

# **OFFICE OF RESEARCH AND DEVELOPMENT FY2004-2005 ENVIRONMENTAL JUSTICE ACTION PLAN**

## **EXECUTIVE SUMMARY**

The mission of the Office of Research and Development (ORD) is to conduct leading-edge research and foster the sound use of science and technology to fulfill EPA's mission. This mission commits ORD to conduct its research in a way that will have a direct and meaningful impact on EPA's decisions and programs. ORD provides EPA, and all Americans, with scientific and technical information to inform decisions about risks to human health and the environment. ORD provides much of the scientific foundation for EPA's regulatory programs and decisions by assessing the state of the environment, identifying new issues of potential concern, and providing guidance and tools to customers and stakeholders.

ORD recognizes the role of science in supporting the protection of public health to be an extremely important one. Sound science is at the core of understanding and adequately addressing the needs of disproportionately affected communities – helping communities of concern, and all communities, make informed decisions about their health and well-being. ORD brings environmental justice concerns to bear, either directly or indirectly, through its research, expert advice, and leadership in the development of Agency science policies.

ORD has organized its research activities around significant environmental issues that support the Agency's regulatory and policy setting activities. Through coordinated efforts with EPA's Program and Regional offices, ORD links with environmental justice activities across the spectrum of Agency science. ORD is committed to conducting research that, while addressing major Agency issues, supports environmental justice concerns through focusing research activities in support of Agency environmental justice programs and/or conducting field studies in disproportionately affected communities. Attachment A presents examples of ORD's research and supported centers/grants related to environmental justice, such as "Environmental Risk and Impact in Communities of Color and Economically Disadvantaged Communities"; "Distribution of Residential Organochlorine Pesticide Residuals along the Arizona/Mexico Border"; and "Center for Hazardous Substances in Urban Environments". In addition, ORD supports environmental justice in its role as the Agency's principal advisor, interpreter and communicator of scientific information about human health and ecological risks.

The purpose of this plan is to describe ORD's approach to environmental justice and current and planned activities (see Attachment B) to support the Agency's environmental justice goals and objectives. This plan is a living document that will adapt and change as necessary to achieve the most effective results.

## **MANAGEMENT ACCOUNTABILITY**

### **Organizational Infrastructure and Management Support**

1. *What is your Regional/Headquarters office's environmental justice policy?*
2. *How will your organizational structure promote the integration of environmental justice within all program areas?*
3. *How will your Regional/Headquarters office management communicate expectations about the Environmental Justice Program, review tangible/intangible outcomes, and evaluate performance?*

ORD's policy is to integrate environmental justice concerns into its research programs where appropriate. ORD staff are expected to have a basic understanding of what environmental justice is and how ORD's work contributes to the efforts of Program and Regional offices in meeting their environmental justice goals and objectives.

ORD plans its research in various levels of detail and time scales. ORD's research strategies and multi-year research plans describe our research direction to address Program and Regional office needs, long-term research goals, and the major products of the research. Research is further defined and implemented by ORD's research laboratories and centers, as well as through individual grant and research center awards.

We communicate the need to integrate environmental justice activities/concerns into ORD's specific research activities through the ORD management chain and our planning process, and we will further expand this communication through the new ORD environmental justice network. In addition, ORD's Science Council serves as a focal point for identifying and promoting opportunities for interactions that bridge across organizational boundaries, scientific disciplines, and human health and ecology - including environmental justice. These mechanisms may also be used to review environmental justice outcomes and evaluate performance.

ORD also provides Designated Federal Officials (DFO) to subcommittees and workgroups of the National Environmental Justice Advisory Council (NEJAC). These subcommittees and workgroups provide advice and recommendations to ORD and the Agency to improve our research focus and understanding of environmental justice needs directly from stakeholders.

### **Operational Resources/Program Support**

1. *Identify the aggregate full-time equivalents (FTE) in your Regional/Headquarters office that will specifically focus on environmental justice issues. If responsibilities and duties are parceled out as collateral duties to one or more employees, please compute what the FTE equivalent would be.*
2. *What are the functions and day-to-day responsibilities of your environmental justice coordinator(s) and/or team?*

3. *Will your Regional/Headquarters office have any ongoing mechanisms for focusing on environmental justice issues, such as teams and workgroups? If yes, please list and describe. Also, state how these mechanisms will be tied to other programs and activities in your Regional/Headquarters office.*
4. *Are there any specific programs/initiatives for which environmental justice will be listed as a funding priority? If yes, please list or attach.*

Currently, ORD has one full time equivalent (FTE) focused on our core environmental justice coordination effort. This FTE is shared among a few staff members on a part time basis. Their primary duties are to serve as the ORD Environmental Justice Coordinator and the Co-Designated Federal Official to the NEJAC Health and Research Subcommittee (HRS) and Cumulative Risks/Impacts Workgroup. The DFO duties are shared with other EPA offices. In addition, ORD participates on the NEJAC Advisory Council.

