EXECUTIVE SUMMARY

Background

Escambia and Santa Rosa Counties (with a combined population of 412,000) are the two most western counties in the State of Florida. A special Grand Jury on Air and Water Quality impaneled by the First Judicial Court of the State of Florida (Grand Jury Report, 1999) addressed the deterioration of environmental health in Northwest Florida due to pollution from point sources (industrial, military, and Superfund sites) and non-point sources (storm water runoff, septic tanks, lead contaminated homes, contaminated aquifers, and other diffused sources of pollution). In recent years, as part of a National Relocation Pilot Effort, the U.S. EPA has relocated 361 households from around the Escambia Wood Treating Company (ETC) Superfund site. In response to the continued health concerns of the affected residents, emerging evidence of groundwater contamination from some of the Superfund sites, and the community's general concerns about regional environmental pollution and potential impacts on human health, the U.S. Congress provided directed source funding to the University of West Florida to initiate environmental health studies in Escambia and Santa Rosa counties, FL. These initial studies, as summarized below, are relevant to the Goals 8-8, 8-10, 8-11, and 8-12 of "Healthy People 2010" in the area of environmental health, and are helpful in identifying potential exposure risks and assisting in the community efforts for improving the health status and quality of life of the residents in Northwest Florida.

Task 1. Assessing Fisheries as Vectors for Toxic Materials from the Environment to Humans.

A. Contaminants in blue crabs and oysters

We conducted an initial screening level assessment of contaminants in blue crabs (*Callinectes sapidus*) and oysters (*Crassostrea virginica*) collected from various locations in bays and bayous in the Pensacola, FL area. Tissue samples were analyzed for mercury, arsenic, cadmium, chromium, copper, lead, nickel, selenium, tin, zinc, 17 dioxin/furan compounds, and 12 dioxin-like PCB congeners (PCB-77, PCB-81, PCB-105, PCB-114, PCB-118, PCB-123, PCB-126, PCB-156, PCB-157, PCB-167, PCB-169, and PCB-189). Contaminant levels were compared to Screening Values (SV) calculated using the U.S. EPA recommendations for establishing consumption advisories. Four different consumption rates were used in the derivation of the SVs.

We identified five chemicals of concern (dioxins/furans/PCBs, arsenic, mercury, cadmium, and zinc) in either crab muscle, crab hepatopancreas, total crab tissue, or oysters based on exceedence of one or more SVs. We also assessed health risks (non-carcinogenic and carcinogenic) that may arise as a result of consumption of these shellfish species. Dioxins/PCBs accounted for 85-99%, 60-90%, 27-94%, and 53-99% of the total excess cancer risks for crab hepatopancreas, total edible crab tissue, crab muscle, and oysters, respectively. The relative contributions of dioxins/furans and dioxin-like PCBs to the TEQs and resultant risks varied with location, as evident from analysis of the crab hepatopancreas samples. Dioxins/furans were a greater contributor in samples from Bayou Chico and Perdido Bay, whereas PCBs were

dominant in Bayou Grande and Western Escambia Bay. The locations that exceeded SVs and had the highest carcinogenic or non-carcinogenic health risks were generally located in urbanized waterbodies (Bayou Texar, Bayou Grande, and Bayou Chico) or downstream of known contaminated areas (Western Escambia Bay). Oysters collected from commercial oyster beds in Escambia and East Bays, and crabs collected from East, Blackwater, and Perdido Bays generally had the lowest levels of contaminants. Despite accounting for only 15% of the total tissue, inclusion of hepatopancreas in a crab meal increased contamination to levels above many SVs, and therefore, direct or indirect consumption of hepatopancreas from crabs in the Pensacola Bay system should be discouraged. Further investigation is warranted to determine whether consumption advisories should be issued for shellfish from specific locations in the Pensacola Bay system.

