APPENDIX H3

Health Risk Assessments: Background

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Taken in part from USEPA: Air Pollution and Health Risk and Risk Assessment for Toxic Air Pollutants: A Citizen's Guide, both 1991 and Cal EPA (OEHHA): A Guide to Health Risk Assessments, 2003

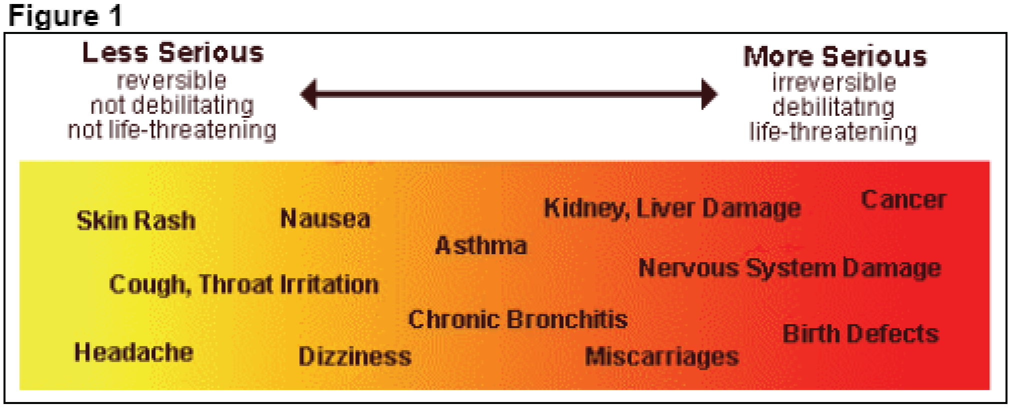
What are Health Risk Assessments:

Health Risk Assessments are everywhere these days, from news reports on toxic air contaminants, to annual information provided on water safety in utility bills, to guidelines posted on fishing piers on the amount of fish people should consume. Reports discuss average risks over time from all types of environmental pollution and lifestyle choices. With all this information, how do we know when a risk is serious? And what is a Health Risk Analysis anyway?

Definition: *Health risk is the probability, or chance, that exposure to a hazardous substance, at a certain level, over a certain period of time, will make you sick.*

Often, health risk assessments are thought of as cancer studies, but risk can refer to both chronic (like cancer) and acute (like asthma) diseases and can be designed to study a range of symptoms/diseases (Figure 1). Health Risk Assessments are tools used by regulators to predict the risk related to a certain level of exposure and base decisions, often land use planning and consumption advisories, on the estimated risk.

Figure 1



Health Risk Assessments are currently being done for all development projects at the Port of Los Angeles through the CEQA process. They focus primarily on the potential impacts of airborne diesel particulate matter (DPM), considered a carcinogen by the State of California, on the surrounding residential communities.

Health Risk Assessments v. Epidemiological Studies:

Health Risk Assessments are not diagnosis studies. People often mistakenly think a risk assessment will tell them whether a current health problem or symptom was caused by exposure to a pollutant. Simply, health risk assessments are often confused with epidemiological studies. Epidemiological studies look at past exposure and try to link that exposure, often in a population, to a disease. Health risk assessments, on the other hand, estimate if *current* or *future* exposures will result in health risks to a broad population.

In the Port's case, we are trying to determine if current and future emission levels from terminal operation will result in health risks to the surrounding residential communities and how mitigation measures may lessen the potential risk.

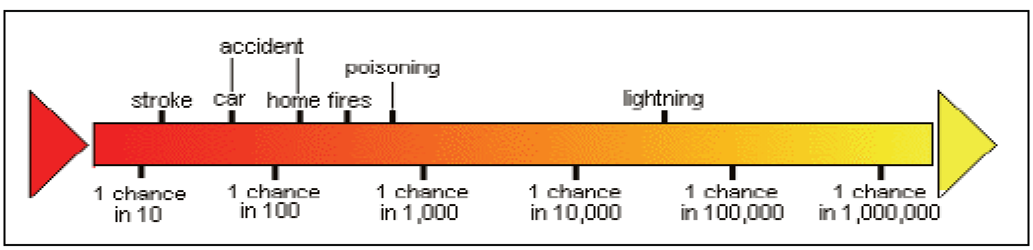
How is Risk Expressed?

Risk assessments commonly report cancer risk as some additional chance in a large population. For example, risk expressed as 1 in a million means that there is one chance in 1,000,000 of an event occurring. Regulators often set acceptable risk values for air contaminants. These risk numbers are derived from conservative assumptions meant to protect the most vulnerable of a community's citizens. For example, to estimate a residential receptor's risk from air contaminants, the standard model assumes the resident (person) is exposed to the air contaminants while breathing at the 80th percentile breathing rate for 24 hours a day, 350 days a year, over a 70-year period. At the Port of Los Angeles, we have adopted the threshold of less than 10 in a million, as compared to residential receptors, as being an acceptable increased cancer risk level for new projects. Our Health Risk Assessments also examine the risks from acute and chronic noncancer exposure. For acute and chronic noncancer exposure, we use the reference exposure levels (RELs) developed by OEHHA. A REL is the concentration level at or below which no adverse health effects are anticipated for specified exposure duration. A Hazard Index of 1.0 or less indicates that the exposure would present an acceptable or insignificant health risk (i.e., no adverse health impact)

What do the Risk Numbers Mean?