Since ORD science and research are intended to support Agency regulatory, policy, and implementation programs, the day-to-day activities of ORD's environmental justice coordinator may differ from those of other EPA Program and Regional offices. ORD's environmental justice coordinator provides input to various environmental justice reports, communicates environmental justice activities and needs across EPA, raises the environmental justice awareness of ORD staff, and serves as ORD's primary contact for all environmental justice requests.

Although ORD has numerous environmental justice related research projects integrated across the breadth of our program (see Attachment A), there are few formal mechanisms for focusing exclusively on environmental justice issues; and direct support is primarily through research grants and centers associated with our Science to Achieve Results (STAR) grants program. ORD is in the process of identifying an environmental justice contact in each of its laboratories, research centers, and offices (see Attachment B) to improve input to and coordination of ORD's environmental justice efforts, as well as document and communicate examples of ORD's environmental justice related activities.

#### **GPRA Alignment (Link to Mission and Priorities)**

1. *How will your Regional/Headquarters office's environmental justice program be linked to your Regional/Headquarters office's main GPRA priorities?*
2. *How will your Regional/Headquarters office's environmental justice strategies and activities be integrated into specific programmatic areas/functions? (e.g., permitting, community outreach, etc.)*
3. *Will your Regional/Headquarters office utilize Performance Partnership Agreements (PPAs) and Performance Partnership Grants (PPGs) to specifically address environmental justice issues? If yes, please list and describe.*

EPA's Strategic Plan distributes ORD's research program across all of the Strategic Goals and the cross-Goal Science Plan. This structure underlies ORD's approach to supporting science and

research priorities across the Agency. Through this structure, ORD's research program supports the scientific basis for Program and Regional GPRA priorities in broad research areas relevant to environmental justice, such as susceptible sub-populations and cumulative risk assessment. This structure does not, however, lend itself to identification of specific environmental justice Objectives or Sub-objectives within the Agency's GPRA structure. ORD's environmental justice efforts are described at a lower hierarchical level within the GPRA architecture.

ORD does not utilize Performance Partnership Agreements (PPAs) and Performance Partnership Grants (PPGs) to specifically address environmental justice issues, although we may work with Regional offices and states in the conduct of their agreements.

### **INTERNAL ORGANIZATIONAL ENGAGEMENT**

- 1. Will your Regional/Headquarters office's environmental justice program have any ongoing mechanisms to communicate with, receive input from, and otherwise consistently engage with other programs in your Regional/Headquarters office? If yes, please list and describe.*
- 2. Will your Regional/Headquarters office develop any related guidance to the staff regarding the integration of environmental justice in areas such as authorization/delegation, environmental education, grants and contracts, inspection, enforcement and compliance assistance, permitting, performance partnership, public participation, waste site cleanup/brownfields, etc.? If yes, please list and describe.*

ORD's environmental justice program is led by the Office of Science Policy (OSP). OSP is also ORD's lead for coordinating research planning activities, including the development of multi-year plans and cross-Agency research coordination teams. OSP's Regional Science Program includes a network of Regional Science Liaisons and Hazardous Substances Technical Liaisons located in each Regional office; and our Tribal Program includes hosting the Tribal Science Council. This organizational structure supports cross-Agency communication of science priorities, and is accessed by ORD's environmental justice coordinator. Through these established networks, ORD communicates, receives input, and otherwise engages its laboratories, research centers and offices in research efforts, including related environmental justice issues and activities. ORD also engages its Science Council, led by ORD's Deputy Assistant Administrator for Science and including Science Associate Directors from ORD's laboratories, centers and offices, to serve as a focal point for identifying and promoting opportunities for interactions that cross organizational boundaries, scientific disciplines, and human health and ecology. As part of this responsibility, members of the Science Council may address integration of environmental justice research where appropriate..

To improve ORD's organizational engagement in environmental justice activities, ORD is establishing a network of environmental justice contacts across its laboratories, research centers and offices (see Attachment B). It is expected that this network will provide additional guidance to the staff on integrating environmental justice into ORD's research programs. The goal of integrating environmental justice activities/concerns into ORD's research programs will be

communicated to those conducting the more-detailed science planning and research, both through the environmental justice network and through the management chain. The network will also document and communicate examples of ORD's environmental justice activities.

