

**DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION
National Center for Environmental Health/
Agency for Toxic Substances and Disease Registry**



**Board of Scientific Counselors Meeting
November 3-4, 2011
Atlanta, Georgia**

Record of the Proceedings

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ATTACHMENT 1**List of Participants****BSC Members**

Dr. Timothy Ryan, Chair
 Dr. Tina Bahadori [via conference call]
 Dr. Darryl Barnett
 Dr. Arthur Frank
 Mr. Daniel Kass [via conference call]
 Dr. Michael Kleinman
 Dr. Shannon Marquez
 Dr. Andrea Kidd Taylor
 [via conference call]

BSC Federal Expert Members

Dr. John Decker (National Institute for
 Occupational Safety and Health)
 Dr. Bonnie Richter
 (U.S. Department of Energy)
 Dr. Kristina Thayer (National Toxicology
 Program, National Institute of
 Environmental Health Sciences)
 Dr. Hal Zenick
 (U.S. Environmental Protection Agency)

Designated Federal Official

Dr. Vikas ("Vik") Kapil, Chief Medical
 Officer, Associate Director for Science,
 NCEH/ATSDR

CDC/NCEH/ATSDR Representatives

Dr. Christopher Portier
 (NCEH/ATSDR Director)
 Dr. Thomas Sinks
 (NCEH/ATSDR Deputy Director)
 Henry Abadin
 Michael Allred
 Behrouz Behbud
 Barry Brooks
 Mary Jean Brown
 Sharunda Buchanan
 Brady Castro
 Selene Chou
 William Cibulas
 Gregory Crawford
 Scott Deitchman
 Tim Dignam
 Gerard Dublin

James Durant
 Betsy Dunaway
 Barbara Ellis
 Julie Fishman
 Tina Forrester
 David Fowler
 Laura Frazier
 Jen Gaily
 Paul Garbe
 Kim Gehle
 Benjamin Gerhardstein
 Rick Gillig
 Doug Hanley
 Olivia Harris
 Michael Hatcher
 Danielle Henson
 Lindsey Horton
 Sandra Isaacs
 Peter Kowalski
 Gladys Lewellen
 Shirley Little
 Elise Lockamy
 Sandra Malcom
 Morris Maslia
 Ted Meinhardt
 Sara Merkle
 Susan Metcalf
 Deborah Millette
 Susan Moore
 Amy Mowbray
 Moiz Mumtaz
 Ed Murray
 Whitney Neal
 Gary Noonan
 Radha Pennotti
 James Pirkle
 Judith Qualters
 Faye Ralston
 Rob Robinson
 Helen Rogers
 Lorisa Romanoff
 Perri Ruckart
 Patricia Ruiz
 Michael Sage
 Franco Scinicariello

Karen Scruton
Dolly Sinha
Cassandra Smith
Marissa Scalia Sucusky
Scott Sudweeks
Jana Telfer
Terry Tincher
Carolyn Tylenda
Germaine Vazquez
Anne Venner
Marlena Wald
Patrick Wall
Carol Waller
Clement Welsh
Lynn Wilder
Sharon Williams-Fleetwood

David Williamson
Rachel Worley

Members of the Public

Eric Allen (Kellen Company)
Chris Friedman (Battelle)
Jasmine Grant Gray (Price Waterhouse
Cooper)
Todd Gray (Price Waterhouse Cooper)
Robert Hill, Jr. (Battelle)
Talayah Jackson (Price Waterhouse
Cooper)
Dana Jean-Baptiste (Price Waterhouse
Cooper)
Ashley Kantor (Clayton State University)

ATTACHMENT 2
Glossary of Acronyms

| | |
|---------|--|
| ACCLPP | Advisory Committee on Childhood Lead Poisoning Prevention |
| ALS | Amyotrophic Lateral Sclerosis |
| AOEC | Association of Occupational and Environmental Clinics |
| APHA | American Public Health Association |
| BLLs | Blood Lead Levels |
| BSC | Board of Scientific Counselors |
| CAP | Community Assistance Panel |
| CDC | Centers for Disease Control and Prevention |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act |
| DCHI | Division of Community Health Investigations |
| DLS | Division of Laboratory Sciences |
| DOE | U.S. Department of Energy |
| DTHHS | Division of Toxicology and Human Health Sciences |
| EEHS | Division of Emergency and Environmental Health Services |
| EH | Environmental Health |
| EJ | Environmental Justice |
| EOC | Emergency Operations Center |
| EPA | U.S. Environmental Protection Agency |
| EPH | Environmental Public Health |
| ERCs | Educational Resource Centers |
| FDA | Food and Drug Administration |
| HHLPPB | Healthy Homes/Lead Poisoning Prevention Branch |
| HHS | Department of Health and Human Services |
| HUD | U.S. Department of Housing and Urban Development |
| HUGS | Health Understanding Grants |
| MDR | Multi-Divisional Report |
| MSF | Médecins Sans Frontières (Doctors Without Borders) |
| NAS | National Academy of Sciences |
| NEHPC | National Environmental Health Partnership Council |
| NHANES | National Health and Nutrition Examination Survey |
| NIOSH | National Institute for Occupational Safety and Health |
| NPL | National Priorities List |
| NTP | National Toxicology Program |
| OD | Office of the Director |
| PCB | Polychlorinated Biphenyl |
| PHAs | Public Health Assessments |
| RESPIRE | Randomized Exposure Study of Pollution Indoors and Respiratory Effects |
| RRT | Rapid Response Team |
| TFA | Trans Fatty Acids |
| USMC | U.S. Marine Corps |
| VOCs | Volatile Organic Chemicals |
| VSP | Vessel Sanitation Program |
| WASH | Water and Sanitation Hygiene |
| WHO | World Health Organization |

EXECUTIVE SUMMARY

The Department of Health and Human Services (HHS) and the Centers for Disease Control and Prevention (CDC) National Center for Environmental Health/Agency for Toxic Substances and Disease Registry (NCEH/ATSDR) convened a meeting of the Board of Scientific Counselors (BSC) on November 3-4, 2011 in Atlanta, Georgia.

In accordance with Federal Advisory Committee Act regulations, the Chair confirmed the presence of a quorum on both days of the meeting for the BSC to conduct its business. The voting members were reminded of their responsibility to identify individual conflicts of interest and recuse themselves from participating in discussions or voting on issues. The Chair called for public comment at all times noted on the agenda published for the November 3-4, 2011 BSC meeting.

The NCEH/ATSDR Director presented a comprehensive update that covered the following areas:

- recent activities conducted by NCEH/ATSDR at the level of the Office of the Director (OD);
- highlights of recent activities conducted by NCEH and ATSDR programs;
- reorganization of the NCEH/ATSDR OD structure and the ATSDR functional-based structure;
- the FY2012 President's budget, Senate mark and draft House budget for NCEH and ATSDR; and
- NCEH/ATSDR's impact statements to Congress to retain funding for the Healthy Homes/Lead Poisoning Prevention Program, Tracking Program, and Asthma Program.

The BSC was extremely troubled and disturbed by adverse effects that are likely to occur in current and future generations in the United States, particularly children, as a result of severe budget cuts to NCEH/ATSDR's key environmental health (EH) programs.

A Health Scientist in the NCEH/ATSDR Office of Science presented an update on ATSDR's "Public Health Priority Level Guidance for Site Triage" Table. Examples of ATSDR sites, products, actions and target timelines were described for the 5 types of sites in the table: "Urgent Priority," "Priority 1," "Priority 2," "Priority 3," and "Refer."

