

## **EPA Inventory on Aging-Related Projects and Summaries**

EPA Administrator Christine Todd Whitman has expressed an interest in and concern for the environmental health of older Americans. To begin the effort to address this concern, we reached out to the Agency to assemble an inventory of those EPA activities that relate to older individuals. Intramural and extramural research, science and other activities from 1996 to the present were submitted, as were projects proposed for FY03 and beyond. This was the first effort to get a picture of recent and future activities. We asked that the Region and Program Offices be inclusive of all projects related to persons 55 years and older. 75 projects were submitted for inclusion in the inventory of which 31 were from the Office of Research and Development.

### **EPA Project Sponsors**

- All EPA offices responded to our request for information. Those with projects included Regions 5, 6, 7, 8, 9, Office of the Administrator, (OA), Office of Air and Radiation (OAR), Office of Administration and Resource Management (OARM), Office of Enforcement and Compliance Assurance (OECA), Office of Environmental Information (EI), Office of Prevention, Pesticides, and Toxic Substances (OPPTS), Office of Research and Development (ORD), Office of Solid Waste and Emergency Response (OSWER), and Office of Water (OW).
- Projects are being carried out on a nationwide scale and the local and tribal levels. The District of Columbia and the following 30 states have projects: Arizona, California, Colorado, Connecticut, Florida, Georgia, Hawaii, Illinois, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, North Carolina, Nebraska, New York, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Texas, Utah, Washington, Wisconsin, and Wyoming.

### **Financial Support**

- 45 projects included budget information. Total money allocated to these projects is \$12,857,870. This does not include the \$30 million for Libby, MT investigation.
- 43 projects included information for fiscal years. 28 projects were active in FY01 or before, 18 projects were in FY02, and eight projects are proposed for FY03 or later.

### **Types of Activities**

- There are 46 research studies, 13 outreach initiatives, five assessment efforts, three intervention projects, three enforcement activities, two monitoring projects, three data collection activities.

### **Health Concerns and Pollutants**

- Particulate matter (PM) and the effect of PM exposure on respiratory, cardiovascular and pulmonary health was the focus for the majority of projects. 36 projects identified PM as the main stressor for human health concerns.
- Two of the projects proposed for FY03 and beyond focus on microbial and pathogen contaminants from drinking water exposure as the primary pollutant of concern. PM is addressed in fifteen

projects that are continuing through FY03. Other pollutants that are addressed are poly chlorinated biphenyls (PCBs) and pesticides. Two projects have yet to determine the pollutant of concern, although the projected health focus is neurotoxic susceptibility and cancer. Another project proposed for FY03 is an outreach project addressing general environmental health concerns.

### **Summary of Activities Related to the Elderly**

**OA** - Office of the Administrator

OA - Office of Children's Health Protection submitted four extramural project descriptions. Three of the projects were included in FY02 budgets, while the fourth is in the FY03 budget. Project focuses include two intergenerational outreach projects and two research activities on general environmental hazards.

- The Environmental Alliance for Senior Involvement (EASI) will develop training materials and implement two pilot environmental health projects to mentor youth and work within the community to reduce environmental risks to children. This project will begin in FY03.
- An **intergenerational** environmental health and safety kit for junior and high school age youth with older Americans on environmental health issues in their community is being developed by the National Safety Council. It will address several environmental health issues including environmental asthma triggers, sun safety, pesticides, lead poisoning and drinking water.
- The National Academy of Sciences Workshop focuses on the differential **susceptibility** and exposure of the elderly to environmental hazards. It will be held December 2002.
- A monograph series addressing **environmental hazards** associated with or that aggravates health conditions such as asthma, kidney disease and cancer is included in the FY02 budget. The research is taken place on tribal lands through a cooperative agreement with the National Indian Council on Aging in New Mexico. 5 monographs will be published

**OAR** - Office of Air and Radiation

OAR submitted three extramural activities between FY01 and FY02, that focus on asthma and respiratory illnesses.

- Johns Hopkins University received a grant to assess mobile source impact on indoor & outdoor concentrations of **particulate matter** (PM). The project, located in Baltimore, MD, focuses on asthma and other health concerns related to PM exposure. Other pollutants of concern included

benzene, formaldehyde, and acetaldehyde.

