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New Jersey Department of Environmental Protection (DEP)

CAMDEN WATERFRONT SOUTH AIR TOXICS PILOT PROJECT

QUALITATIVE ASSESSMENT OF STRESSORS

This document describes those stressors which cannot be quantified and have the potential to impact the health of the residents of Camden Waterfront South. A qualitative assessment is sometimes included in a Cumulative Risk Assessment (CRA). CRA combines the risks from relevant exposures to multiple stressors over time (EPA, 2003). These stressors can be either chemical or non-chemical. CRA is in the developmental stage. There are no prescribed precise methods for calculating cumulative risk at this time.

The stressors discussed in this section have the potential to impact the entire population of Camden Waterfront South. The most vulnerable sub-populations are fetuses, infants, children, the elderly, those with pre-existing disease (especially those with cardiopulmonary disease), and those who work or exercise outdoors.

I. Low Socioeconomic Status (LSES)

The residents of Camden Waterfront South experience a poverty level that is more than four times the rest of the state (US, 2000), and the population is composed almost entirely of racial and ethnic minorities, many living in low-income rental units. LSES is associated with many elements that can adversely impact human health. These include inadequate or nonexistent health care; urban blight; poor health and nutritional status; low education level; pesticide exposures; the lack of information on risk from exposure to environmental contamination; and how risk-promoting lifestyles and behavior effect health (Haynes & Smedly, 1999). At the DEP community outreach meeting, residents of Camden Waterfront South have said that they feel additional stress over living in close proximity to industry and many known contaminated sites (over 25 sites have been identified in and around the census tract).

A study by Evans and English (2002) found that children growing up in poverty experience a greater level of socio-emotional problems (that is, multiple physical problems, from factors such as inadequate housing, noise, crowding) and psychosocial problems (family turmoil, early childhood separation, community violence) than their middle-class counterparts. Although the Evans and English study focused on a rural community, the authors imply that the results are applicable to urban communities.

Other researchers have found a strong correlation between economic prosperity and good health (Sen, 2000), while Geronimus (1999) reports that chronic, stress-related diseases (e.g. cancer and circulatory diseases) play a considerable role in excess mortality in poorer communities. LSES can also increase exposure to many life-challenging risks, including homelessness, hunger, acute and chronic stress, overburdened/absent social support, depression, and increased risky behaviors. Urbanites living in poverty have a higher mortality rate than their rural counterparts.

Persons of LSES may be more susceptible to the toxicity of environmental contamination, because of their exposures to multiple stressors and because they experience a higher prevalence of certain diseases [e.g., diabetes, Sickle-Cell anemia, chronic liver disease, hyper-reactive airways disease, Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS)]. These diseases have been known to increase vulnerability to environmental contamination.

A. Inadequate Health Care

During community outreach meetings for the Camden Waterfront South Air Toxics Pilot Project, Camden Waterfront South residents often complained that they did not have any medical clinics in the immediate neighborhood. They also mentioned that other barriers to obtaining proper health care include having to take public transportation and making appointments.

In general, the urban uninsured are medically under-served (Geronimus 1999) due to reductions in staff at public hospitals, the closure of many inner-city clinics, and decreases in the incentives for hospitals to provide uncompensated care.

A study by Southerland, Hart and Atkins (2002) compared families' medically-related activities before and after obtaining health care coverage. The authors found a significant increase in the following measurements after the families were enrolled in the FamilyCare program: having a primary care provider; the child is seen by the same physician/physician's office; child obtains regular general physicals and dental checkups; child's immunizations up-to-date; obtaining a physician's care immediately when needed; and parents purchasing prescribed medications. These are all indicators of improved medical care for the children. Some of the problems that occur when children do not seek medical treatment on a regular basis include increases in asthma, dental decay and ear aches; deficiencies in vision; and inadequate immunizations.