The Informatics Team Lead of the NCEH Environmental Health Tracking Branch and the Acting Director of the NCEH Division of Environmental Hazards and Health Effects presented a joint update on the National Environmental Health Tracking Program. The goals and new features of the Generation 2 Tracking Portal were described and a live demonstration was presented. New data that were added to the Tracking Network in 2011 and new activities planned for FY2012 based on the BSC's peer review recommendations were highlighted.

The Director of the NCEH Division of Laboratory Sciences (DLS) presented an update on two major activities: (1) the *Second National Report on Biochemical Indicators of Diet and Nutrition in the U.S. Population* and (2) the first-time measurement of plasma trans fatty acids in the U.S. Population. The BSC congratulated DLS on its exciting new laboratory methods that will have national significance and also will serve as a solid approach to evaluate the impact of public policy.

The BSC Federal Experts provided updates on recently completed or ongoing EH activities of their respective agencies: National Institute for Occupational Safety and Health, National Toxicology Program, U.S. Department of Energy, and U.S. Environmental Protection Agency (EPA).

The Director of the ATSDR Division of Health Studies presented an update on ATSDR's site activities at the U.S. Marine Corps Base at Camp Lejeune, North Carolina. ATSDR's four ongoing studies at Camp Lejeune include the "Adverse Pregnancy Outcomes Study," "Specific Birth Defects and Childhood Cancers Study," "Mortality Study," and "Morbidity Study." ATSDR expects to release final reports of these studies in June-July 2012 and in 2014.

A Public Health Analyst on the NCEH/ATSDR Program Development Team presented an overview of the "Future of Science at ATSDR Symposium" that will be held in March 2012. The objectives of the symposium will be to evaluate ATSDR's scientific approach to assessing health risks at sites and generate action-oriented ideas to improve activities. The symposium will focus on a key recommendation in the National Conversation Action Agenda for ATSDR to review and improve its scientific methods that are used in community settings. The BSC proposed a number of suggestions for ATSDR to consider in the planning process of the symposium.

The Director of the ATSDR Division of Regional Operations presented a public health perspective of ATSDR's hydraulic fracturing and other natural gas activities. ATSDR and EPA attended numerous listening sessions in Colorado, New York, Pennsylvania and Texas in which thousands of community residents complained about risks, health effects, quality of life issues and stressors posed by the natural gas industry. The public health exposure concerns related to hydraulic fracturing that are most important to ATSDR include private and public drinking water contamination and air emissions in terms of local and regional air quality effects.

The BSC made a number of comments and suggestions on potential next steps in ATSDR's public health approach to hydraulic fracturing and other natural gas activities. The Chair polled the BSC and confirmed that all of the members in attendance were in favor of ATSDR prioritizing hydraulic fracturing as a major public health problem.

The BSC emphasized the critical need for ATSDR to extensively engage its federal partners in this effort, but several members noted that ATSDR should take leadership and serve as a champion to address health effects associated with hydraulic fracturing. The BSC also advised ATSDR to characterize the seriousness of hydraulic fracturing as a top priority at the levels of the HHS Secretary and CDC Director.

A panel of NCEH leadership presented overviews on two of CDC's global EH activities. The Chief of the NCEH Healthy Homes/Lead Poisoning Prevention Branch presented an overview of the lead poisoning outbreak in Zamfara State, Nigeria. The outbreak was the largest and most serious incident of lead poisoning in modern times.

CDC and an extensive group of domestic and international partners implemented a holistic and strategic plan that included case management, soil lead testing, village and home cleanup, and lead poisoning public health messaging in Zamfara State. CDC developed a plan with multiple strategies to mitigate the effects of artisanal gold ore processing.

The NCEH/ATSDR Chief Medical Officer and Associate Director for Science presented an overview of global household air pollution and health issues. CDC and an extensive group of domestic and international partners have conducted research to fill important gaps on health effects associated with cooking indoors with open-air fires in Nepal, Ghana, India, Kenya and Guatemala.

Several initiatives by CDC and its partners were highlighted: the mission of the Global Alliance of Cleaner Cook Stoves; a field assessment of a new, promising stove in Guatemala; technical assistance to India to address high rates of childhood pneumonia and mortality associated with household air pollution; efforts to reduce household air pollution in Kenya with cleaner stoves; and new technologies in the global stove industry.

Dr. Andrea Kidd Taylor is an Assistant Professor at Morgan State University. Her term as a BSC member expired in June 2011. The Chair and NCEH/ATSDR Director thanked Dr. Kidd Taylor for her excellent participation and service on the BSC over the past four years.

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**BOARD OF SCIENTIFIC COUNSELORS
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Minutes of the Meeting

The Department of Health and Human Services (HHS) and the Centers for Disease Control and Prevention (CDC) National Center for Environmental Health/Agency for Toxic Substances and Disease Registry (NCEH/ATSDR) convened a meeting of the Board of Scientific Counselors (BSC). The proceedings were held on November 3-4, 2011 in Building 106 of the CDC Chamblee Campus in Atlanta, Georgia.

Opening Session: November 3, 2011

Timothy Ryan, PhD

Associate Professor, School of Public Health Sciences and Professions
Ohio University, College of Health and Human Services
BSC Chair

Dr. Ryan confirmed the presence of a quorum and called the BSC meeting to order at 8:46 a.m. on November 3, 2011. He welcomed the participants to the meeting and opened the floor for introductions. The list of participants is appended to the minutes as Attachment 1.

Dr. Ryan asked the BSC voting members to recuse themselves from participating in discussions or voting on issues scheduled on the November 3-4, 2011 agenda for which they had a real or perceived conflict of interest.

NCEH/ATSDR Director's Report

Christopher Portier, PhD

Director, NCEH/ATSDR
Centers for Disease Control and Prevention

Dr. Portier covered the following areas in his Director's report to the BSC:

Office of the Director (OD) Update. NCEH/ATSDR provided 4 Congressional briefings in June-October 2011 on the Vieques, Puerto Rico site, health registries, and the Camp Lejeune site. NCEH/ATSDR's publications over the past 6 months have covered a broad range of topics. These publications include articles in ~25 journals, 6 chapters in books, and a variety of other reports. NCEH/ATSDR launched its Twitter account in April 2011 and has dramatically increased the number of followers since that time from 582 to 1,663. The public can access the Twitter account at [@CDC_DrCPortier](#) to obtain links to fact sheets and information on other emerging issues (e.g., heat emergencies and hurricanes).

NCEH/ATSDR launched the "Your Health, Your Environment" blog in October 2011 to increase public knowledge of environmental health (EH). The blog serves as a forum for NCEH/ATSDR to share concerns, describe activities and provide guidance on EH issues. The blog address is <http://blogs.cdc.gov/yourhealthyenvironment>.

Environmental justice (EJ) has reemerged as a major issue throughout the entire U.S. government. President Obama reinstated a Presidential directive that was implemented during the Clinton Administration. The directive requires all federal agencies to develop and submit EJ Action Plans. Both HHS at the department level and NCEH/ATSDR at the agency level have submitted their EJ Action Plans.

As the Director of the NCEH Division of Emergency and Environmental Health Services (EEHS) and the Director of the NCEH/ATSDR Community Health Liaison Office, Dr. Sharunda Buchanan serves as the lead for CDC's EJ activities. In this effort, Dr. Buchanan receives support from the EEHS Healthy Homes and Lead Poisoning Prevention Branch (HHLPPB): Dr. Mary Jean Brown, Chief of HHLPPB, and Ms. LaToria Whitehead, Public Health Advisor.