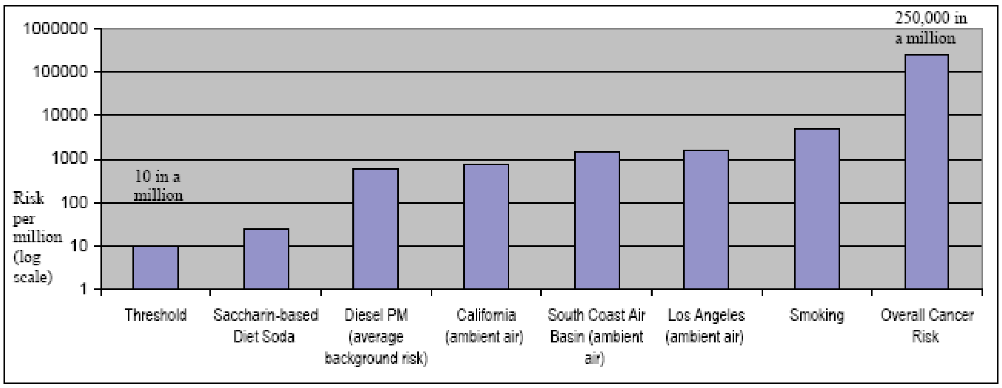
Figure 2 depicts the risk of exposure to some other "common" events to create a picture of relative risk.

Figure 2



Below are some other risk numbers (shown both in tabular format and as a graph using a logarithmic scale) that may be useful in framing the pollution discussions at the Port of Los Angeles.

Source	Excess Risk*	
Port of Los Angeles Threshold	10 in a million	
Saccharin-based Diet Soda	25 in a million	
Diesel PM (average background risk)	580 in a million	*USEPA, 2000*
California (ambient air)	760 in a million	*OEHHA, 2003*
South Coast Air Basin (ambient air)	1,400 in a million	*MATES II, 2000*
Los Angeles (ambient air)	1,500 in a million	*MATES II, 2000*
Smoking	5,000 in a million	
Overall Cancer Risk	250,000 in a million	*OEHHA, 2003*



It is important to note that the above risk numbers were derived using different methodologies. Different methodologies present a challenge to the regulatory process. This subject is discussed later in the Uncertainty Section.

The 4 Steps to Developing a Health Risk Estimate?

The Port has developed a Port-specific model that has been reviewed by both SCAQMD and CARB. Basically, there are four main general steps to developing a health risk estimate for residential receptors.

1. Hazard Identification: The first step is to identify the contaminant and the sources: For Port projects, the main contaminant is DPM (although other contaminants are also analyzed) and the source is the new project's operation over the length of the lease extrapolated over 70 years. Emissions from ships, tugs, yard equipment, trucks and rail are the main contributors to the risk model.

2. Exposure Assessment: Once the project elements are finalized, the next step is to determine the amount of the toxic air pollutants released in a specific time period and how it moves away from the source(s). The Port's model uses specific Port meteorological information to model how air emissions are dispersed throughout the community, over the length of the project's lease extrapolated over 70 years.

3. Dose Response: The third step in a risk assessment is to estimate the amount of contaminants each person inhales. To do this, scientists combine estimates of breathing rates and lifespan of an average person with estimates of the amount of pollutant in the air that the person breathes. The Port's model uses a 80th percentile breathing rate for residential receptors (the 50th percentile would be an average healthy adult person's breathing rate, the 80th percentile breathing rate is used to ensure children, elderly people, and immuno-compromised people are also protected). The model assumes the population in question breathes the air contaminants modeled in step 2 at their residences for the 70-year time period (24 hours a day, 350 days a year).

4. Risk Characterization: After steps 1-3 are completed, a risk number is generated using factors developed by the State of California that relate a dose to a particular risk level. This risk number is compared to a standard acceptable level. For the Port, the project's risk number must be below 10 in a million to be within an acceptable level of risk.

Uncertainty in Risk Estimates

By their nature, risk estimates cannot be completely accurate because they are *predictions* of risk.

Scientists, medical experts, regulators, and practitioners do not completely understand how toxic air pollutants harm human cells and how different pollutants may interact with each other in the human body. The exposure assessment often relies on computer models which are based on a multitude of assumptions, both in terms of present and future conditions.

When information is missing or uncertain, risk analysts generally make assumptions that tend to prevent them from underestimating the potential risk. These assumptions provide a margin of safety in the protection of human health. Again, to protect public health, these assumptions are very conservative. For example, most people do not stay in one place for 24 hours a day, 350 days a year and 70 years. Additionally, there is no one standard way of doing health risk assessments, leading to possible problems in comparing different risks. Assumptions also change over time and even HRAs completed using the same models can produce different results.