- The National Environmental Health Association will provide a list of actions related to the elderly. This nationwide project will focus on asthma, lung cancer, and respiratory infections that can be triggered by **indoor environmental factors** such as radon, environmental tobacco smoke, and mold.
- The Indoor Environments Division is conducting a literature search for research related to **indoor environmental pollutants** and the elderly with the intention of creating a document to share and gain information from key stakeholder organizations.

#### OECA - Office of Enforcement and Compliance Assurance

OECA submitted three intramural projects that took place between FY00 and FY02. Two projects focused on asthma & air pollution related illnesses. Another action pertained to **microbiological contaminants** and the adverse health effects such as gastrointestinal illnesses that occur from unfiltered drinking water. All three are enforcement activities

- Enforcement of the Clean Air Act including both stationary and mobile sources is an ongoing enforcement activity. These types of activities reduce exposure to **PM**.
- Ensuring compliance of the Safe Drinking Water Act protects sensitive subpopulations, such as the elderly, from the effects of various **microbiological contaminants**. An example of such an enforcement action was ruling to require installment of filtration for a portion of New York City's drinking water.
- An unregistered **pesticide** was responsible for asthma and related respiratory illnesses stemming from its fragrance. Exposure of the pesticide can occur at home after spraying for dust mites. OECA issued a civil administrative complaint against the nationwide manufacturers of the pesticide.

#### OEI – Office of Environmental Information

OEI conducted **focus groups** consisting of senior citizens. They were held in Phoenix, Chicago, Portland, and Providence. Seniors were asked to determine the types of environmental information they want and need, and the barriers they face in obtaining this information.

**OPPTS** - Office of Prevention, Pesticides and Toxic Substances

OPPTS submitted a description of an assessment project. Although the project is not looking specifically at older Americans at this time, efforts are underway to develop a model to estimate an individual's exposure to **pesticides** over a lifetime. This model could be used to understand the effects of pesticides on the aging population through exposure from food and drinking water, as well as from the residential and occupational environments.

**ORD** - Office of Research and Development

ORD submitted descriptions of 55 projects. The projects covered the period of FY96 to FY06. 37 projects are extramural, 6 intramural and 7 contained both components. The highest proportion (about 49% or 27 out of 55) of projects were research activities that focused on asthma, respiratory and cardiovascular illnesses from PM sources. In addition, several projects addressed exposure to pesticides, microbial pathogens, and other chemical contaminants. One project was an economic study on willingness to pay.

- Several projects involved a National Health and Environmental Effects Research Laboratory (NHEERL) Epidemiology Studies collaboration. These studies quantified the associations between day-to-day or experimental variations in ambient **air particle mass** concentrations and selected physiological functions in older persons living in retirement centers or involved in selected clinical studies. There are nationwide components and a study specific to Baltimore.
- Three studies are also associated with this NHEERL collaboration. These studies examined the cardiac effect & immune system endpoints of **PM** on older retirees in Baltimore, MD from FY97 to FY98, as well as in Fresno, CA in FY99. They examined air pollution from power generation, manufacturing processes and automobile traffic.
- From FY96-99, a research project on acidic **PM** and daily human mortality was undertaken in three cities, Philadelphia, Buffalo and New York City. This project addressed health concerns associated with air quality from exposure to PM.
- Research on long-term morbidity and mortality related to exposures to **PM** and associated air pollutants was another activity focused on the effects of exposures to PM and associated air pollutants. This project sought to further knowledge of the effects of PM on chronic cardiovascular and cardiopulmonary diseases between FY98 and FY01.

- FY98 to FY00, a research project in California explored the relationship of ambient **PM** to heart rate variability and cardiac arrhythmias in elderly adults with coronary artery disease. This project examines whether, in older adults with coronary artery disease, exposures to elevated levels of ambient particulate matter and ultra fine particles are associated with altered cardiac autonomic nervous system, as well as increased number and frequency of serious cardiac arrhythmias.
- From FY98 to FY01, a study on lung injury from inhaled ultra fine **particles** in compromised rats of old age focused on the relationship between the stress caused by ultra fine particles and stress in compromised aged organisms.
- Another project that explores the relationship between PM and chronic cardiovascular and pulmonary diseases is the “Assessing Human Exposure of High Risk Subpopulations to **Particulate Matter**” study. This project researches preliminary PM mass concentrations associated with longitudinal panel studies. The study uses real world assessment and is projected to be completed in 2003.
- The NERL Tampa Air Pollution Study (TAPS) will identify & quantify factors affecting micro-environmental concentrations & exposures. This FY03 to FY06 study will examine combustion-related products, **PM**, and air toxic exposures among the elderly living in Tampa. The focus is on elderly with no prejudice regarding disease state.
- The National Exposure Research Laboratory (NERL) Research Triangle Park PM Panel Study is a longitudinal panel study to characterize temporal variations of personal exposure **PM** and related co-pollutants.