NCEH/ATSDR formed the National Environmental Health Partnership Council (NEHPC) to raise the profile of EH globally. The Planning Committee met in June 2011 to draft a purpose statement and 2012 goals. The Steering Committee was formed in October 2011 to provide leadership to NEHPC and establish year 1 goals with support from the American Public Health Association (APHA), RESOLVE and NCEH/ATSDR. A full partner meeting will be convened in the spring of 2012.

NEHPC's draft purpose statement is two-fold. First, support for EH policy and programs will be increased and sustained by creating a credible and influential voice in the nation that supports environmental public health (EPH), uniting the environmental and public health fields, and shaping policy and practice nationally.

Second, a forum will be provided for leaders and organizations to share information, concerns and priorities; discuss and review needs, programs, policies and solutions; consider the impact of new information and research on policy and practice; explore strategies to leverage resources and maximize the impact of programs and policies; and generate momentum to foster collaboration and coordination both domestically and globally.

NCEH/ATSDR developed an EH Portfolio to track all of its activities and created a prioritization scheme to rank these initiatives. From July-September 2011, NCEH/ATSDR received 127 new requests, conducted 118 projects and completed 2 events. Dr. Portier highlighted a few of the EH Portfolio projects. The Yakutat Tribe Culture Camp asked NCEH/ATSDR to review existing

sampling data collected from Ankau Saltchucks and provide consultation on three issues related to the safety and concentration levels of the samples.

A national media inquiry was published in *Consumer Reports* to identify countries that are the world's largest producers of arsenic and determine whether the United States is still the largest consumer of arsenic. The Food and Drug Administration (FDA) asked NCEH/ATSDR to conduct an epidemiologic study. FDA will use these data to estimate the extent and magnitude of inadvertent strontium-82 and strontium-85 exposure associated with positron emission tomography scans.

NCEH/ATSDR, the U.S. Environmental Protection Agency (EPA), and the National Institute for Occupational Safety and Health (NIOSH) received numerous requests to analyze hydraulic fracturing and drilling as a nationwide public health activity. NCEH/ATSDR was asked to analyze potential health effects from a black liquor spill into the Pearl River in Bogalusa, Louisiana that resulted in fishkill. A paper mill was the source of the release. NCEH/ATSDR issued an advisory against consuming fish from the river until the black liquor levels decreased.

NCEH/ATSDR released the final Action Agenda of the National Conversation on Public Health and Chemical Exposures in June 2011 (www.nationalconversation.us). In conjunction with numerous partners, NCEH/ATSDR is taking actions in several areas to support this effort:

- planning a symposium for early 2012 that will consider strategies to improve ATSDR's site-specific scientific methods (e.g., ToxProfiles™, mixtures, health disparities/social determinants of health efforts, and community health assessments);
- using new and existing mechanisms (e.g., funds from EPA and the CDC Foundation) to explore opportunities to provide additional technical assistance services and capacity building funding to community groups concerned about chemical exposures;
- increasing the number of staff assigned to regional offices and establishing clearer lines of accountability within ATSDR; and
- developing recommendations for when and how ATSDR should use biomonitoring in community settings.

On June 29, 2011, 20 NCEH/ATSDR employees climbed to the top of the steps to improve their health. Dr. Thomas Frieden, Director of CDC, joined the NCEH/ATSDR employees in their climb on the following day.

ATSDR Program Highlights. To date, ATSDR has made site visits to ~5,000 communities in the United States. ATSDR issued a public health advisory to E.C. Electroplating in New Jersey because the site leaked extremely high levels of chromium-6 into the drinking water supply. The advisory allowed EPA to list the site on the National Priorities List (NPL) and initiate immediate mitigation actions. The final report showed that cancer risks in the area were similar to those in other New Jersey communities.

ATSDR implemented health campaigns based on needs identified by leaders in two EJ communities. To address EH concerns and social determinants of risk at the Mossville, Louisiana site, meetings were held and other activities are underway to provide clinical care to community residents. Several initiatives are being implemented in partnership with residents of the Corpus Christi, Texas site to alleviate EH issues. ATSDR investigated the Mirant Generating Station site because particulate mater and sulfur dioxide levels posed a health

threat. Based on the findings in ATSDR's report, the city and power company will permanently close the station in 2012.

ATSDR is preparing a report on its investigation of the Vieques, Puerto Rico site. The report will be translated in Spanish and will include public communication tools. ATSDR expects to release the report for a 90-day public comment period by the end of 2011. ATSDR will conduct follow-up activities in Vieques.

ATSDR is administering a health survey of U.S. Marine Corps (USMC) personnel and civilians in Camp Lejeune, North Carolina. The participants will include 300,000 Marines, sailors and civilians who lived and worked at Camps Lejeune and Pendleton. To date, 54,772 surveys have been completed and returned. The deadline for submission of all surveys is December 15, 2011.

ATSDR is using social media, a partnership with USMC, and collaborations with other groups to increase awareness of the survey. Most notably, both ATSDR and USMC uploaded videos on YouTube in September and October 2011. ATSDR will convene another Community Assistance Panel on November 10, 2011 to update the Camp Lejeune residents on the health survey.

ATSDR recently marked the first anniversary of its National Amyotrophic Lateral Sclerosis (ALS) Registry and initiated new projects. State and metropolitan area-based surveillance projects will help to assess the completeness of the entire registry. A clinical research notification system will be implemented to inform individuals of ALS clinical trials. A bioregistry will be established to collect and store blood, saliva and tissue from volunteers for future research. ALS registrants represent all 50 states.

The Affordable Care Act mandated ATSDR to provide clinical services in Libby, Montana. ATSDR awarded a 4-year, \$10 million grant to the CARD Clinic in July 2011 to conduct screening, outreach and health education to residents. ATSDR's screening of community residents in 2000-2001 detected excess pleural plaque (e.g., 51% in mine workers, 23% in household contacts of miners, and 14% in other Libby residents). ATSDR also found that the rate of asbestosis mortality was 40-80 times higher in the Libby, Montana community compared to the remainder of the nation.

ATSDR received Institutional Review Board approval on its protocol to conduct a birth cohort study of the Navajo Nation. The ATSDR/Navajo Area Indian Health Service interagency agreement has been finalized. This effort is being undertaken due to consistently high levels of uranium exposure to Navajo people. ATSDR awarded a 3-year, \$2 million grant to the University of New Mexico to recruit 1,500 pregnant Navajo women to quantify fetal risk from uranium exposure. The key outcomes of the study will be to assess uranium exposure at key developmental milestones; follow children post-birth to evaluate any associations with birth defects or developmental delays; and increase the frequency and use of prenatal care among Navajo mothers.

ATSDR conducted site visits to three communities to investigate problems associated with hydraulic fracturing. A detailed overview of this activity is scheduled on the agenda. ATSDR activated the CDC Emergency Operations Center (EOC) in response to flooding of the Souris

River in Minot, North Dakota. ATSDR staff in Region 8 provided extensive assistance in the response by helping with cleanup of the area and distributing information to the community on mold and other flooding-related issues. CDC fact sheets were provided to the community.

ATSDR was contacted by the U.S. Department of Housing and Urban Development (HUD) to investigate high levels of methane gas from two low-income housing complexes in Mount Clemens, Michigan. The complexes were constructed on a former landfill. Based on its review of HUD's data, ATSDR declared an emergency public health hazard at the site. EPA and state agencies installed an active ventilation system to temporarily mitigate the threat, but a more permanent solution is being explored at this time.

