Written Testimony
Jan L. Powell, Ph.D., M.P.H. and O. Colin Stine, Ph.D.

Jan L. Powell, Ph.D., M.P.H. and O. Colin Stine, Ph.D. are faculty members in the Department of Epidemiology and Preventive Medicine at the University of Maryland School of Medicine. Dr. Powell, an Assistant Professor in the Department of Epidemiology and Preventive Medicine, is a leading expert on Vibrios. She obtained her Ph.D. from the University of Otago in New Zealand. She moved to the University of Maryland as a postdoctoral fellow and obtained a Masters in Public Health from the Johns Hopkins Bloomberg School of Public Health and Hygiene. The focus of her research has been on bacteria from the genus Vibrio. While she was in New Zealand, she focused a fish pathogen Vibrio anguillarum. After coming to the US, she shifted her focus to the human pathogen V. vulnificus. She has received grant support from FDA and NIH for her work on V. vulnificus. She has prepared a proposal to USDA that focuses on the potential interactions between V. vulnificus and the Asian oyster, Crassostrea ariakensis. The initial reviews were favorable, but suggested a few easily made revisions. It is anticipated the subsequent review will result in funding this project eventually.

O. Colin Stine, Ph.D. is an Associate Professor in the Department of Epidemiology and Preventive Medicine and the Scientific Director of the Biopolymer/Genomics Core at the University of Maryland School of Medicine. He was raised in Maryland and spent summer on his grandparent's, now his parent's farm. He is broadly trained geneticist. His Ph.D. dissertation at the University of Virginia involved the population genetics of land snails. He subsequently moved to Johns Hopkins School of Medicine where he worked on 1) the evolutionary history of people with sickle cell hemoglobin, and 2) the underlying genetics of a) Huntington's Disease and b) Bipolar Affective Disorder (also know as Manic Depression Disease). He moved across Baltimore to the University of Maryland to study 1) the genetics of asthma and stroke, and 2) the genetics of pathogenic and antibiotic resistant bacteria. The pathogens include E. coli O157, Salmonella, Listeria, Yersinia, Vibrio cholerae and V. parahaemolyticus. Each of these pathogens can cause severe sometimes life threatening diarrhea. His work on V. parahaemolyticus has focused on the evolution of the pandemic strain (one that causes in many people over a broad geographic range) from less virulent ancestors, a change that probably occur in 1995. He has study antibiotic resistant bacteria on farms and in hospitals in an attempt to causes behind the increased incidence of antibiotic resistant infections. From 2002 to 2004, Dr. Stine has been a member of the U.S. Environmental Protection Agency's National Drinking Water Advisory Committee's Working Group on the Candidate Contaminant List (CCL).

Their testimony relates to the potential public health impact of the proposed introduction of Asian oysters (Crassostrea ariakensis) into the Chesapeake Bay. This oyster species has been chosen for their improved growth to market size and increased resistance to oyster pathogens, including MSX and Dermo that have devastated the native C. virginica population in the Bay. Successful introduction of this species into the Bay would potentially have a positive economic impact. It is commendable that much effort is being made, through the use of triploid (sterile) oyster spat, to limit the potential for C. ariakensis to spread during growth trials in the Chesapeake Bay. Great care has also been taken to ensure that the broodstock contain no unknown diseases, parasitic, bacterial or viral, that could be spread to native oyster populations.

However, the issue of human disease transmission in Asian oysters has been omitted from the environmental risk analysis studies. Currently, the Eastern oyster (Crossostrea virginia) is a primary vehicle for transmission of a number of important human pathogens, including Vibrio vulnificus, Vibrio parahaemolyticus and enteroviruses, in the United States. Vibrio parahaemolyticus is noted for having caused several large outbreaks of gastroenteritis in the U.S. in recent years, and continues to cause sporadic disease with an incidence of 2.5/1,000,000. Vibrio vulnificus is the leading cause of death associated with the consumption of raw oysters in the U.S., with approximately 70-100 cases per year, up to 50% of which die. Both of these organisms live naturally in marine environments, including Chesapeake Bay, and can be cultured from all oysters in the bay, particularly during the summer. In Asia, V. parahaemolyticus causes endemic outbreaks, outbreaks that effect many people, uncounted because of a lack of public health resources, spread over large geographic regions, as opposed to the sporadic outbreaks experienced to date in the U.S. Additionally the incidence of V. vulnificus disease and death is also much

higher in Asia. Whether the increased incidence of disease in Asia is associated with oyster species is unknown.

Our concern with the potential introduction of the Asian oyster into Chesapeake Bay is that there is insufficient data to know whether these oysters will modify the disease transmission patterns of V. parahaemolyticus, V. vulnificus and other pathogens to humans. There is the potential, due to their faster growth rate and increased size relative to the Eastern oyster, that they will also acquire high body-burdens of these naturally occurring pathogens through filter-feeding. Higher body-burdens may translate to increased disease incidence and death caused by these pathogens. Differences in oyster physiology may also select for particularly virulent strains of these pathogens. The lack of scientific data, both locally and internationally, does not allow us to determine with confidence whether the Asian oyster can be introduced and not impact human health. These diseases remain of concern to both federal and local agencies. FDA recommendations include that oysters not be harvested when V. parahaemolyticus levels exceed 10,000 per gram of oyster tissue, and that oysters be refrigerated within 10 hours of harvest to limited post-harvest spread of these organisms. The Interstate Shellfish Sanitation Conference has also set industry goals to decrease the number of V. vulnificus cases annually, including education programs and a number of post-harvest strategies.

To summarize our concern, certain bacterial pathogens associated with oysters can cause severe illness in humans. In Asia, incidence of these diseases is much higher than in the U.S. These pathogens are known to live in the Chesapeake Bay, although fortunately for us at low levels. However, if the higher incidence of disease is because the Asian oysters are a better home for the pathogens than the American oyster, then introducing the Asian oysters would be expected to cause the incidence of these diseases to increase in the U.S. and potentially close oyster beds to harvest. This risk depends only on how well the bacteria grow in Asian oysters and not where those oysters originate. Whether or not there is an increased level of pathogenic bacteria in Asian oysters grown in the Chesapeake Bay that could lead to increased incidence of severe diarrhea from V. parahaemolyticus and septic infections from V. vulnificus can and should be tested to determine whether the Asian oyster release into the Chesapeake may have effect on human health.