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Board Agenda Item

TO: Air Pollution Control District Board

FROM: Terry Dressler, Air Pollution Control Officer

CONTACT: Tom Murphy, Technology and Environmental Assessment Division Manager, (961-8857)

SUBJECT: Recent Actions to Control Air Pollution from Marine Shipping and Upcoming Issues

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RECOMMENDATION:

Receive and file an update on actions to control air pollution from marine shipping, and direct staff to continue vigorous efforts in this area.

DISCUSSION:

In March the International Maritime Organization (IMO) took action that represents a leap forward in the effort to reduce air pollution from one of the largest sources in this county. The IMO designated the coast off North America an Emission Control Area, and large ships traveling up to 200 miles off our coast now face stricter engine and fuel standards. This international action is particularly significant since the vast majority of these ships (90 percent) are foreign-flagged. The District estimates that these standards will reduce nitrogen oxide (NOx) emissions from ships affecting this county by approximately 37 percent by 2020.

The District has been working for decades to raise awareness of the need to reduce pollution from these ships, which are not under our local control. This Board Letter outlines the IMO action, describes unintended consequences of a new state rule, reports on a new U.S. Coast Guard study of the location of shipping lanes, and discusses implications for the future.

Background

More than 40 percent of the NOx emissions in our inventory are contributed by large ships traveling through the Santa Barbara Channel. Our inventories and Clean Air Plans since 1994 have consistently shown that the pollution contributed by these ships has the potential to overwhelm onshore efforts to reduce emissions of NOx, which is involved in the formation of ground-level ozone, also known as smog. The ships have been largely unregulated until recently,

and their engines burn a particularly dirty fuel known as bunker oil. In addition to NOx pollution, the ships emit sulfur dioxide, particulate matter, toxic air pollutants, and greenhouse gases. The District has filed lawsuits calling on the U.S. Environmental Protection Agency (USEPA) to take regulatory action (see Attachment A), and staff and District Board Members have pursued multiple strategies over the years (see Attachment B). Most recently District Board Member First District Supervisor Salud Carbajal achieved resolutions in 2008 and 2009 from the National Association of Counties calling for more aggressive action by the USEPA to reduce marine shipping pollution.

Fuel standards reduce sulfur, particulate and toxic air emissions; engine standards reduce NOx emissions. Fuel standards apply to all ships in the fleet—old and new—while engine standards only apply to new engines, and take effect as engines are replaced, and new engines are manufactured, reducing NOx emissions only over the long term. To address the need to reduce NOx and particulate emissions from the existing fleet, the District partnered with other agencies to test control strategies on a functioning ship. In 2007 a fuel-water emulsion system and slide valves were installed on the vessel APL Singapore. Preliminary results indicated that NOx emission reductions of up to 30% are achievable. Tests planned for 2009 were cancelled by the shipping company due to concerns about engine reliability when using a low-sulfur fuel mandated by California.

IMO Action

In 2009, the USEPA announced new standards for new engines (Category 3) on U.S.-flagged ships, and also, with Canada, proposed that the IMO designate up to 200 miles off the coast of North America an Emission Control Area. The IMO approved the proposal on March 26, 2010. Table 1 outlines fuel and engine standards for ships in the ECA, plus the global standards that apply outside the ECA.