ATSDR provided technical support to EPA Region 8 in response to the silvertip pipeline spill at the Yellowstone River, Montana site. This effort was undertaken in a unified command with on-scene coordinators. Technical information and other outreach efforts were targeted to county health departments. ATSDR will release a DVD in November 2011 that will include 171 ToxProfiles™, 13 interaction profiles, a *Chemical Mixtures Guidance Manual*, 40 ToxGuides, 189 ToxFAQs™ in English and Spanish, and 167 public health statements in English and Spanish.

ATSDR released 13 addenda over the past year to ensure that ToxProfiles™ remain current despite severe budget reductions. The addenda topics include polychlorinated biphenyl (PCB), TCDD, dinitrophenols, formaldehyde, 1,1,2-trichloroethane, and N-nitrodiphenylamine. ATSDR conducted a chemical risk assessment, implemented outreach efforts, and produced a video to inform an Alaskan community of potential health impacts from exposure to sulfolane in the water supply. Sulfolane is a proprietary chemical used in crude oil refinement.

NCEH Program Highlights. NCEH has oversight of two new chemical weapons elimination sites in Kentucky and Colorado. To date, 89% of the original weapons stockpile has been eliminated with no public health impact. In partnership with EPA, NCEH developed a framework for risk-based clearance of emerging chemical agents and toxic industrial chemical threats in a contaminated critical infrastructure. NCEH is proud of this strong interagency collaboration that resulted in a public health success story.

NCEH is continuing its response to the disastrous cholera outbreak that initiated in Haiti and eventually spread to the Dominican Republic. NCEH staffed the Water and Sanitation Hygiene (WASH) Desk in the EOC; served as the Joint Information Center co-lead for the entire response; developed the CDC WASH Strategic Plan for Haiti; created training modules for 280 new rural water technicians; and helped to develop a Community Health Worker Cholera Training Program.

HHLPPB deployed staff to Nigeria and saved the lives of 100 children who had dangerously high levels of lead poisoning. NCEH funded 34 states and the District of Columbia to address lead poisoning prevention and multiple housing hazards; deployed a surveillance system to three additional states for a total of 17 states; and convened a "Level of Concern" Workgroup of the Advisory Committee on Childhood Lead Poisoning Prevention (ACCLPP) to delineate new approaches for addressing elevated blood lead levels (BLLs) in children.

The NCEH Vessel Sanitation Program (VSP) continues to provide technical advice on draft ship sanitation inspection manuals. VSP also published an updated *Construction Guidelines and Operations Manual*; performed comprehensive construction yard inspections on two new ships; and conducted 234 unannounced comprehensive operational inspections.

NCEH developed a Carbon Monoxide Toolkit that describes various poisoning scenarios and at-risk populations. NCEH also conducted formative research on carbon monoxide poisoning in residences and during summer and winter storms. Field tests were performed and focus groups were held with homeowners to explore strategies to better inform the public about the risks of generators in carbon monoxide poisoning. The NCEH website contains numerous tools that communities can download to obtain more information on carbon monoxide poisoning (e.g., web banner advertisements, fliers, public service announcements in print, bill inserts, web content, Tweets and text messages).

NCEH expanded the National Environmental Health Tracking Program with new content on community design and asthma prevalence data. The website was redesigned to be faster, more interactive and user-friendly. The query interface includes maps, charts and tables. NCEH made tremendous progress on a new climate change module, a new query system, and a special project on air pollution prevention.

NCEH released an Extreme Heat Media Toolkit with downloadable and customizable materials for the media, local health departments and other organizations to use in informing the public about heat events. The website of the toolkit received >9,300 page views and >4,900 whole or partial downloads. Dr. Portier's Twitter account also received 7,679 clicks to the toolkit website.

NCEH responded to several tornados in 2011. Mortality data were gathered in partnership with the Alabama Department of Public Health, American Red Cross, and Alabama Vital Statistics Agency. Death information was analyzed in Georgia, Missouri, Mississippi and Tennessee to determine risk factors for mortality and evaluate Red Cross mortality surveillance data. NCEH will assist the CDC National Center for Injury Prevention and Control with an Epi-Aid in December 2011. The combined data from these states will create a more complete picture of the overall morbidity and mortality from tornado events in the United States.

The National Asthma Control Program published the *Asthma Vital Signs Report* in May 2011 and reported that 25 million persons (or 1 in 12) have asthma in the United States. The publication potentially reached 917 million persons through newspaper reports and websites and an additional 19.2 million persons through electronic sources. NCEH estimated the publicity value of the publication to be \$366,268.

The National Biomonitoring Program published population-based data segmented by age, gender and race/ethnicity on priority environmental chemicals. State-based laboratory biomonitoring programs in California, New York and Washington continued to receive support from NCEH in FY2011 in the amount of \$5 million. Technical assistance and training were provided to states on biomonitoring analytical methods. Biomonitoring measurements were provided to 52 exposure and health effects studies. Methods were developed to measure nine new chemicals in individuals.

The Nutrition Laboratory developed a plan for trans fat analyses; analyzed 30 nutritional indicators in the U.S. population; developed and improved methods for measuring five nutrients and dietary bioactive compounds in individuals; completed five studies on nutritional status and disease; and completed unweighted data analyses of urine sodium levels based on data from the 1988-1994 and 2003-2006 National Health and Nutrition Examination Surveys (NHANES). Dr. Portier presented a slide with data on the sodium-potassium ratio and all-cause mortality.

NCEH will soon publish the Second National Report on Biochemical Indicators of Diet and Nutrition in the U.S. Population. A detailed overview of this publication is scheduled on the agenda. NCEH was extensively involved in the response to the Fukushima Nuclear Power Plant incident in Japan. CDC's urine radionuclide screen was used to measure radiation exposures in >250,000 Americans working in Japan at the time of the incident. The screen detected very low levels of radionuclides that posed no health threat to individuals. NCEH staff provided communications support to the Japanese government and oversaw the EOC at CDC Headquarters in Atlanta.

NCEH launched a national emergency event in 2011 as part of its routine emergency planning. A CDC team was deployed to a radiological event in Baltimore to collect 10,000 urine uranium samples. CDC retained 3,000 samples and completed its analysis in <48 hours. In terms of surge capacity outside of CDC, other laboratories across the country reported analytical results of the remaining 7,000 samples within 72 hours. The exercise was a success due to a high level of accuracy and precision among the participating laboratories.

The Tobacco Laboratory provided extensive subject-matter expertise on measuring harmful constituents in smoke and smokeless tobacco products. Several important projects have been completed to date (e.g., the development of new methods to measure 14 toxic or addictive substances, studies of three alterations in product construction, and measurements of cotinine and tobacco carcinogens).

NCEH/ATSDR Reorganization. In July-August 2011, the draft NCEH/ATSDR OD structure and ATSDR functional-based structure was presented with a 30-day comment period for all staff to review and submit comments. In September-October 2011, the draft structure was updated based on comments received and a package was prepared. In November-December 2011, staff will review and provide comments on the revised structure and the package will be submitted to the Office of the HHS Secretary and the Office of Management and Budget for approval. In early 2012, NCEH/ATSDR expects to receive provisional approval.

Key findings from the external evaluation of ATSDR's functional-based structure are highlighted as follows. ATSDR scientists are held to the highest scientific and ethical standards. Despite continued budgetary constraints, ATSDR is extremely productive. However, ATSDR needs to establish priorities, improve effectiveness in tracking its activities and develop standard operating procedures.