The Committee on the Consequences of Uninsurance of the Institute of Medicine reported (NAS, 2002) that those without health insurance do not seek medical attention as needed. The researchers found that working-age Americans without health insurance are more likely to have poorer health and to die prematurely. Specifically:

● Uninsured adults are less likely to seek preventive and screening medical services, and if they do, they do not receive them on a timely basis. This results in delayed diagnosis and premature mortality, especially for cancer patients.

● Health insurance coverage would help to reduce the disparities seen by racial and ethnic minorities in obtaining preventive and screening services and in rates of morbidity and mortality.

● A review of population-based studies of persons with breast, cervical, colorectal and prostate cancer and melanoma showed that uninsured cancer patients have a poorer health status and are more likely to die early due to delayed diagnosis. This may also be due to differences in the type of treatments received by insured versus uninsured patients.

● The Committee examined persons with five chronic illnesses, i.e., cardiovascular disease, diabetes, HIV, mental illness and end-stage renal disease. They found that uninsured persons had worse clinical outcomes than those with insurance. For example, diabetics who did not receive the proper foot and eye examinations were at higher risk for amputation and blindness.

● Uninsured hospital patients with various diagnoses are more likely to receive a lower quality of care in the hospital and fewer services, resulting in additional injury to the patient. Subsequently, those patients are more likely to die in the hospital than their insured counterparts.

● It has been documented in short term studies of 1 to 4 years duration that uninsured adults and those who lost coverage have an overall decrease in general health status than those with coverage.

● Comparison of the uninsured to those privately insured indicates that the uninsured are more likely to die prematurely.

• The Committee also found that the disparities in health status between the insured and uninsured is even greater for vulnerable sub-populations such as those living with severe mental illness; persons aged 55 to 65 (persons older than 65 receive the federal Medicare program which covers hospitalizations, physicians and out patient services); the chronically ill; members of ethnic and racial minorities; and those of LSES.

The report concludes that some of the benefits of having insurance include "financial security and stability, peace of mind, alleviation of pain and suffering, improved physical function, disabilities avoided or delayed, and gains in life expectancy".

Another report, ”Health Insurance is a Family Matter” (NAS, 2003), looked at how not having health insurance impacts the family, specifically pregnant women, infants and children. Their findings are listed below:

● Families are adversely impacted if one or more of the family members do not have health insurance.

● Families without coverage for all family members are associated with specific socio-demographic characteristics, such as low income, racial and ethnic minority status, single parent household, and immigrant status.

● Low-income parents who are uninsured are less likely to enroll their children in public programs even when the children are eligible for coverage.

● A parent's own use of health care is correlated with their children's use of the health care system.

● As children grow older, they are less likely to have health coverage because the public/private family insurance programs do not usually cover young adults (over 19 years of age). Even though young adults are able to work, they are less likely to find employment-based coverage and usually do not make enough money to purchase it on their own.

● Due to the prevalence of employment-based coverage, dependents are likely to lose coverage when their parents are laid off, change jobs, separate, divorce, retire at 65 and become eligible for Medicare, or die.

● Having health insurance is one factor (among others) which improves health-related outcomes.

● Insured children use medical (including prescriptions), vision and dental services more frequently than their uninsured counterparts, even after controlling for race, ethnicity, income, and health status.

● Adolescents have the highest uninsured rate.

● Uninsured children are more likely to use emergency services and become hospitalized for conditions that could have been treated on an outpatient basis.

● Uninsured children are more likely to have asthma, iron deficiency anemia, attention deficit-hyperactivity disorder, and middle ear infections. These, in turn, can adversely impact performance in school, and mental, language and hearing development.

● Children with special needs are a vulnerable sub-population of uninsured children.

● Women with no health insurance receive less prenatal care and fewer expensive treatments (e.g., Caesarean sections).

● Uninsured sick newborns average shorter hospital stays, receive fewer services, have worse health outcomes (e.g., low birth weight), and die prematurely. It was recognized in this report that other factors may play a role in adverse health outcomes and premature death.

● Families without health insurance risk adverse health and financial outcomes.