## **EXTERNAL STAKEHOLDER ENGAGEMENT**

- 1. Will your Regional/Headquarters office have any processes in place to receive input on environmental justice issues from external stakeholders, such as workgroups, advisory bodies, or listening sessions? If yes, please describe the process and explain how the input gathered may be (or has been) used by your Regional/Headquarters office.*
- 2. Will your Regional/Headquarters office have any ongoing mechanisms to share information to external groups regarding environmental justice such as websites, faxback system, printed outreach materials, etc.? If yes, please list and describe. Also please mention the specific stakeholder group(s) which benefit from these outreach mechanisms.*
- 3. How will your Regional/Headquarters office identify stakeholders who could benefit from increased awareness about environmental justice and become more engaged in the collaborative problem-solving process?*
- 4. How will your Regional/Headquarters office promote collaborative problem-solving among stakeholders?*
- 5. Will your Regional/Headquarters office have any special initiatives or provisions to address issues for persons with limited English proficiency? If yes, please describe or attach.*
- 6. In the course of your environmental justice outreach, will your Regional/Headquarters office utilize any informational materials translated in languages other than English? If yes, please list and describe.*
- 7. Are there any specific grant programs for which environmental justice will be listed as a funding priority? Please list and describe.*

ORD receives advice from NEJAC's Health and Research Subcommittee. In addition, EPA's Program and Regional offices identify environmental justice issues or specific situations needing additional study and raise those issues to ORD for consideration as it develops its research program. For example, ORD recently co-sponsored a "Science of Environmental Justice" working conference with EPA New England and Boston University School of Public Health, with the goal of providing an interactive, learning forum joining together scientists, technical experts, community leaders, nonprofit groups, academia, and government representatives to discuss current, national community-based participatory research efforts helping to assess, address and resolve environmental and public health risks in potential environmental justice areas of concern. ORD also relies on Program and Regional offices to identify stakeholders who could benefit from increased awareness about environmental justice.

Information on science activities related to environmental justice can be found in the EPA's web based Science Inventory. Originally designed to help EPA scientists and managers coordinate the planning and development of science activities, the Science Inventory now provides the public with a window into EPA's quality science program. The searchable database is available

on the internet at: <http://www.epa.gov/si> .

ORD is committed to coordinating its research activities with other Federal agencies' environmental justice research programs. ORD is presently engaged with EPA's Office of Environmental Justice and the U.S. Department of Health and Human Services Office of Minority Health to promote interagency efforts that link work on environmental justice with work to eliminate health disparities, including examining the scientific foundations of the linkage between environmental risks, cumulative effects, vulnerable populations, and health disparities, especially as they pertain to children.

### **DATA COLLECTION, MANAGEMENT, AND EVALUATION**

1. *List your Regional/Headquarters office's main data sets - the ways in which you collect environmental justice information. Also, describe how this information will be utilized by your Regional/Headquarters office (e.g., environmental justice assessment, program tracking/evaluation, etc.).*
2. *Will your Regional/Headquarters office have a method of identifying and highlighting best practices and lessons learned? If yes, please describe.*

ORD does not maintain systems dedicated to the collection of environmental justice information. Any environmental justice information collected by ORD is part of a specific research study. If this information is integral to a research activity, it would be included, as appropriate, in any scientific paper or report resulting from the research. As stated previously, EPA's Science Inventory can be accessed via the internet, and can be searched for environmental justice related science activities across ORD and the Agency.

As previously mentioned, we will use the ORD environmental justice network to identify and highlight examples of ORD's environmental justice activities to staff and stakeholders.

### **PROFESSIONAL AND ORGANIZATIONAL DEVELOPMENT**

1. *Will your Regional/Headquarters office plan to provide training on environmental justice? If yes, please list and describe.*
2. *What methods will you utilize to promote shared learning, such as best practices and lessons learned among staff? If yes, please list and describe.*

ORD plans to conduct environmental justice training to raise awareness and increase consideration of environmental justice issues when planning and implementing its research programs (see Attachment B). The proposed environmental justice network will be used to determine what topics to include in the new environmental justice training materials, as well as methods (videos, web-based, etc.) to be employed in order to train its geographically dispersed staff. It is anticipated that existing environmental justice training modules may be modified/expanded to include ORD's science related activities.