Dr. Portier presented slides to illustrate NCEH/ATSDR's current and proposed organizational structures and ATSDR's current and proposed divisions. In the proposed structure, the new ATSDR "Division of Community Health Investigations" (DCHI) would reflect the integration of the Division of Health Assessment and Consultation and 10 Regional Offices. DCHI would be

broken down into three geographical branches (e.g., Eastern Branch, Central Branch and Western Branch) that would operate from Atlanta.

The DCHI Science Support Branch would focus on exposure investigations, dose reconstruction and analyses. DCHI leadership would include Directors and Deputy Directors at the scientist level, liaisons to the Office of Communications and Office of Policy, and Principal Management Officials. A new Quality Assurance/Quality Control position would be added to the Office of Science.

In the proposed structure, the new ATSDR "Division of Toxicology and Human Health Sciences" (DTHHS) would reflect the integration of the Division of Toxicology and Environmental Health and the Division of Health Studies. DTHHS leadership would be similar to DCHI, but Science Innovation Fellows would be added to the Office of Science. This function would allow staff to be detailed to the Office of Science as Science Innovation Fellows for a fixed period of time to develop, test and implement ideas to improve ATSDR's science. Based on its success, the new function might be expanded to NCEH and other parts of CDC.

NCEH/ATSDR OD identified several benefits of the reorganization (e.g., stronger emphasis on science and communities, enhanced focus on education and outreach efforts, clearer lines of responsibility, rotation of staff for programmatic innovation, equal distribution of workloads across the Central, Eastern and Western Regions, and more regional staffing opportunities). Health Assessment, Health Education, and Community Involvement staff would support each level of ATSDR's new structure to facilitate an organized and concentrated approach and clearly delineate goals.

A pulse survey was administered to ATSDR staff to obtain input on the proposed reorganization. Of 158 surveys that were completed, ~52% of respondents have been employed by NCEH/ATSDR for >10 years. The survey responses further showed that 40% of respondents were aware, but lacked understanding of the initial change; 33% of respondents were not fully committed and felt forced to make the change.

The survey included three key questions to determine staff responses in one of five categories: "strongly agree," "agree," "neutral," "disagree" or "strongly disagree." The overwhelming majority of staff was "neutral" to the questions: "The reorganization will improve ATSDR's effectiveness" (58%). "The reorganization will improve ATSDR's relationships with its external partners" (56%). "The reorganization will contribute to achieving ATSDR's mission or resolving problems" (48%).

NCEH is not being reorganized at this time, but PwC was contracted to assess NCEH's current organizational structure, function, mission and goals. To support this effort, interviews were held with external stakeholders, partners, and NCEH leadership and staff at the division, branch and office levels. Documents, administrative data and information collected from the "Roles and Responsibilities" Surveys also were reviewed.

NCEH/ATSDR OD will receive findings from the assessment in mid-November 2011 and a final report in January 2012 that will describe options for NCEH's organizational design. A decision will be made at that time on whether the NCEH structure should be reorganized or maintained. During the next BSC meeting, Dr. Portier plans to present a joint vision for NCEH and ATSDR.

Several efforts are underway to ensure NCEH/ATSDR staff is kept up-to-date throughout the reorganization process. A communications plan was developed for NCEH/ATSDR staff. The *Transitions* weekly newsletter provides staff with current information on the reorganization. An Employee Advisory Group with representation by both NCEH and ATSDR staff provides direct guidance to NCEH/ATSDR OD on an ongoing basis.

NCEH/ATSDR Budget. The House and Senate reviewed the FY2012 President's budget and passed individual bills. The most likely option for the FY2012 budget is that federal agencies will operate under a continuing resolution. The Budget Control Act of 2011 created and charged the Joint Select Committee on Deficit Reduction (Super Committee) with issuing formal recommendations to Congress on reducing the deficit by at least \$1.5 trillion over the next 10 years beginning in 2013.

The Super Committee is equally represented by 12 Democrats and Republicans from both the House and Senate. The bipartisan recommendations will receive an "up" or "down" vote in Congress before December 23, 2011. The recommendations will affect the FY2013 budget, but not the FY2012 budget.

The FY2012 President's budget, Senate mark and draft House budget would be relatively flat for ATSDR, while NCEH would face substantial reductions in FY2012 (\$30 million in the President's budget, ~\$30 million in the Senate mark, and ~\$50 million in the draft House budget). All of these proposed budgets would reflect a 20%-30% decrease in FY2012 and would have major implications for NCEH programs. For example, the President's budget would integrate the Lead and Asthma Programs and cut the combined funding by 50%. The Senate budget would entirely eliminate the Lead Program and fully fund the Asthma Program.

NCEH/ATSDR gathered data to make evidence-based statements to Congress regarding the national impact of three major NCEH programs. Program 1 is the NCEH Healthy Homes/Lead Poisoning Prevention Program. In 2008-2010, primary prevention efforts by this program reduced the number of children with BLLs ≥ 5 $\mu\text{g}/\text{dL}$ who were exposed to lead and required close monitoring by 200,000. Based on 2005-2008 NHANES data, the estimated distribution of BLLs in 1 $\mu\text{g}/\text{dL}$ increments among U.S. children 1-5 years of age dramatically decreased over time. ACCLPP most likely will use these biomonitoring data as the basis to recommend a new action level for lead poisoning.

Over the past three years, \$30 million annually to this program has translated to \$7.5 billion savings in lifetime productivity for affected children in the United States. NCEH/ATSDR's impact statement strongly emphasizes that no safe level of lead exists. Most notably, every 1 $\mu\text{g}/\text{dL}$ increase in BLLs costs \$3,000 in productivity. CDC's overall goal is to eliminate childhood lead poisoning.

Program 2 is the NECH Tracking Network that is supported by the Prevention and Public Health Fund. If these dollars are eliminated, the Tracking Network would be eliminated as well. Tracking Network funds that are allocated to 23 states and New York City cover 164 million persons (or 53% of the U.S. population). Mentoring and training provided by the Tracking Network to 13 additional states cover 75 million persons and provide >200 jobs nationwide. The Tracking Network has successfully improved public health efforts in several states (e.g.,

California's preterm birth rates, Maryland's private water wells, and South Carolina's coastal environments).

Program 3 is the NCEH Asthma Program. Asthma prevalence in the United States has increased by 12.3% since 2001, but hospitalizations and severe effects associated with asthma have decreased. Asthma hospitalization rates declined by 14% from 2000 to 2007 in CDC-funded states. This decrease translates into real healthcare cost savings. However, asthma is still the third leading cause of hospitalization for children and continues to account for ~3,500 deaths each year.

Based on 2011 dollars, asthma costs to the U.S. healthcare system were estimated at \$59 billion annually. Although Medicaid spends >\$9 billion annually to treat asthma, both Medicaid and Medicare save ~\$2 billion per year due to the Asthma Program's national asthma prevention efforts. Compared to CDC's other National Centers, both NCEH and ATSDR have had the most severe budget cuts (e.g., an 18% cut in the President's budget, a 17% cut in the Senate mark, and a 32% cut in the House mark).

Dr. Portier, other leadership and staff provided additional details on NCEH/ATSDR's ongoing activities in response to the BSC's specific questions. The discussion topics included:

- EJ oversight, coordination and referral services provided to EJ communities by the Environmental Justice Interagency Workgroup;
- ATSDR's ongoing technical activities at the Mossville, Louisiana site;
- the EH aspects of CDC's asthma activities;
- the percentage of the U.S. housing stock that still contains lead-based paint and remediation of these properties for low-income families;
- potential reasons for NCEH/ATSDR's larger budget cuts compared to other CDC National Centers;
- the need to increase synergy with the new ATSDR structure if a decision is made in the future to reorganize the NCEH structure; and
- potential synergies between the CDC Center for Global Health and NEHPC;

The BSC was extremely troubled and disturbed by adverse effects that are likely to occur in current and future generations in the United States, particularly children, as a result of severe budget cuts to NCEH/ATSDR's key EH programs. The BSC members made several comments and suggestions in response to Dr. Portier's Director's report.