The following studies are PM research funded by STAR (Science to Achieve Results) grants. The funding was awarded under a cooperative agreement through EPA's STAR program. This grant program is designed to engage the nation's best university scientists and engineers in environmental research, and funds research in numerous environmental science and engineering disciplines through a competitive solicitation process and independent peer review. Seventeen of the 24 STAR granted research projects focused on particulate matter. The other 7 studied other pollutants and pesticides.

- The “Cardiovascular Vulnerability to Particulate Pollution” project is an epidemiologic study that measured the variances of cardiovascular function with changes in particulate air pollution in Boston. It was completed in FY01.

- Eight projects are researching individuals who are most sensitive to the effects of air pollution and particulate exposure. In addition, the research is examining the chronic effects of indoor and outdoor particles. Three studies are identifying effects on heart rate, heart rate variability, and/or blood viscosity. A study is being conducted in Chicago, Minneapolis, and Seattle to assess chronic effects of particulate exposure and confounding of co-pollutants. One research project is looking at the relationship among personal, indoor, and outdoor particulate matter levels relative to home characteristics, such as ventilation. Another study, to be done in several cities across the nation, is testing whether patients with diabetes, respiratory, or cardiovascular conditions are more susceptible to particulate matter exposures. One study will follow individuals in six cities for up to 24 years to identify the cumulative effects of long term particulate exposure. Another study looks at persons age 65 or older that already have chronic obstructive pulmonary disease (COPD), cardiovascular disease. Some of these studies are expected to be completed in FY04.
- Another study will examine major urban cities in seven states to determine the combined effects of fine particles and co-pollutants. It will conclude in FY04.
- Two projects focus on airborne **PM**- induced lung inflammation. One looks at the alveolar macrophage (AM) as the target of this inflammation. The “Health Effects of Airborne Particulate Matter and Gases” study examines particulate toxicity in the lungs of neonatal rats. It uses a combination of indoor and outdoor pollutants and examines the epithelial cells in the respiratory tract. It will be completed in FY04.
- Two studies will assess the health effects of particulate matter and other air pollutants in elderly residents of California. One will follow 6,338 residents who have been participating in the study since 1977. The other will document acute effects of PM in “worst-case” Southern California air pollution. They will be completed in FY03.
- An experiment on aged rats will examine the effects of inhaled ultra fine carbon particles on blood cell oxygen levels, pulmonary responses, and on cardiac function. It will be completed in FY03.
- A time-series investigation in Atlanta, Georgia is being conducted in an effort to relate the number of visits to cardiac and emergency departments to daily measures of air quality, significantly measures of PM . It began in FY02 and will conclude in FY04.
- A health risk assessment on the relationship between fine particulate mass and acute changes in

cardiac rhythm is being conducted in Salt Lake City, UT. The study began in FY01 and will continue through FY03.

- A study on the effect that aging has on toxicological responses to Carbon Tetrachloride (CCL<sub>4</sub>) was conducted on rats. CCL<sub>4</sub> is an environmental contaminant that affects the liver, kidneys, and the central nervous system. This study was completed before FY01.
- “The Valuation of Mortality Risk Reductions” surveyed people in Maryland to obtain estimates of willingness to pay for mortality risk reductions. It was completed in FY00.

The second highest proportion of ORD projects relate to bacterial disease and contaminants from drinking water.