B. Contaminants in fish

During the course of this study we experienced considerable difficulty in collecting fish from the Pensacola Bay System due to unusually low oxygen levels in several bays. We were able to collect and analyze only 27 samples (representing seven species of fish) for contaminants as examined in shellfish. Based on these limited tests, we identified three contaminants of concern in fish: arsenic, mercury, and dioxins/furans/PCBs (dioxin-like PCBS). In general, arsenic levels tended to be elevated in fish species that forage in or near sediments (croaker, flounder, mullet, and red drum). Mercury concentrations were highest in predatory species such as speckled trout and white trout, with two of the speckled trout samples exceeding the mercury SV for recreational fishers and the State of Florida limited Consumption Advisory Level. Dioxin/furan/PCB TEQs were much higher in samples of whole fish than in fillets. Several species (mullet, spot, red drum, white trout, and speckled trout), however, exceeded the recreational fisher dioxin/furan TEQ in tests of fillet samples. Additional sampling and analyses are needed to assess contaminant loads in fish from the Pensacola Bay System and the associated potential health risks.

C. Fish consumption survey

A fish and shellfish consumption survey, developed following guidelines provided by the US EPA (1998), was administered to assess patterns of seafood consumption by the Pensacola Bay area population. Self-addressed prepaid postage surveys were manually distributed to fishers residing in Escambia and Santa Rosa County FL, while they were fishing on the Pensacola Bay and Gulf Breeze fishing bridges in May 2002. We received completed surveys from 58 of these fishers, including 46 who reported catching fish. A larger survey was conducted in August 2003, involving the mailing of 9,000 survey forms to registered voters in Escambia and Santa Rosa counties (4,500 surveys in each county). Of these, 1500 were completed and returned (16.6%). The respondents included 768 females, 646 males, and 86 unspecified gender. The racial profile of the respondents was: 1376 white (92%), 33 African-American (2.2%), 24 Hispanic (1.6%), 20 Asian-American (1.3%), 7 other (0.47%), 15 Native-American, and 25 no response (2.7%). The mean age was 52.8 years (range 14 to 95 years). The health survey section was completed by 1,483 of the respondents. They identified high blood pressure, high cholesterol, and eye disease as the top three health issues of concern. Although the initial goal of the survey was to establish a

consumption rate for fish in the Pensacola Bay region, a majority of the respondents did not provide amounts of fish consumed but instead they simply indicated whether or not the fish species had been caught, purchased, or consumed. Therefore, consumption rates could not be accurately determined for the population in Northwest Florida. Only 264 of the 1500 respondents had fished in the two weeks prior to completing the survey. The remaining 1236 respondents either were not fishers or were unable to fish due to poor weather conditions at the time of the survey. The average time spent fishing in the two weeks prior to completing the survey was 4.6 h, and 186 of the fishers ate their catch during the survey period. Although only a minority of the respondents had fished in the two weeks prior to the survey, 875 of the respondents reported eating seafood in a restaurant and 770 reported eating seafood purchased from a store. The cumulative results of these surveys confirmed that the species we selected for initial screening were indeed among the most commonly consumed locally harvested species in the Pensacola Bay region.

Task 2. Environmental Follow-up Assessments for Children with Elevated Blood Lead Levels.

The aim of this project was to conduct environmental follow-up assessment services for children with elevated blood lead levels (those identified by the Escambia County Health Department, ECHD, from 1999-2001 screenings, and any new cases identified by the ECHD during the project period), to complement other components of case management. The availability of no-cost lead assessment services was communicated to target households by letters, and to the community at large through news media and multiple community partners. Nevertheless, voluntary participation in this program was relatively low, presumably because of potential consequences of finding lead contamination in homes (e.g., owner liability, costs of remediation, displacement of tenants), frequent movement of target individuals among rented dwellings, and general apathy. Consequently, this assessment was limited to 33 homes built before 1979 in the Escambia County. Analyses of paint chips, soil, and wipe samples showed that 21.2% of the tested homes had lead contamination levels above the HUD guidelines for one or more samples, whereas 51.5% of the homes had detectable levels of lead contamination. Regardless of the level of lead contamination found, each of the study participants was provided with education materials and contact information for additional advice on dealing with lead hazards. Specific recommendations were made to the study participants, ranging from extensive building replacement to interim controls and inexpensive ways to maintain a clean home, so as to reduce lead hazards in the home. The findings from the present study, along with the City of Pensacola HUD program data indicating a cumulative lead prevalence between 50-55% above HUD guidelines and 80% with detectable levels of lead contamination, suggest that continued education and lead screening of homes and children would be beneficial for the reduction of lead hazards and improvements in community health.