- NCEH/ATSDR should expand representation of the NEHPC Steering Committee to strengthen collaborations with the occupational medicine community, other professional organizations and existing federal partners (e.g., the Association of Occupational and Environmental Clinics (AOEC), American Industrial Hygiene Organization and EPA).
- ATSDR should focus on applied public health goals to address infant mortality and increase access to prenatal care in the birth cohort study of Navajo pregnant women.
- NCEH/ATSDR OD should develop metrics to rigorously evaluate whether the ATSDR reorganization reached its desired impacts and outcomes.
- NCEH/ATSDR and the BSC should jointly explore and discuss innovative approaches to raise the visibility of and maintain funding for CDC's EH programs. Most notably, 90% of

recommendations outlined in the Asthma Action Plan relate to EH issues (e.g., the control of allergens and mold).

Update on ATSDR's Public Health Prioritization Scheme

Lindsey Horton, MPH

Health Scientist

NCEH/ATSDR Office of Science

Ms. Horton presented an update on ATSDR's public health prioritization scheme that was developed to rank the importance and timeline of site activities in the current era of budget cuts. The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) mandated ATSDR to assess the presence and nature of health hazards at specific Superfund sites; help prevent or reduce further exposure and resulting illness; and expand the knowledge base about health effects from exposure to hazardous substances.

The Resource Conservation and Recovery Act of 1976 mandated ATSDR to conduct public health assessments (PHAs) at hazardous waste storage or destruction facilities when requested by EPA, states or individuals. ATSDR engages in activities at 300-400 sites annually and conducts PHA activities at NPL sites.

ATSDR receives requests for assistance from various sources, including private citizens, federal and state EH agencies, other federal response agencies, Congressional staff, municipalities and health professionals. NCEH/ATSDR OD, any ATSDR division, or any of ATSDR's 28 state cooperative agreement partners may receive these requests.

ATSDR initiated the prioritization scheme in 2010 by developing the "Public Health Priority Level Guidance for Site Triage" Table through a collaborative process between NCEH/ATSDR OD and ATSDR management. The goal of this effort is to eliminate inconsistency and prioritize site activities by using clear and consistent public health criteria. In May-September 2011, ATSDR implemented the prioritization table on a trial basis and released a public comment period. The table was revised based on feedback from ATSDR leadership, staff and state cooperative agreement partners.

Management will assign all requests that are submitted to ATSDR to one of five levels: "Urgent Priority," "Priority 1," "Priority 2," "Priority 3," or "Refer." Each level includes criteria for ATSDR to take action, defer or refer a request. Target timelines for ATSDR to complete site activities also are included in each priority level.

A hazard that is present with evidence of a health effect is defined as "acute" in the Urgent Priority level, "intermediate/chronic" in the Priority 1 level, and "suspected" in the Priority 2 level. The Urgent Priority, Priority 1 and Priority 2 levels include standardized language related to a minimum risk level or equivalent environmental guidance value. The "Refer" level includes all requests that are outside of ATSDR's mandate and would be more appropriately addressed by another agency. The five levels of the Public Health Priority Level Table are summarized below.

Urgent Priority Level. Examples of ATSDR sites that would be assigned to this category include Warren, Ohio (hydrogen sulfide at levels of concern) and Garfield, New Jersey (hexavalent chromium at levels of concern). ATSDR's products for sites in this category include letter consultations, technical assistance, health consultations, exposure investigations or health advisories.

ATSDR's actions for sites in this category include immediate notification to NCEH/ATSDR OD and entry of the site into the EH Portfolio; prompt identification of federal, state and local partners; concurrent development of a communications plan; referrals to appropriate partner organizations; and updates to NCEH/ATSDR OD, CDC OD and HHS as indicated. The target completion date for activities at Urgent Priority sites is 2 months.

Priority 1 Level. Examples of ATSDR sites that would be assigned to this category include Anniston, Alabama (suspicion of PCB exposure) and Saufely C&D Landfill in Pensacola, Florida (an uncontained release of emissions). ATSDR's products for sites in this category include health consultations, exposure investigations and technical assistance.

ATSDR's actions for sites in this category include immediate entry of the site into the EH Portfolio; weekly notification to NCEH/ATSDR OD through a multi-divisional report (MDR); prompt identification of federal, state and local partners; and concurrent development of a communications plan. All Priority 1 documents must be externally peer reviewed unless otherwise indicated. The target completion date for activities at Priority 1 sites is 6 months.

Priority 2 Level. Examples of ATSDR sites that would be assigned to this category include most NPL sites and Health Outcome Data review sites. ATSDR's products for sites in this category include health consultations, exposure investigations and health statistics reports.

ATSDR's actions for sites in this category include immediate entry of the site into the EH Portfolio; monthly notification to NCEH/ATSDR OD through an MDR; and identification of and outreach to federal, state and local partners as necessary. A communications plan is not required. The target completion date for activities at Priority 2 sites is 1 year.

Priority 3 Level. Examples of ATSDR sites that would be assigned to this category include sites with an ecological hazard only and sites with no human exposure or human health effects indicated. ATSDR's products for sites in this category include a letter or memorandum to the requestor describing the rationale for characterizing the site as Priority 3.

ATSDR's actions for sites in this category include immediate entry of the site into the EH Portfolio; notification to the requestor within 60 days; exploration of approaches to gather data if the information provided is inadequate; identification of federal, state and local partners; and a review of the request in 180 days to examine any new information and potentially elevate the priority level of the site. For Priority 3 sites, ATSDR will close all requests after 365 days if the priority level is not elevated within that time frame.

Refer. Examples of ATSDR sites that would be assigned to this category include activities outside of ATSDR's mandate. Requests that would be more appropriately addressed by other agencies also would fall in this category. ATSDR's products for sites in this category include entry of the referral into the EH Portfolio; written referral to the responsible agency; and written

notification to the requestor to document the transfer of leadership for the site activity. No timeline has been established for referral sites.

ATSDR has already implemented internal processes to address prioritization of site activities. ATSDR OD and Division Directors hold weekly meetings to review decisions made for high-priority sites and emergency responses. MDRs that list high-priority sites and describe emerging issues are submitted to NCEH/ATSDR OD on a weekly basis. All incoming requests are tracked through the EH Portfolio. ATSDR Division Directors hold weekly meetings to review the prioritization of requests.

ATSDR presented a rough draft of the Public Health Priority Level Table during the May 2011 BSC meeting. Since that time, the table was extensively revised based on comments submitted. ATSDR's responses to the major comments are summarized below.

"Appropriate prioritization of sites where data are lacking is of concern." ATSDR outlined its responsibility in the policy document. ATSDR confirmed that approaches would be explored to gather necessary data for appropriate site categorization in situations where information is inadequate. Text was included to emphasize the importance of considering EJ communities and other groups that lack resources.

"Federal, state and local partners should be notified." ATSDR's policy document clearly defines notification to federal, state and local partners as an "initial action" for all priority levels. Referrals to ATSDR's public health partner organizations also were added (e.g., AOEC, American College of Medical Toxicology, Pediatric Environmental Health Specialty Units, and Poison Control Centers).