B. Urban Blight

Urban blight describes communities that have one or more of the following: substandard, abandoned or condemned buildings (according to 2000 US census data, 31% of all housing units in Camden Waterfront South were vacant); overcrowded housing; empty lots; illegal dumping of trash; drug trafficking and use; homelessness, prostitution; overburdened social networks; and stray dogs (Geronimus 1999). Most of these characteristics have been observed by DEP staff attending the Camden Waterfront South community meetings. Urban blight can also lead to increased stress due to the prevalence of violence, HIV/AIDS, asthma, homicide, fire deaths and accidental injuries.

C. Living Close to Industry

The residents of Camden Waterfront South live in a heavily industrialized area (29 sources in and around the neighborhood were modeled for the pilot project). Living in close proximity to multiple stationary sources increases exposure to pollutants released from those facilities and from the equipment servicing the facilities. The residents have expressed concern about: being exposed to pollutants released from local industry; the unknown health risks associated with those pollutants; and the perception that the community is being unfairly targeted for the siting of industrial facilities.

D. Known Contaminated Sites

Known contaminated sites in Camden Waterfront South contain a wide variety of environmental hazards, both chemical and radiological. These can have a wide variety of associated health effects. It is estimated that there could be as many as 24 known contaminated sites in the area. Residents expressed concern at the DEP community outreach meetings over inadequate information regarding the sites in the neighborhood, the open access to some of these contaminated areas, and exposure and risk.

1. Martin Aaron Superfund Site - This site consists of soils and groundwater that are contaminated with pesticides, volatile organic chemicals, semi-volatile organic chemicals and metals. The site is fenced off so that exposure from trespassing can not occur. The soil is somewhat stabilized with an overgrowth of weeds but there is a chance that fugitive dust can impact the community. At this time, the groundwater contamination extends only about 100 feet out from the property line. The U.S. Environmental Protection Agency (USEPA) expects to have a Record of Decision, which will describe the remedial actions, by the end of 2004. It is anticipated that clean-up activities could take up to five years to complete.

2. General Gas Mantle - This site was identified by USEPA in the 1980s and was placed on the National Priorities List in 1996. By the early 1990s, DEP detected elevated concentrations of thorium and radium (radioactive elements) in the top 6 to 8 feet of the soil. Some areas of contamination on the property and nearby Fourth Street go as deep as 12 feet. Most of the contamination is located on the property itself and areas immediately in the vicinity, i.e., around Fourth, Jefferson and Arlington Streets. Some of the affected properties include Mafco, Dynamic Blending, and the property located catty-corner to the original site. There are some small pockets of isolated contamination throughout Waterfront South. USEPA has demolished the former General Gas Mantle building, and the New Jersey Housing and Mortgage Finance Agency has demolished the houses on Arlington Street. In addition, USEPA removed the contaminated soils from the Arlington Street properties. At the present time, USEPA is still investigating the entire site and has made the residential properties a clean-up priority.

E. Pesticides

Dilapidated housing and urban settings are prime locations for pest infestation and subsequent pesticide use. Indoor exposure to pesticides occurs due to direct use of the pesticide and as a result of infiltration from the outside (NJDEP, 2003). Rugs, floors and house dust have been identified as major sources of pesticide residues inside the home.

Pesticide exposure has been linked to a variety of adverse health effects including Multiple Chemical Sensitivity; exacerbations of asthma; and adverse impacts on the endocrine, reproductive, neurological, and immune systems, and on learning and memory. Acute exposure such as accidental ingestion can cause death.

II. Odors

The levels of odorous compounds in a community is a function of source, emission rates, dispersion, deposition, and degradation (Shiffman et al., 2000).

This community is subjected to a multitude of odors and odor events. The odors are pervasive and severe. The biggest contributors are Mafco, a licorice processing plant whose odors can be likened to burnt organic matter; the Camden County Municipal Utilities Authority (CCMUA), a countywide sewage treatment facility whose odors are associated with municipal and industrial sewage; and the large number of diesel trucks which travel through the community.