## **ENVIRONMENTAL JUSTICE ASSESSMENT**

- 1. Will your Regional/Headquarters office have a process by which an environmental justice assessment will be conducted? If yes, please describe.*
- 2. Will your Regional/Headquarters office rely on any information resources with which to conduct an environmental justice assessment, such as the Environmental Justice Mapper, Environmental Justice Toolkit, etc.? If yes, please list and describe.*

ORD does not take a lead role in the conduct of environmental justice assessments of affected communities, since such assessments more properly fall under the purview of EPA's Program and Regional offices. While the Program and Regional offices may be the ultimate users of such assessments, ORD does consult on such assessments by offering sound technical advice and counsel. ORD scientists also have been involved with the development of tools for conducting assessments, such as the "Framework for Cumulative Risk Assessment".

## **PROGRAM EVALUATION**

- 1. Will your Regional/Headquarters office have any performance measures specifically related to environmental justice? If yes, please describe.*
- 2. Will your Regional/Headquarters office conduct any needs assessments, reports or other documents (produced internally or through a contract) to identify, quantify, and evaluate methods to strengthen and/or improve your environmental justice program? If yes, please list and describe.*
- 3. How will your Regional/Headquarters office highlight the accomplishments and results from your Environmental Justice Action Plan?*

ORD has organized its research activities, and performance measures, around significant environmental issues that support the Agency's regulatory and policy setting activities. Environmental justice activities are an integral part of these programs and are not separately identified as GPRA performance measures. Any efforts to identify, quantify, and evaluate methods to strengthen and/or improve environmental justice efforts will be done in the course of implementing specific research activities. For example, we mentioned previously the "Science of Environmental Justice" working conference that was recently completed this year (May 2004). A report will be generated addressing community-based participatory research and cumulative risk analysis as tools to advance environmental justice in urban, suburban and rural communities. The report will be reviewed for ways to strengthen and improve our environmental justice efforts. Also, the accomplishments and results from this Environmental Justice Action Plan will be reported in the annual progress reports compiled by EPA's Office of Environmental Justice.

### Attachments

- A. ORD Environmental Justice Research - Examples
- B. Environmental Justice Action Plan Matrix

## ORD ENVIRONMENTAL JUSTICE RESEARCH - EXAMPLES

### Distribution of Residential Organochlorine Pesticide Residuals along the Arizona/Mexico Border

The use of DDT has been banned for many years in the United States. Mexico began a 10-year phase out of DDT in 1997. DDT was banned in the U.S. primarily because of its environmental persistence. Thus, DDT is still found in the outdoor and indoor environment. We report the results from samples collected in 83 homes in Arizona along the Arizona/Mexico border. The media sampled included indoor air, floor dust, dermal wipes, and blood serum. 4,4'-DDT was detected in 62% of the floor dust samples, 19% of the indoor air samples, and 31% of the dermal wipes. This may be from spray residuals in older housing stock, recent use of chemicals obtained in Mexico, track-in from outdoor usage, or other sources.

The primary objective of the Arizona Border study was to determine if the population of the U.S./Mexico Border area of Arizona is more highly exposed to environmental contaminants than the residents of the state of Arizona as a whole. The Arizona Border Study will also demonstrate the feasibility of using these measurement processes in future multimedia-multipathway studies along the U.S./Mexico Border.

### An Extract of *Stachybotrys chartarum* Causes Allergic Responses in a Balb/c Mouse Model-- Biochemical and Pathological Responses

Environmental exposure to *Stachybotrys chartarum* has been associated with adverse health effects in humans. The objective of this study was to assess soluble components of this fungus for allergenic potential. The goal of this study was to understand children's risks from exposure to molds in their environment and to explore risk management options for mitigating those risks. This study is important to environmental justice communities because many of these communities contain sub-standard housing where mold is a problem.

### Environmental Risk and Impact in Communities of Color and Economically Disadvantaged Communities

Research has shown that communities of color and economically and/or educationally disadvantaged communities are at a greater risk of impact from environmental hazards. Studies conducted to date have used surrogate measures of exposure because of the lack of data on actual exposures in these communities. Community-specific data are needed to address any linkages between environmental exposures and health outcomes. A long range goal of this project is to develop and validate community-level exposure scenarios that can be adapted to other similar communities.



In FY01, North Carolina Central University (NCCU) received Congressional funds to assess environmental exposures in a community impacted by environmental hazards and to develop the research infrastructure of the NCCU Environmental Science Program. EPA's National Exposure Research Laboratory (NERL), through collaboration with NCCU, will gain expertise in cumulative exposure, local community exposure concerns, exposure scenarios, subpopulation activities, and environmental characteristics. Project objectives are to: 1) assess environmental exposures in communities of color and/or economically/educationally disadvantaged communities, and 2) develop the research infrastructure of the NCCU Environmental Science Program. The project will begin with a pilot study to assess exposures in a local environmental justice community. The pilot will be followed by a larger study applying the lessons learned from the pilot.