Table 1

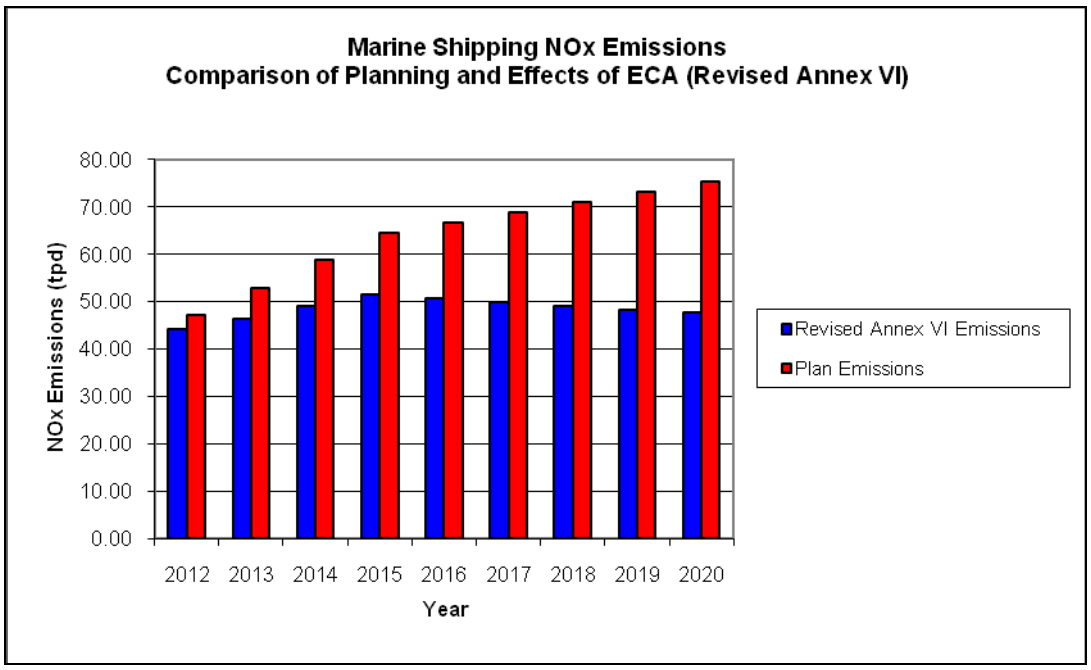
Emission Control Areas (ECA)		
Fuel Standards	**Engine Standards**	**NOx Factors**
10,000 ppm starting July, 2012	Tier 3 for new engines: 80% NOx reduction starting January 2016	2.0 - 3.4 g/kW-hr NOx (depending on rated engine speed)
1,000 ppm starting January 2015		

Global		
Fuel Standards	**Engine Standards**	**NOx Factors**
35,000 ppm starting January 2012	Tier 2 for new engines: 20% reduction in NOx starting January 2011	7.7 -14.4 g/kW-hr NOx (depending on rated engine speed)
5,000 ppm starting January 2020	Tier 1 for existing engines: 15-20% NOx reduction from current uncontrolled levels.	9.8 - 17 g/kW-hr NOx (depending on rated engine speed)

As the table illustrates, there will be significant reductions in parts per million sulfur levels in fuel standards (for all ships) and significant reductions in NOx from engines of new ships starting in 2015 and 2016, from the implementation of the ECA.

Figure 1 below shows previous Clean Air Plan projections for NOx emissions from ships (in red) compared against reduced emissions projections with the implementation of the ECA (blue). This figure illustrates a potential 37 percent reduction in NOx by 2020 with the implementation of these new standards. This is very significant from an air quality planning standpoint, because historical NOx emission increases from this huge source have overwhelmed the NOx reductions anticipated onshore.

Figure 1



California Air Resources Board (ARB) Ocean-Going Vessels Fuel Rule

On July 1, 2009, a new state rule took effect that requires large ships traveling up to 24 nautical miles off the California coast to use a lower-sulfur fuel. The need for the rule was identified in the state's Diesel Risk Reduction Plan, which aims to reduce emissions of diesel particulate, considered the number one airborne carcinogen in California.

The lower-sulfur fuel is more expensive, and many ships are now traveling outside the Santa Barbara Channel Islands to avoid the rule's requirement. As Table 2 indicates, this development, and the decline in shipping from the economic downturn, has reduced the number of ships traveling through the Channel. This unintended consequence of the fuel rule has likely produced

positive air quality benefits given that the emissions from ships are generated farther off our coast.

Table 2

Santa Barbara Channel Marine Vessels Annual Transits		
2000	6,449	
2001	6,911	
2002	6,701	
2003	7,113	
2004	7,207	
2005	7,086	
2006	7,436	
2007	7,277	
2008	6,152	
2009	4,641	ARB Fuel Rule 7/1/2009
2010 (projected)	2,183	Assumes 70 percent avoidance
Source: Transit data 2000 - 2007 Southern California Marine Exchange; 2008-2009, Scripps Automatic Identification System (AIS)		