Health symptoms occur due to exposure to the odor (the sensation) or the odorant (the compound that has the odor). Toxicity can be expressed in both the upper and lower respiratory systems. Frequently reported health complaints from odors include irritation of the eye, nose and throat; hoarseness; sore throat; cough; chest tightness; shortness of breath; nasal congestion; palpitations; drowsiness; stress; mood alterations; diarrhea; and feelings of anger and tension. Odors have also been reported to exacerbate allergies and asthma.

III. Ozone

Ozone is a regional summertime problem. Ozone is a photochemical oxidant which is formed by chemical reactions between air pollutants [e.g., volatile organic compounds (VOCs) and nitrogen oxides (NO_X)] and sunlight.

Stationary and mobile sources are major sources of NO_X and VOCs. Ozone can be formed locally or transported from upwind locations that are hundreds of miles away.

Ozone exposure has been linked to a wide range of respiratory problems, such as difficulty breathing, chest pains, nausea, throat irritation, congestion, asthma, reduced lung function, scarring of lung tissue, and premature death. Research is emerging which links the onset of asthma to ozone exposure (McConnell et al., 2002).

Ozone also causes welfare damage, that is, corrosion or discoloration of building materials, deterioration of rubber, damage to plants, etc., which adds to urban blight.

In 2001, every DEP monitoring site exceeded the National Ambient Air Quality Standard (NAAQS) for ozone. Out of 19 monitoring sites, the Camden air monitoring station recorded the second highest number of daily exceedances of the 8-hour standard in the state. (Note: The Newark air monitoring site was excluded because data was not available for the majority of the ozone season that year.)

IV. Noise

Noise has been described as "unwanted" sound (NJDEP, 3/2003). The residents of Camden Waterfront South experience noise due to their proximity to a major interstate highway, the flight path from the Philadelphia airport, and the trucks that service the industry in the community.

Human health effects of noise include sleeplessness, irritability, hearing loss and impacts to the cardiovascular system. Noise-related health effects can be considered to be stress-related health effects (Van Raaj & Oortgisen, 1996).

V. Trucks and Diesel Emissions

Diesel exhaust is composed of hundreds to thousands of gaseous and particulate compounds. Many of them are known to be toxic to human health; for example, formaldehyde, acetaldehyde, benzene, 1,3-butadiene, and polycyclic aromatic hydrocarbons (PAHs). Over 40 compounds in diesel exhaust are classified as Hazardous Air Pollutants (HAPs) under the Clean Air Act. Diesel exhaust is a major contributor to ambient levels of $PM_{2.5}$. Research has shown an association between exposure to ambient levels of $PM_{2.5}$ and morbidity and premature mortality (Samet et al., 2000).

Trucks are the primary source of diesel emissions in Camden Waterfront South. In addition, they are noisy and can cause unsafe conditions for the community. Camden Waterfront South experiences an unusually high level of truck traffic. It has been estimated that 900 trucks/day travel through this community. This amounts to 328,500 trucks/year. The Camden County municipal waste combustor has, on average, 220 trucks/day. These vehicles travel from Interstate 676 to Morgan Boulevard, which is located in the southern section of Waterfront South. The St. Lawrence Cement Company has approximately 140 trucks a day, with a maximum of 500 trucks/day when a delivery occurs. These trucks travel from Beckett Street Terminal of the South Jersey Port Corporation to 2nd Street to Atlantic Ave. to Interstate 676 to Morgan Boulevard to get to the facility. This route circles the Waterfront South neighborhood. Del Monte Fresh Produce, located at the South Jersey Port's Broadway Terminal, has about 120 trucks/day, traveling Interstate 676 to Morgan Boulevard to the port. All trucks servicing the industry in Waterfront South have the potential to travel directly through the neighborhood. The community has also complained about excessive truck idling in their community, which contributes greatly to the level of diesel emissions.