Task 3. Clinical Toxicology and Public Health Evaluation of Communities Near Superfund Sites in the Palafox Redevelopment Area, Escambia County.

The Palafox Redevelopment Area (PRA) in Pensacola, FL includes two Superfund sites -

Escambia Treating Company (ETC) and Agrico Chemical Company (ACC) and other sources of contamination that are of public health concern. With funding provided by the State of Florida, the Florida Department of Health, Escambia County Health Department (ECHD), working in collaboration with a community group (CATE: Citizens Against Toxic Exposure), initiated the Community Environmental Health Project (CEHP) in July 2000 to locate and provide health screenings for individuals who may have been affected by contamination in the PRA. These eligible citizens were invited to participate in a health screening, which included a health and exposure history/survey, routine blood and urine analysis, and a screening chest x-ray for clients >39 years old. Between December 2002 and May 2004, the ECHD, in conjunction with the University of West Florida, and the University of South Florida, conducted a toxicological health evaluation of a 228-person subset of the eligible workers/residents identified in the CEHP study who had been potentially exposed to chemical contaminants at the ETC Superfund site. Participant age in our study group ranged from 14 to 88 years (mean: 57 years), with the following characteristics: 202 African Americans (88.6%), 26 Caucasians (11.4%); 137 females (60.1%), 91 males (39.9%); 27 workers (11.8%), 201 residents and family members of workers (88.2%). This demographic profile is similar to that derived from census data for the community around the ETC site, and our study group is representative of the target community in its inclusiveness with regard to age, race, and gender of the participants. This study included a physical examination conducted by a physician, analysis of the health screening profiles collected during the CEHP study, and blood sampling for contaminants that had potential to be found in the study population as a result of exposure to the ETC site.

The health screening identified an elevated prevalence of diabetes, hypertension, and hepatitis A, B, and C, relative to national levels. The prevalence of overweight and obese persons in the ETC cohort also exceeded national averages, which suggested that excess weight in the cohort could be a major factor in the etiology of diabetes and hypertension. The ETC population exhibited a higher prevalence rate of uterine/cervical and prostate cancer than national levels, although we were unable to establish a direct link between the cancer prevalence and exposure to environmental contaminants from the ETC site. Overall, it appears that the ETC population suffers from the same diseases as do similar populations in terms of demographics and lifestyle.

We found that the ETC cohort exhibited elevated levels of serum dioxins/furans relative to levels in the general population, and the congener profiles in the participants appeared to reflect patterns that are commonly observed in persons exposed to wood-treatment facilities using pentachlorophenol (PCP). Workers were generally found to have higher dioxin/furan concentrations and cancer prevalence than residents, although the number of workers in the study group was relatively small. The levels of dioxin-like PCBs in the ETC cohort were not abnormal and were similar to those reported nationally as background levels. Although the ETC population exhibited higher than national average rates of diabetes and hypertension, we found that dioxin/furan levels were significantly correlated only with hypertension. Elevated levels of dioxin-like PCBs, however, were significantly correlated with diabetes. Future studies that would enable comparison of these results to a control population from the region may reveal other significant impacts on the ETC cohort.

At the end of participation in the health evaluation and following the completion of the physical examination and consultations with the physicians, the participants were given a brief questionnaire to be completed anonymously. This survey would permit us to gauge their perceptions on the quality of clinical evaluation services and identify areas of concern for consideration in future studies. Out of the 228 participants, 219 completed all aspects of the

evaluation, including the final physical examination and consultation with physicians, and all of these individuals were surveyed. A substantial majority of the participants (84 to 92%) were very satisfied with the clinical evaluations carried out during our studies.