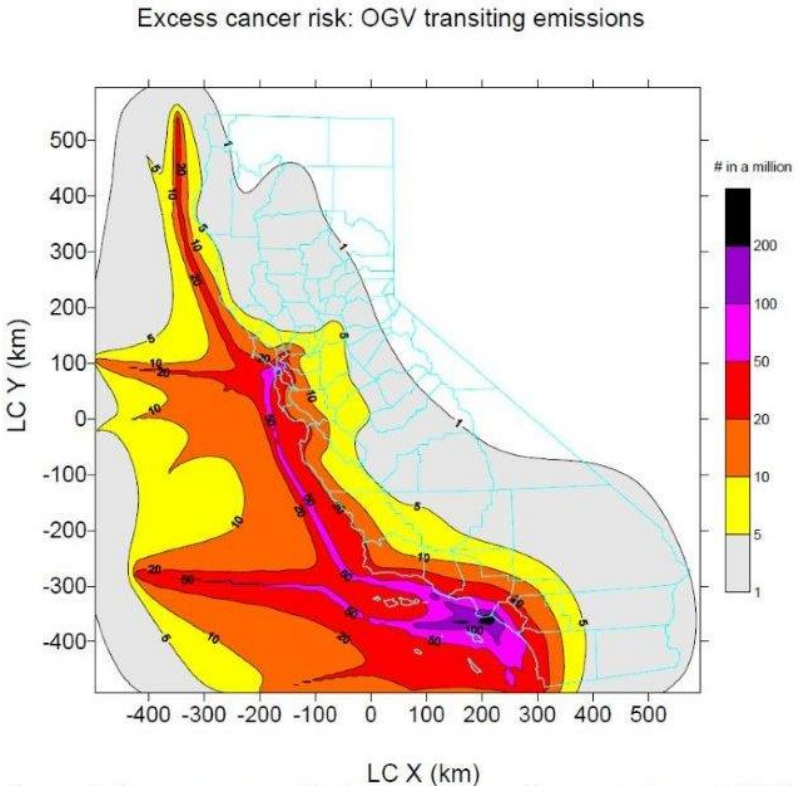
Diesel Particulate and Toxic Risk

The District's emission inventories have focused on emissions of ozone precursors in the past, since our Clean Air Plans are designed to show how the county will attain and maintain federal and state ozone standards. In recent years, more attention has focused on particle pollution, and especially on diesel particulate, which includes multiple air toxics.

In preparation for its fuel rule, the ARB performed modeling to determine the impact of the rule on onshore cancer risk from shipping emissions. Figure 2 shows results of ARB modeling that quantifies the excess cancer risk from diesel particulate from ocean-going vessels (OGV) transiting along the coast of California (outlined in light blue). The figure shows up to 50 in a million excess cancer risk offshore, and 10-20 in a million excess cancer risk onshore, for the coastal areas of Santa Barbara County,

For perspective, our California Environmental Quality Act and air toxics significant risk thresholds are set at a 10 in a million excess cancer risk. Relocation of the shipping lanes to the south side of the Channel Islands would decrease excess cancer risk levels for Santa Barbara County significantly, possibly to below that 10 in a million threshold.

Figure 2



Source: California Air Resources Board

U.S. Coast Guard Port Access Route Study

The internationally-approved and IMO-designated commercial shipping lanes, also known as traffic separation schemes, currently go through the Santa Barbara Channel. The route outside the Channel is not internationally designated or approved. Concerns about ship traffic outside the Islands since implementation of the new state fuel rule have led the U.S. Coast Guard to announce it will conduct a Port Access Route Study. The Study will examine establishing approved shipping lanes outside the Channel for ships heading into the Los Angeles and Long Beach Ports (see Attachment C for Federal Register notice). The Coast Guard's authority to designate these lanes derives from the Ports and Waterways Safety Act, which has the purpose "to promote navigation, vessel safety, and protection of the marine environment."

The Coast Guard study represents the beginning of a process that could possibly culminate in moving the approved shipping lanes to outside the Channel, an action that would significantly benefit our air quality. The District plans to recommend that the U.S. Coast Guard include a thorough and rigorous evaluation of onshore air quality and public health impacts in its consideration of the location of shipping lanes in the Port Access Route Study.

Conclusions/Implications for the Future

- The IMO action and other recent developments will benefit our air quality. However, there is still work to be done. New engine standards do not address the existing fleet. Fuel standards do, but do not reduce emissions of NOx, and do not provide major reductions in emissions of particles and air toxics. Strategies to reduce pollution from the existing fleet of ships are needed.

- Moving the shipping lanes further off our coast could produce major benefits for Santa Barbara County air quality, reducing NOx emissions, and reducing cancer risk from diesel particulate. More information is needed to quantify the regional health (ozone, particulate, and toxics) impacts associated with moving the shipping lanes out of the Santa Barbara Channel.

ATTACHMENTS

A - District Lawsuits on Regulation of Marine Vessels - Status Update

B - Reducing Pollution from Ships - District Board and Staff Actions

C - Federal Register Notice – U.S. Coast Guard Port Access Route Study