#### Arsenic Treatment Demonstration Project

With the final standard for arsenic in drinking water announced in October 2001, drinking water systems across the nation are gearing-up to be in compliance with the regulation by January 23, 2006. For small systems, this can be an overwhelming and costly task. EPA's Treatment Technology Demonstration Project provides for the R&D of more cost-effective technologies in addition to technical assistance and training for operators of small systems in an effort to reduce their compliance costs. The purpose of the effort is to provide information to fill-in research gaps that exist for a number of technologies or compliance approaches, and provide this information to utilities, engineering firms, regulatory officials and others.

A Cooperative Research and Development Agreement (CRADA) was recently signed with the Village of Nambe Pueblo, New Mexico. The Village of Nambe Pueblo is one of 12 localities receiving support from EPA for addressing arsenic levels in drinking water in Round 1 of the Technology Treatment Research Demonstration.

#### Fish Consumption for Subsistence Fishermen

Contaminated fin fish and shellfish are potential sources of human exposure to toxic chemicals. Communities who engage in subsistence fishing may be more exposed to contaminants in fish because of their higher consumption rate and because they may tend to obtain their fish from one source. Accurately estimating exposure to contaminants in fish requires a reliable estimation of intake rates of the caught fish by both fishermen and their families. Data on fish consumption rates for subsistence communities are limited. In addition, previous research has shown that many fishermen may not pay attention to fish advisories or may not be aware of their existence. A few studies have been conducted to assess fish consumption among populations of Native Americans (CRITIF 1994, Toy et al. 1996, Duncan 2000). One study in the literature focused on a population of Asian & Pacific Islanders (Sechena et al. 1999). Data on the children of these subsistence fishermen is even more limited. The purpose of this project is to identify a community where subsistence fishing is prevalent and conduct a fish consumption survey to assess their intake of home-caught fish and shellfish.

## Children's Total Exposure to Persistent Pesticides and Other Persistent Organic Pollutants

Young children, especially those of the preschool ages 1-5, are hypothesized to have greater exposures to pesticides and other persistent organic pollutants than do older children or adults. These greater exposures may result from what children eat and drink, where they spend their time, and what they do there. The impact of the exposures may be greater on young children because of their smaller body masses, immature body systems, and rapid physical development. Very young children learn about their environment by exploring not only the appearance and texture of objects, but also their taste and smell. Thus non-dietary ingestion can play an important role in their exposures. Children's Total Exposure to Persistent Pesticides and Other Persistent Organic Pollutants, (CTEPP) is a pilot-scale research study involving about 260 preschool children in North Carolina and Ohio. It is the first large aggregate exposure study of young children. CTEPP is designed to investigate the possible exposures that young children may have to common contaminants in their everyday surroundings, to gain information on the various activities, environmental media, and pollutant characteristics that may influence children's exposures, and to generate further questions and hypotheses for future research. Children who stay at home with an adult caregiver and children who attend preschool or day care are included in the study. Emphasis is on the younger children aged 18 months to 4 years. Exposures of the children and their primary adult caregivers living in the same household are estimated through the collection and analysis of samples of food, beverages, and drinking water; indoor and outdoor air; hand wipes; house dust, classroom dust, and play area soil; and smooth floor and food preparation surface wipes. Urine samples are also collected for analysis for biomarkers of exposure. Information about the children's activities during the sampling period is collected via activity diaries and food diaries. Approximately 10% of the children are videotaped at residences in Ohio for two hour periods during the sampling to supplement the activity diaries and observations. Targeted organic chemical pollutants include polycyclic aromatic hydrocarbons; chlorinated, carbamate, triazine, pyrethroid, and organophosphate pesticides; phthalate esters; phenols; and polychlorinated biphenyls. These compounds are persistent in the indoor and sometimes the outdoor environments, so that very low levels may exist in the children's surrounding microenvironments and provide a source of chronic, non-acute exposure. Specific compounds were selected because they may be carcinogenic, mutagenic, acutely or chronically toxic, or possibly disruptive to the human endocrine system; and because they are widespread and often persistent in the indoor or outdoor environment.