"Specific procedures are needed to direct actions (e.g., responsibility, frequency of updates, and content of communications plans)." ATSDR defined its responsibilities in the policy document. ATSDR management will be responsible for creating internal standard operating procedures for each action. The Office of Communications currently is developing general communications guidance and will collaborate with ATSDR Division Directors on rollout plans.

"The timeline for ending site activities should be clearly defined." ATSDR clearly defined site closures in the table for Priority 3 sites and in the policy document for all other priority sites. ATSDR added new text to clarify that site activities are considered closed when documentation related to the site is released.

"State cooperative agreement partners and their responsibilities with respect to the table are of concern." ATSDR funds 28 partners at levels ranging from \$100,000-\$700,000 annually. Cooperative agreement partners account for 75% of all site-specific activities conducted by ATSDR annually (e.g., PHAs, community outreach and health education activities). The policy document clearly defines the responsibilities of state cooperative agreement partners.

The table is intended for use by ATSDR staff and state partners that perform ATSDR-funded activities. State partners must meet the timelines for each priority level or ATSDR leadership will take appropriate action to expedite actions. Ms. Horton welcomed comments and suggestions from the BSC on the Public Health Priority Level Table before ATSDR shifts to full implementation.

In response to the BSC's specific questions, NCEH/ATSDR leadership and staff described examples of Priority 3 sites with an ecological hazard only and examples of Priority 1 documents that would not require external peer review.

Overall, the BSC strongly supported ATSDR's approach. The BSC's position was that the Public Health Priority Level Table would be a tremendous asset in improving ATSDR's management of its site-specific activities.

The BSC advised ATSDR to consider one issue before fully implementing the prioritization table. ATSDR's use of existing guidelines (e.g., "no exposure above a current health guidance level") may miss opportunities to identify new hazards or existing hazards at lower levels. For example, CDC's BLL of concern is 10 µg/dL at this time, but ACCLPP currently is reviewing data to lower this threshold.

Update on the National Environmental Health Tracking Program

Patrick Wall, BS

Informatics Team Lead, Environmental Health Tracking Branch/NCEH
Centers for Disease Control and Prevention

Mr. Wall presented an update on changes NCEH recently made to enhance and improve the Tracking Program. The Tracking Program was created in response to the Pew Commission report, *America's Environmental Health Gap*, that recommended the establishment of a nationwide health tracking network for diseases and exposures. After receiving its Congressional appropriation, CDC developed the Tracking Program with a mission to provide information from a nationwide network of integrated health and environmental data that drives actions to improve the health of communities.

The original Tracking Portal that NCEH launched in 2009 was limited by capabilities of the technology at the time. NCEH received feedback from users to enhance the Tracking Portal. Users noted that the graphs, tables and maps had serious limitations and even small updates required an extensive amount of time. Moreover, the Tracking Portal did not have sufficient capacity to develop national choropleth maps for all 3,143 counties in the United States. The query speeds were slow as well. Over the past year, NCEH used this guidance to redesign the National Public Portal to be better, stronger and faster.

NCEH's goals for the Generation 2 Tracking Portal were to create an easier-to-use interface, redesign the system to be easier to update and facilitate more efficient growth, and address performance limitations of the current system by adding more speed and increasing capacity to handle larger amounts of data.

The new features include interactive tables and charts, stunning visual effects, export and print options, support for several types of web browsers, a "data-aware" query interface, and capacity to compare multiple maps on a screen. The section of the Tracking Portal that provides the

content and public health messaging was upgraded to be consistent with CDC's latest web template.

A sophisticated content management system was developed for queries rather than page content. The system is needed for the large number of "business rules" (e.g., rules for populating the query interface and displaying measures) related to each content area measure. The content management system can be immediately updated and does not require a new deployment of the application. The time for users to query national data at the county level was dramatically reduced from ~180 seconds to ~7 seconds. Mr. Wall concluded his portion of the update by presenting a live demonstration of the upgraded Generation 2 Tracking Portal.

Judith Qualters, PhD

Acting Director, Division of Environmental Hazards and Health Effects/NCEH
Centers for Disease Control and Prevention

Dr. Qualters presented an overview of new data that were added to the Tracking Network in 2011 and new activities planned for FY2012 based on the BSC's peer review recommendations. Asthma prevalence data were added to the asthma module based on Behavioral Risk Factor Surveillance System data. The indicators for this module include asthma prevalence among adults and children. Asthma call-back data will be added to the module in December 2011. These data will reflect state and local data on the health and experiences of persons with asthma.

Indicators for the community design module include the types of transportation to work, air quality based on the ozone and particulate matter, childhood lead poisoning, and motor vehicle-related fatalities. Indicators for the climate change module include temperature distribution, heat-related mortality, and heat vulnerabilities based on population and environmental characteristics (e.g., persons with diabetes, cardiovascular disease or other chronic diseases; persons with advanced age; and persons with racial, poverty, social isolation and land use indicators). Data from the National Aeronautics and Space Administration are a major source of information for the climate change module.

The BSC's peer review recommendations will play an important role in the future directions of the Tracking Network. The BSC advised NCEH to rapidly expand the Tracking Network because the breadth of data in the portal was too narrow. The BSC further recommended a closer relationship between the Tracking Network and NHANES exposure data; continued focus on making data available at the smallest geographic area possible; improvement of the Tracking Network's data linkage capacity, data usage and functionality; prominent display of data to better impact public health policy; and increased productivity in terms of scientific publications.

The NCEH Tracking Content Workgroup launched four new initiatives for FY2012: state biomonitoring, radon, occupational indicators, and unregulated drinking water in private wells. For the National Public Portal, the climate change module will be expanded with new data on cancer, water, hospitalizations, and emergency department visits.

A new developmental disabilities module will be included; a special project on air pollution health impacts will be completed; a biomonitoring module will be included with NHANES data; and the toolkit will be expanded with more resources for the public (e.g., tools for health impact

analysis, data analysis and communications). The National Secure Portal will be enhanced for state partners to have more robust access. Manuscripts and reports will be published to more widely disseminate Tracking Network data.

NCEH acknowledges that the Tracking Network needs to demonstrate impact, value, return on investment and overall success to ensure its sustainability. NCEH has implemented several strategies to achieve this goal. The Tracking Network serves as a platform for other programs at federal, state and local levels. Resources are leveraged from other websites (e.g., the Department of Transportation).

State utilization and success stories related to the Tracking Network are widely publicized. For example, Massachusetts utilized Tracking Network data to enhance its National Environmental Policy Act activities by incorporating health data. The Tracking Network also played a key role in Massachusetts promoting health impact assessments under the state Transportation Reform Law. Partners are extensively engaged. A return-on-investment contract was released.

A toolkit is being developed to assist state and local partners with communication planning. These tools include coordinated messages and strategies for grantees to communicate success stories of the Tracking Network to their state and local partners, policymakers and other groups. NCEH welcomes input from the BSC on additional strategies to ensure the sustainability of the Tracking Network over time.

In response to the BSC's specific question, Dr. Qualters discussed confidentiality issues related to future capacity to collect data for the Tracking Network at a level below the county (e.g., specific communities in a county affected by an NPL site).

The BSC advised NCEH to consider one issue during its ongoing efforts to improve the Tracking Network. NPL sites and other Superfund sites should be included in the Tracking Network. Ecological data should be overlaid with Tracking Network data to identify health impacts (e.g., cancer rates) at Superfund sites. This approach will improve the interpretation of Tracking Network findings when the data are used outside of CDC.

