The subject of the cumulative impacts on communities from a variety of environmental stressors is extremely important. It is now more crucial than ever that work on this issue is continued and even expanded.

I agree that the major focus needs to be on Environmental Justice communities including both tribal communities of Native Americans and economically disadvantaged communities that may comprise a variety of racial or cultural groups but often have high representations of Hispanic and/or African-American individuals. Before the effects of heavy industries are even considered, individuals in such communities may already be suffering the health consequences of living in substandard housing, subsisting on a nutritionally inadequate diet and experiencing stress from stretching an inadequate income to cover the necessities of life.

The presence of one heavy industry, such as chemical manufacturing, for instance, may result in result in contamination of the air, water and ground with spillage of solids and chemical solvents used in the processes. Such accidental releases are often dismissed as negligible in the permitting of the plant but, under actual operating conditions, significant releases may occur with some frequency. The residents are subject to the quantifiable harm of exposure to toxic chemicals, but must also contend with the mental stress of wondering when the next accident will occur and whether it might expose them to the risks of an explosion and fire.

In areas already zoned for industry, it is likely that a neighborhood already burdened by the presence of one plant will be considered as an appropriate site for a other heavy industries The permits for any new use will only consider the amount of criteria air pollutants such as ozone, NOX and particulate matter that will come from the new industry. They don't take into account that the NOX from the new plant may be added to an existing level that is already high enough to be near acceptable limits. The permits also do not take into account how ozone from the new industry might react with the chemical solvents from the existing use to form new toxins. Nor do they consider how breathing in particulate matter from the new industry could greatly exacerbate the lung damage from small amounts of chemical vapors being released from the existing chemical industry.

There are clearly many ways in which stressors from different sources can combine to endanger the health of communities. In the simplest case, the contributions of a given stressor may be strictly additive, as would happen if one or more of the criterial pollutants were to be emitted by both the existing industrial plant and the new one under consideration. But there are many known cases where two different volatile organic compounds can act in a synergistic fashion and result in a far greater level of toxicity than the same amounts acting alone. Ethanol and carbon tetrachloride are one example in which the toxicity of the combination is far greater than it would be if each chemical was tested separately.

Small particles of solids are known to cause severe lung inflammation even if the solids are of a material that would be expected to have generally low chemical reactivity. Particles that have adsorbed toxic chemicals have frequently been found to present an even greater danger. This raises the question whether exposure to particles with simultaneous exposure to toxic or

carcinogenic volatile aromatics might display a pronounce synergistic effect. To date, there seems to be little data on this issue.

One issue that is particularly important now is the question of what happens when to neighborhoods already burdened with high levels of particulates, ozone, NOX and SOX become sites for processing and/or liquefying natural gas. Areas where these processes are carried out are recognized as having high levels of asthma, heat and lung diseases and various cancers. The question is if the results of adding compounds including benzene, toluene, ethyl benzene, and other aromatics are simply additive or whether there may be synergistic effects that will greatly increase the health burden already faced by the residents.

Some data that could help elucidate the effects of different stressors might be obtained by looking at the health problems in communities near sites where there is hydraulic fracturing to release oil or gas in shale deposits. Numerous studies on health issues in surrounding communities are now available. A few studies have also been done on households which are in close proximity to compressors used in natural gas lines. They show increased levels of rashes, asthma and other symptoms consistent with exposure to aromatic hydrocarbons. It should be noted that people living near compressor stations also complain about stress from the noise of the compressor, lights and worry that there may be a large release of vapors resulting in an explosion. These stressors are, of course, common for those living near heavy industry. The rural inhabitants near compressor station generally have far less exposure to NOX, ozone and particulate matter from heavy traffic or industry. Comparing data from these rural areas with data from industrial areas might offer some help in clarifying results when many stressors are operating at once.