## Exposure to Toxic Components Associated with PM (Causal Agents)

Research is currently being conducted by EPA and others to identify the biological mechanisms causing toxic responses to particulate matter (PM), the components of PM that are responsible for the toxic response, and the actual exposures of the most susceptible individuals. Key uncertainties include understanding the exposure distributions for PM and constituents and whether susceptible populations are more highly exposed than the general population. This project will specifically address the question, "what are the exposures to biologically important constituents and specific characteristics of PM that cause response to potentially susceptible subpopulations and the general population?" A field study will be conducted to collect data that

will address these uncertainties and to provide information on the distribution, variability, and intensity of exposure to PM and air toxics. The data generated will be used to understand and quantify factors that impact personal exposure to these air pollutants. Spatial monitoring of PM across residential areas in a city will be modeled for PM and air toxics exposures. Source contributions at the personal and residential level will also be determined.

The main objective of this research is to estimate exposure distributions of PM constituents, PM characteristics, and PM from specific sources. In addition, this study will determine if ambient measures of PM constituents, PM characteristics and PM from specific sources can be used as appropriate surrogates of exposure to estimate health impact in epidemiological studies. These data will also be used to develop databases and models that will characterize and predict human exposure to PM constituents and PM from different sources relative to that measured at ambient sites.

#### Field Studies to Identify and Quantify Factors That Affect Microenvironmental Concentrations and Exposures

This project will build the research base for including asthma as a health outcome in the National Children's Study (NCS). This is one of a series of pilot studies focused on (a) simple, cost effective methods for assessing environmental exposures relevant to asthma, and (b) techniques for the early assessment of asthma-related health outcomes. This research project is focused on the development of methods for understanding the factors that contribute to indoor concentrations and exposures to Combustion Related Products (CRPs), Particulate Matter (PM) and air toxics. The research will develop and assess simple questionnaires and measurements for classifying children's exposures. The questionnaires and methods will be evaluated in a field monitoring study in Tampa, Florida. These research tools will be used to identify and quantify the microenvironmental factors (including penetration and deposition rates) associated with children's exposures in a real-world environment. The study data will be used to develop simple models for estimating children's exposure in large epidemiological studies, such as the NCS.

#### Human Exposure Measurements - Children's Focus in Support of FQPA - Field Verification Studies

In 1998, a 10X Exposure Working Group was formed to evaluate approaches and data needs for implementing the Food Quality Protection Act (FQPA) with respect to exposure. In 1999, this workgroup produced the report "Exposure Data Requirements for Assessing Risks from Pesticide Exposure of Children". The report defined the components of a complete and reliable data set. The document also described why the components of a complete, reliable data set are currently not available. Critical elements that are missing include an understanding of the most important pathways of exposure for young children, approaches for evaluating exposure for critical pathways such as dermal and non-dietary exposure, protocols for generating the exposure data, and exposure factor data. A report "Draft Protocol for Measuring Children's Non-Occupational Exposure to Pesticides by all Relevant Pathways" was prepared in FY '01 that identified the approaches, data requirements, and methods for conducting exposure assessments

for young children. The goal of this study is to conduct field studies to verify the draft protocol, refine the protocol as necessary, and develop a core set of exposure concentration and exposure factor data to be applied in the assessment procedures. This task is targeted toward high-level, short-term exposures that could result from recent pesticide applications.

#### Outdoor vs. Human Exposure: PM Exposure Panel Studies

An association has been demonstrated between ambient particulate matter (PM 2.5 and PM 10) concentrations and human morbidity/mortality. However, little is known regarding the most important sources of PM exposure, interpersonal and intrapersonal variability in exposure, and the relationship between personal exposure and ambient exposure estimates based on fixed site monitoring. Currently data from several recent longitudinal (10-28 day) panel studies are being analyzed to address these uncertainties and to evaluate the important determinants of PM exposure for different subpopulations, area of the country, air sheds, housing structures, and life styles. Exposure assessments are being performed on panel data involving the elderly, individuals with cardiovascular disease, and African-Americans living in an environmental justice neighborhood. Select populations living in Baltimore, MD; Fresno, CA; and Research Triangle Park, NC are involved. Data from personal exposures, ambient, outdoor residential, and indoor residential locations for measurements of PM will be analyzed. Co-pollutants such as CO, ozone, NO<sub>2</sub>, metals, and elemental-organic carbon will also be incorporated into the analysis. Information on time/activity patterns and potential sources of PM exposure from all participating subjects, in conjunction with real-time PM monitoring, is being used to establish the influence of various sources (ambient, indoor, personal) on total personal PM exposures. Results to date indicate that personal PM mass concentration exposures for individual panelists can be highly dependent upon the contribution of non-ambient sources (such as the presence of cooking aerosols within a home). The contribution of PM of ambient origin to personal exposures in many of the studies does not appear to be dependent upon susceptibility (health status), season, or other factors such as socio-economic status classification. Data from one study, performed over the course of one year and involving over 30 participants, estimated that approximately 46% of one's personal PM mass concentration exposure is of ambient origin.