- One research project developed methods for the isolation and characterization of non tuberculous mycobacteria in order to address opportunistic **bacterial pathogens** in immunocompromised hosts such as the elderly. The project was undertaken in Cincinnati, Ohio and primarily examined drinking water as a source of contamination.
- There are three projects that concentrate on *Toxoplasma gondii* in drinking water. One research project will seek an innovative molecular and/or antibody detection method for *Toxoplasma gondii*. This activity will explore **microbial contamination** in drinking water to address the concerns of individuals with compromised immune systems, such as the elderly. Another project will field test the method in environmental waters. Another STAR granted research study has been planned to perform a field test of the methodology for detecting *Toxoplasma gondii* in water. *Toxoplasma gondi* is a protozoan parasite that can contribute to waterborne disease. The study is proposed for FY03 and FY04.
- Another STAR Grant study looked at the effects of endocrine disruptors on prostate development and growth. It assessed the consequences of fetal exposures in mice to an endocrine disruptor in the form of a pesticide. It was conducted from FY99 to FY02.
- The “Detroit - Ann Arbor (MI) Metro Public Information Project” was an outreach program to establish and promote a web site with environmental data for the public. It was conducted in FY00 and FY01, and funded by STAR grant.
- Another outreach program, “Environmental Monitoring and Awareness Program (EMAP) for Healthy Water,” was aimed at increasing public knowledge on water availability and quality. It was

conducted in FY99 and FY00, and funded by STAR grant.

- A health and ecological risk assessment was conducted in St. Louis, MO to coordinate data about environmental hazards associated with abandoned and decrepit properties. The targeted pollutants in this study were lead paint, soil lead contamination, asbestos, and chemical wastes. The local, state, and federal agencies collaborated and organized their data to be put in a format for the public to warn them of potential risks. This study continued from FY00 to FY01, and was funded by a STAR grant.
- A research activity in Chapel Hill, NC will examine the infectivity of Norwalk and Norwalk-like viruses. Researchers plan to understand risk associated with exposure to waterborne human caliciviruses as a function of dose and host susceptibility factors. This study of **microbial pathogens** in drinking water systems was undertaken between FY98 and FY01.
- A research project on hazard and risk characterization of potentially susceptible subpopulations, including the elderly, to chemicals in **drinking water** attempts to identify and examine key scientific issues for these subpopulations in risk assessment of drinking water contaminants on the Candidate Contaminants List (CCL).
- The Springfield, MA Surface Water Action Monitoring Partnership is another ORD project that focuses on water contaminants. This monitoring and outreach project addresses the health risks associated with exposure to nutrients, metals and organic contaminants in food and **drinking water**. The project began in FY00 and will be completed by the end of FY02.
- The Potential Risk Indexing System (P-RISK) ranks areas of concern according to multi-media chemical releases, **chemical toxicities** and selected demographics of surrounding populations using screening methodology and computer-based programs. It identifies potential hazards to vulnerable populations including Toxic Release Inventory (TRI) Releases and Permit Compliance System (PCS) releases in air, water, and land.
- One proposed research project will evaluate age-related changes in gene expression which may influence susceptibility to carcinogenic effects from environmental **chemical exposures**.
- A research project that is concerned with **cancer** is a study of the relationship between age-related hormone changes and reduced tumor suppression activity. It will extend results to animal models of reduced plasticity to explore age responses that can lead to cancer.



- A Research Triangle Park project that is proposed for upcoming fiscal years will explore age-related changes in gene expression. The genetic response following an environmental insult will be addressed in order to determine if this could contribute to **susceptibility** in the brains of the aged.
- Fetal Origins of Disease in Later Life is a national research planning meeting to investigate fetal origins of disease in the elderly and to explore the contribution of early environmental exposure and gene-environment exposures in the later expression of disease in the geriatric population, particularly **Alzheimer's Disease and Parkinson's Disease**.
- A research-outreach project in Colorado provided risk communication to grocery customers regarding dietary exposure to chemical **pesticide** residues. Communication of risks and strategies to maintain a healthy diet was the focus. Older customers were a portion of the audience to whom the outreach message was delivered. The project ran from FY98 to FY00.
- Another study focused on the health risks of exposure to disinfectant by-products in the very young and the elderly in FY01 and FY02. In FY03, the focus will also include the effects of **pesticide** exposure. The effects of early pesticide exposure on ocular dysfunction in the elderly will be explored. This research examines the age-dependent metabolic responses to disinfectant by-products and pesticides. The study is being conducted in Research Triangle Park, NC.
- An assessment of the human health effects of PCBs and derivation of an RfD is being performed between FY01 and FY03. This assessment will focus on the human health effects of environmental **PCB** exposure from food and contaminated sites. The assessment will address adverse health outcomes on susceptible populations.
- "Exploration of Aging and Toxic Response Issues" is a report that provides an overview of age-related health concerns and encompasses a wide range of related topics.
- Developed between FY99 and FY02, the National Exposure Research Laboratory's Consolidated Human Activity Database is a compilation of human activity data available to modelers. It can be used for exposure and intake dose modeling or statistical analysis. Data relating to the elderly is available in the database.
- The Region 5 Science Strategy was developed to include a focus on **susceptible subpopulations** such as the elderly.

