends that your Board authorize the APCO to enter into agreements with the emissions testing contractors selected for this project using partner contributions and APCD funds currently estimated at $22,500.

FISCAL IMPACT:

Funds contributed by the APCD for this Marine Shipping Retrofit Program will be taken from the Chevron Trust Funds held in the ITG Projects designation. No taxpayer or general permit fees will be used to fund this program. The $22,500 APCD expenditure appropriation for this project is already included in the FY 2006-07 budget; however, additional funds that the APCD will be passing through for other districts require an increase in budgeted revenues and expenditures of $77,500, with no net financial impact on the APCD.

ATTACHMENTS:

1. Emissions testing draft MOA
2. FY06/07 Budget Revision Request

# **Attachment 1:**
Draft Emissions Testing MOA

# **Attachment 2:**
FY06/07 Budget Revision Request

# Budget Revision Request 2006-07

*Gov. Code Sec. 29125 & 29130*

## Summary

| | Budget Unit | Budget Unit | Budget Unit | See attachment(s) for detail of this column when revision involves more than three budget units. |
|---|---|---|---|---|
| **Increase/(Decrease) in appropriation for:** | 871 | | | |
| Salaries & Benefits | | | | |
| Services & Supplies | 77,500.00 | | | |
| Other Charges | | | | |
| Operating Transfers | | | | |
| Fixed Assets | | | | |
| Reserve or Designation | | | | |
| **Sources:** | | | | |
| Revenue | 77,500.00 | | | |
| Operating Transfers | | | | |
| Reserve or Designation | | | | |
| **Net effect on Fund Bal.** | 0.00 | 0.00 | 0.00 | 0.00 |

## Justification for Transfer

**For ALL Changes:** explain what the change is for and why it is required.

**When Moving Appropriation:** explain why it's available, the purpose of the move, and why the move is needed.

**When Revenue is Adjusted:** explain the reason for the increase or decrease and the *Impact on Revenue* .

The APCD has agreed to be the collector and distributor of funds from other public agencies which will be used to pay for source testing an APL container vessel equipped with emission control devices. We have also provide funding for this effort and have already set aside $50,000 in our 2006-07 budget, of which we plan to spend $22,500.

Other Air Pollution Control Districts and the ports of Los Angeles and Long Beach will be contributing a total of $77,500. Appropriations will not exceed their contributions and our earmarked funds.

A 4/5's approval is required to recognize unanticipated revenue and increase appropriations per Gov. Code 29130(c).

**Air Pollution Control Officer Comments (as appropriate)**

| Air Pollution Control Officer Approval | Air Pollution Control District Board's Action |
|---|---|
| Date | ☐ Approved Date |
| Transfer/Revision in Accordance with District Policy. | ☐ Disapproved |
| Air Pollution Control Officer | Clerk of the Board of APCD |

*Revised 11/2004*