#### Research Apprenticeship Program for High School Students

The Research Apprenticeship Program began in 1990 as a collaborative effort between EPA's Office of Research and Development in Research Triangle Park, NC and Shaw University in Raleigh, NC to address the under representation of minorities in the fields of science and engineering. Educational researchers have determined that the problem with the under representation of minorities in science and engineering can begin as early as elementary school. Factors that improve minority performance in science and math include parental involvement; development of positive attitudes toward science and math through parents, teachers, advisors, and peers; and classroom influences such as manipulative and participatory activities. Students participating in the Research Apprenticeship Program must live in Wake County, NC and be in grades 9 through 12. Students apply to the program in the spring semester of 8th grade and continue in the year-round program until they graduate from high school. Students accepted into

the program must demonstrate superior ability in science and math. Applications are evaluated based on grades, teacher evaluations, and an essay written by the student. Eight rising 9th graders are accepted into the program annually. Students must maintain high academic performance in high school in order to remain in the program.

The objective of the EPA/Shaw University Research Apprenticeship Program for High School Students is to encourage students to pursue advanced degrees in math, science, and engineering. This is accomplished by enriching the scientific and mathematic concepts that students study in the classroom; providing students the opportunity to interact with scientists and engineers; developing effective scientific research and technical skills; and enhancing students' motivation, self-confidence, and desire to achieve in the fields of math, science, and engineering.

The Research Apprenticeship Program has two components: 1) the academic year program, and 2) the summer program. The academic year program takes place at Shaw University the first three Saturdays during September through May. It consists of classes, workshops, and monthly "hands-on" presentations by EPA scientists. The 6-week summer program takes place Monday through Friday. In the summer program, students in grades 9 through 11 attend classes and workshops at Shaw University and go on field trips in the Research Triangle area. The rising 12th graders serve as apprentices with mentors at EPA during the 6-week summer program. The mentorship component gives the students an opportunity to work in a research setting with an EPA scientist. At the end of the mentorship program, each student is required to give a presentation on their project to an audience which includes the mentors, other students in the program, their parents, and EPA scientists.

#### Minority Institution-Based Centers

Two centers, originally established as targeted programs, are now being supported through EPA's annual budget primarily to serve the particular research needs of minority and disadvantaged communities. These centers address issues such as environmental justice, risk communication and perception of risk, correlations between socio-economic status and exposure to environmental contaminants, and other topics.

*Center for Environmental Resource Management, University of Texas at El Paso (UTEP).* The Center for Environmental Resource Management's mission is to establish and maintain a program of education, outreach, and research to support analyses and remediation of critical Superfund-related environmental issues. The principal research emphasis has been on the detection, assessment, and evaluation of the risks to human health of hazardous substances and the detection and remediation of hazardous substances in the environment. The Center also has a role in expanding the infrastructure of the university to enable it to better address problems of the region and provide opportunities for their culturally diverse population to train as environmental scientists and engineers. The Center is part of UTEP's existing Center for Environmental Resource Management (CERM). CERM's goal is to address the mounting environmental problems that threaten health, safety, well being, and economic development of the southwest border region of the United States and northern Mexico. CERM provides university-wide

coordination of outreach, service, education, policy, research, development, and technology transfer activities that focus on environmental issues.

*Institute for Environmental Issues and Policy Assessment (IEIPA), Center for Energy and Environmental Studies (CEES).* The Center supports research on environmental issues and policy assessments, including environmental equity. The socioeconomic research supports technology development conducted within the Center for Energy and Environmental Studies, to ensure that the technologies can be used. The Center reaches out into the community to address environmental problems that impact the quality of life in Louisiana. Pollution prevention, environmental equity, Mississippi River environmental strategies, geographical information systems, and environmental risk management are the main issues addressed by the center.