**OSWER** - Office of Solid Waste and Emergency Response

OSWER is involved in a cooperative agreement with Environmental Alliance for Senior Involvement (EASI) for the social science study of various models of community-based volunteer projects in **Brownfields** areas. It is a nationwide research effort examining human health concerns associated with Brownfields through the involvement of senior volunteers.

**OW** – Office of Water

OW submitted an extramural activity for the inventory. The project focuses on **drinking water contaminants** which can cause gastroenteritis and waterborne disease. In FY02, a video will be developed for health professionals and will address prevention of waterborne illnesses.

**Regions**

**Region 5**

Region 5 participated in an extramural activity that piloted the use of retired senior volunteers in promoting local **drinking water** protection programs. EPA funded Environmental Alliance for Senior Involvement who passed on funding to local Retired and Senior Volunteer Program (RSVP) offices. The project identified potential sources of contamination to drinking water supplies and educated local officials on how to trigger local action. The project was mainly based in Illinois.

**Region 6**

Region 6 submitted a description of the Calcasieu Dioxin Investigation project. This extramural activity investigated the cause of elevated blood **dioxin** concentrations in elderly residents. The health concerns were related to dioxin exposure and cancers caused by combustion by-products and various industrial sources. The exposure route is atmospheric deposition and food consumption. This research initiative was located in southern Louisiana in the Calcasieu Parish.

**Region 7**

Region 7 has a cooperative agreement with Kansas City, Kansas Community College for outreach and educational activities. This project includes fact sheets and alternative booklets with starter kits of alternative cleaning supplies with pre- and post-training surveys. The pollutants addressed are **pesticides and household hazardous products** to which an individual can be exposed in homes, yards, senior housing, community buildings, schools, and at work. The health concerns focus on acute affects including asthma attacks, skin burns and poisoning, as well as chronic effects such as cancer and birth defects. The project is being carried out in Kansas City, MO, Kansas City, KS, and Omaha, NE

during FY02.

## **Region 8**

Region 8 has extramural activities, the majority of which address indoor air pollution.

- In 1999, Region 8 undertook an intervention activity in Libby, MT. 20% of the Libby population was identified with lung abnormalities as a result of **asbestos exposure** from a vermiculite mine. Due to the long latency period, many individuals identified in screening are over 55 years and it is estimated that more will suffer as they age. The project is expected to reduce or eliminate ongoing exposure in residential areas of city.
- From FY98 to FY01, Region 8 has been involved in outreach activities in Albany and Carbon Counties, Wyoming. The health concerns are cancer and cardiovascular illnesses resulting from exposure to radon and household hazardous waste. The project addresses environmental exposure to poor indoor air quality and potentially hazardous waste in low income households, particularly those including children or elderly.
- Region 8 is supporting data collection activities by the Retired Senior Volunteer Program (RSVP). This activity will help to maintain the information repository in Toole and Salt Lake City, Utah.

## **Region 9**

Region 9 is participating in a range of activities with a diversity of topics including asthma and consumption of contaminated fish. Three of the four projects are extramural activities.

- A monitoring project in Green Valley, Arizona is assessing real time access to air quality monitoring in a retirement community south of Tucson. The project focuses on asthma and **respiratory illnesses** that are affected by sulfur dioxide and volatile organic compounds. These compounds originate from industrial facilities and mobile sources.
- The Hospital Pollution Prevention Project in California is an intervention activity to work with several hospitals to reduce exposure of hospital workers, patients (many of whom are older Americans) and community members by reducing use of chemicals. The central health issues are those associated with exposure to mercury, dioxin and other **toxic chemicals** that are found in hospital settings.

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