VI. Philadelphia Plume

Camden Waterfront South is directly across the river from Philadelphia. Philadelphia is a large city with many sources of air pollution. The prevailing winds are from the west, thereby increasing the Camden Waterfront South resident's levels of exposure to air pollution. USEPA's 1996 National-Scale Air Toxics Assessment (NATA) estimated that both Philadelphia and Camden County experience some of the highest levels of risk from air toxics in the country. However, this risk needs to be recalculated because it is heavily biased by an incorrect assumption on the part of USEPA that one Camden facility (F.W. Winter) was emitting hexavalent chromium.

VII. Ship Yards/Ports

Camden Waterfront South is situated between two busy terminals of the Port of Camden, the Beckett Street Terminal and the Broadway Terminal (both operated by the South Jersey Port Corporation). The community is

exposed to emissions from the ships and from the equipment servicing the ports, most notably trucks. Particulate matter, ozone and air toxics are either emitted directly from ships or formed in the atmosphere from the compounds emitted by these vessels.

VIII. Boilers
Many industries and residences in Camden Waterfront South utilize boilers for heating. Boilers are also sources of combustion related pollutants. The number and size of the boilers is unknown.

IX. Interstate 676
Interstate 676 is busy highway bordering the Camden Waterfront South neighborhood to the east. It contributes stressors including noise, mobile source-related pollutants, and the perception that living close to a highway is hazardous to your health.

X. Cancer Incidence
The New Jersey Department of Health and Senior Services (NJDHSS) recently released a report which indicated that Camden Waterfront South experiences a higher rate of cancer than expected (NJDHSS, 2003). Although all cancers combined were not statistically significant for men or women, the NJDHSS did find a statistically significant risk for lung cancer in males, and stomach cancer for both sexes combined. Although not statistically significant, there were elevated rates of esophageal cancer for both sexes combined and lung cancer in females. The residents who attended the DEP community meetings have expressed concern about the elevated rate of certain cancers.

XI. Asthma
Relative to the state average, Camden County has a higher rate of asthma hospitalizations (NJDHSS. 2/03). Asthmatics are more susceptible to the effects from air pollution, especially ozone, PM, sulfur dioxide, acrolein, formaldehyde and cadmium. Since many of the residents of Camden Waterfront South do not have adequate access to health care, they are unable to maintain the proper use of medications and associated treatments. This makes them vulnerable to an increase in the frequency and severity of asthma exacerbations.

XII. HIV/AIDS
As of December 2003, Camden County had the 8th highest number of cases of HIV/AIDS relative to other counties in New Jersey (NJDHSS. 2003c). HIV/AIDS increases vulnerability to adverse effects from other stressors in this community.

XIII. Puchack Well Field Contamination
The Puchack Well Field supplied drinking water for 50,000 to 80,000 people living in Camden City. The wells were contaminated with metals and VOCs due to the improper handling of hazardous materials. The first contaminated well was discovered in the early 1970s. The last contaminated well was decommissioned in May 1998. Although there is no current risk associated with these wells, residents have expressed concern over past exposures. This issue has contributed to the community's overall distrust of public officials.

XIV. Lead Exposure
In fiscal year 2001, 2.8% of the children in Camden County tested for blood lead had elevated levels (NJDHSS, 2001). Camden County had the eighth-highest percentage of children with elevated blood lead levels by county in New Jersey. Children in Camden Waterfront South can be exposed to lead through paint, house and street dust, soil, water, food and air. As part of the Air Toxics Pilot Project, the DEP Bureau of Air Quality Evaluation (BAQEv) inventoried lead emissions from thirteen facilities in Camden Waterfront South. In modeling these emissions, BAQEv found that Camden Iron & Metal and Plastics Consulting have the potential to exceed the 24-hour reference concentration for lead. It was also found that the maximum modeled emissions from Plastic Consulting is above the 3-month National Ambient Air Quality Standard.

Elevated blood lead levels can lead to neurological, neurobehavioral and developmental effects in fetuses and young children. Other effects include sterility, genotoxicity, hypertension, neonatal morbidity and mortality (Doull et al. 1991).

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