Center for Hazardous Substances in Urban Environments—led by Johns Hopkins University with the University of Maryland, Morgan State University, University of Connecticut, and New Jersey Institute of Technology. The Hazardous Substance Research Centers program (HSRC) was established by EPA to assist in the implementation of the federal Superfund statute. In the Northeast, the population is heavily concentrated in urban areas with a rich tradition of manufacturing and handling hazardous substances. Urban residents face potential risks caused by exposure to a number of environmental stressors including toxic chemicals from Superfund sites, landfills, incinerators, and brownfields. In this context, the HSRC headquartered at Johns Hopkins University has identified “Urban Livability” as a strategic research priority for EPA Regions 1, 2, and 3; and has developed a research program composed of seven projects to promote a better understanding of physical, chemical, and biological processes for detecting, assessing, and managing risks posed by contaminated soil, water, sediments, and airborne particles. The HSRC program is managed by ORD through the Science To Achieve Results (STAR) grants program and is jointly funded by ORD and EPA’s Office of Solid Waste and Emergency Response. The HSRC program requires that 30 percent of its funds be used for public outreach and technology transfer, highlighting EPA’s growing awareness of the need and resolve to provide technical assistance to environmentally troubled communities and help them become more actively involved in site-cleanup decision making.

**FY04-05 ENVIRONMENTAL JUSTICE ACTION PLAN  
MATRIX FOR THE OFFICE OF RESEARCH AND DEVELOPMENT**

**Objective 1. Risk Reduction / Protect Environmental and Public Health** - To ensure equal implementation of environmental laws to achieve significant risk reduction which will improve the environment and/or public health of affected communities.

ORD does not implement environmental laws. Therefore Objective 1 is not applicable to ORD.

**Objective 2. Outreach and Communication** - To provide opportunities for meaningful involvement and ensure effective communication between the Agency decision makers and stakeholders, including all affected communities.

<b>Activity</b>	<b>Output</b>	<b>Outcome</b>	<b>Resources (FTE/\$)</b>	<b>Lead Contact</b>
1. Designate an EJ contact for each ORD Laboratory, Center and Office	List of ORD EJ contacts	Better coordination and communication of EJ activities across ORD	0.1 FTE	Richard Garnas 202-564-6785 garnas.richard@epa.gov
2. As appropriate, designate EJ-related Science Inventory projects	EJ-related research projects identified in EPA's Science Inventory	Easier identification and tracking of EJ-related research projects	0.1 FTE	John Miller 202-564-1564 miller.johne@epa.gov

**Objective 3. Training** - To provide training for EPA managers and staff to enable them to incorporate environmental justice considerations into their decision making process.

<b>Activity</b>	<b>Output</b>	<b>Outcome</b>	<b>Resources (FTE/\$)</b>	<b>Lead Contact</b>
1. Revise/develop EJ training materials for ORD	By 2005, ORD focused EJ training materials (video; web-based)	Better understanding of problems faced by EJ affected communities and better integration of EJ into ORD research programs	0.1 FTE	Richard Garnas 202-564-6785 garnas.richard@epa.gov
2. Conduct EJ awareness (consciousness raising) training for ORD employees	All ORD employees will receive EJ awareness training by 2006/2007	Better understanding of problems faced by EJ affected communities and better integration of EJ into ORD research programs	0.1 FTEs	Richard Garnas 202-564-6785 garnas.richard@epa.gov
3. Recognize employees for their contributions to EJ integration	Establish an ORD EJ integration award program	Increased integration of EJ activities in ORD research programs.	0.1 FTE	Richard Garnas 202-564-6785 garnas.richard@epa.gov



**Objective 4. *Federal, State, Tribal and Local Government Coordination*** - To ensure effective coordination across all levels of government to address the environmental and/or public health concerns of affected communities.

While ORD does not directly address the environmental and/or public health concerns of affected communities, we are involved in stakeholder communication activities, like the previously mentioned “Science of Environmental Justice” conference. ORD is presently engaged with EPA’s Office of Environmental Justice and the U.S. Department of Health and Human Services Office of Minority Health to promote interagency efforts that link work on environmental justice with work to eliminate health disparities, including examining the scientific foundations of the linkage between environmental risks, cumulative effects, vulnerable populations, and health disparities, especially as they pertain to children. We also are responsible for coordination of EPA’s Tribal Science Council, and regularly participate in EPA’s Community Involvement Conference to showcase ORD’s environmental/public health developments to the public.

**Objective 5. *Grants and Contracts Administration*** - To promote effective and efficient management of all grants and contracts to ensure that the environmental and public health concerns of affected communities are addressed.

ORD does not issue directed community-based environmental grants and contracts to support environmental justice activities; however our Science To Achieve Results (STAR) grants program supports academic research across the nation, with some efforts related to environmental justice tools development or occurring in environmental justice communities.

**Objective 6. *Environmental Justice Assessment*** - To conduct an assessment of the environmental justice indicators within affected communities as part of the decision making process.

ORD does not make community-based environmental decisions; however we are involved in the development of tools and approaches used in these assessments, such as EPA’s “Framework for Cumulative Risk Assessment”.