Update by the Division of Laboratory Sciences (DLS)

James Pirkle, MD, PhD

Director, Division of Laboratory Sciences/NCEH
Centers for Disease Control and Prevention

Dr. Pirkle covered two major topics in his update to the BSC on DLS's recent activities.

Second National Report on Biochemical Indicators of Diet and Nutrition in the U.S. Population. NCEH released the First Nutrition Report 2008 with 27 biochemical indicators (e.g., water- and fat-soluble vitamins, trace elements, iron status indicators, and isoflavones and lignans). The First Nutrition Report filled an important information gap by serving as the first comprehensive report of the nutritional status of the U.S. population and serving as a "one-stop-shop" for nutritional biomarker reference data.

The First Nutrition Report included data that were representative of the U.S. population; a sufficiently large sample size to stratify data by multiple demographic variables; and thoroughly validated and quality assured methods to generate biochemical data. Standardized tables also were included to allow for comparisons among demographic groups and across indicators.

The public health uses of the First Nutrition Report were to establish and improve population reference levels; identify potential at-risk population groups; track trends in biochemical indicator levels over time; assess the effectiveness of public health efforts to improve diet and nutritional status; and generate new findings to stimulate nutrition research and human health studies.

The findings on folate acid in the First Nutrition Report were extremely useful. Folic acid fortification was found to greatly improve the folate status of the U.S. population. The report further noted that most women of childbearing age had reached the Healthy People 2020 goal for red blood cell folate. Moreover, girls and older women had higher folate levels than young women.

Dr. Pirkle highlighted major differences in the Second Nutrition Report. The number of biochemical indicators increased from 27 to 58. The new indicators include vitamin B6, vitamin C, a new iron status indicator (transferrin receptor), fatty acids (e.g., saturated, monosaturated and polyunsaturated), and acrylamide hemoglobin adducts. New features were added to improve presentation of the data.

The 2.5th and 97.5th percentiles were added as new reference intervals for demographic subgroups. New graphs were included to illustrate age patterns by gender and race/ethnicity. Time trends were expanded from the 1999-2002 NHANES cycles to the 1999-2006 NHANES cycles. Graphs were developed with a breakdown of 5th, 50th and 95th percentiles as well as by age, race/ethnicity and gender to determine the prevalence of abnormal concentrations in demographic subgroups.

The Second Nutrition Report will be much larger with 493 pages, 402 tables, 118 graphs, a 16-page Executive Summary, fact sheets, and question/answer sheets. The primary audiences of the Second Nutrition Report include health officials at national, state and local levels; clinicians, nutritionists and other health professionals; Congress and the media; and professional and industry associations, international agencies and advocacy organizations. The secondary audiences include the trade media and the public. NCEH plans to release the Second Nutrition Report in early February 2012.

Dr. Pirkle presented a series of slides with new data that will be included in the Second Nutrition Report. However, he noted that these data have not yet been officially cleared for release and could not be distributed to the BSC during the meeting. Key findings from the new data include:

- the first data ever published on 24 plasma trans fatty acids (TFAs) in the U.S. population, including surprising racial/ethnic differences in which non-Hispanic black adults had higher TFA levels than Mexican American adults;
- the ability of serum transferrin receptors plus ferritin to provide a better diagnosis of iron status than ferritin alone;

- racial/ethnic differences in iron status for two at-risk groups for iron deficiency (e.g., children and women), including worse iron status in Mexican American children and non-Hispanic black women; and
- racial/ethnic differences in acrylamide hemoglobin adducts in the U.S. population, including lower ratios in non-Hispanic blacks compared to non-Hispanic whites and Mexican Americans.

First-time Measurement of Plasma TFAs in the U.S. Population. TFAs are unavoidable in ordinary diets. The sources of TFAs are partially hydrogenated vegetable oil, food from ruminant animals (e.g., milk products), and refined vegetable oils in which TFAs are only in trace amounts. The Institute of Medicine/National Academy of Sciences (NAS) National Cholesterol Program Dietary Guidelines for Americans concluded that trans fat consumption should be as low as possible while consuming a nutritionally adequate diet. The estimated average TFA intake is 5.8 g/day per person (or 2.5% of energy).

TFA consumption is associated with an increased risk of heart attack and coronary heart disease. The risk of heart attack and coronary heart disease is 20%-32% higher for every 2% of energy of TFA consumption that isocalorically replaces carbohydrates. Even when replacing saturated fatty acids, substituting fatty acids with TFA increases cardiovascular disease risk factors. Increased TFA intake raises LDL-cholesterol (“bad”) and decreases HDL-cholesterol (“good”).

To assist consumers in identifying products containing TFA, FDA proposed a nutrition labeling rule in 1999 and issued the final rule in 2003. However, FDA allows foods that contain up to 0.5 g of TFA per serving to be labeled as “0 g trans fat” to account for errors in laboratory measurements. In 2006-2008, New York City and Philadelphia passed rules to ban trans fats entirely, while California passed a rule for a partial ban.

Traditional approaches to estimate TFA intake utilize food questionnaires and food composition databases, but these methods have a high level of uncertainty. Most notably, no accurate and comprehensive database has been developed on TFA in food. Wide variability exists in TFA content within food categories and in reformulations. Current analytical methods do not provide the specificity needed for plasma TFA measurements. To address these gaps, CDC measures TFA levels in individuals to obtain reliable information about actual population exposure.

CDC’s new laboratory method can separate TFA from regular fatty acids to enable more accurate and specific exposure measurements. The method also allows for an assessment of plasma TFA levels for the first time. The method requires 100 μL of plasma or serum, measures free and esterified fatty acids (e.g., TFAs), has a measurement range of 0.1-5.14 $\mu\text{mol/L}$, and has a limit of detection ranging from 0.05-2.80 $\mu\text{mol/L}$. The method has excellent performance features, but requires an extensive amount of time to measure TFA.

The method measures four major TFAs in blood: elaidic acid and linoelaidic acid (primarily in hydrogenated vegetable oil) and vaccenic acid and palmitelaidic acid (primarily in milk and other ruminant fats). Because all four TFA isomers are present in both ruminant and industrial sources, their presence cannot be used to distinguish food intake. The four TFA isomers account for ~40%-60% of the total TFA levels reported in humans.

CDC measured TFA exposure before and after the FDA labeling rules in a subset of the U.S. population. Measurements were taken from the four major TFAs in plasma collected during the NHANES 2000 and 2009 cycles. A random selection was made of a 50% subset of fasting non-Hispanic whites ≥ 20 years of age. The analysis showed that mean TFA levels were 58% lower in this subpopulation in 2009 compared to 2000. LDL-cholesterol levels were 8% lower in blood samples collected in 2009 compared to those collected in 2000. Individual TFA levels were consistently lower in 2009 compared to 2000.

CDC will evaluate TFA exposure in additional subpopulations by measuring TFA levels in children, adolescents and other racial/ethnic groups. CDC also will investigate associations between decreases in TFA values and LDL-cholesterol levels and correlate reductions in TFA levels in blood with those in food items.

Drs. Pirkle and Portier provided additional details on DLS's activities in response to the BSC's specific questions. The discussion topics included:

- a potential cross-sectional association between TFA levels and NHANES findings on individuals (e.g., LDL-cholesterol levels, relationships to diet, and proxy measures for cardiovascular disease and other health risks);
- the measurement of TFA exposure before and after the FDA labeling rule using New York City HANES samples (e.g., a dramatic decrease of ~51%);
- notification to the BSC about the availability of the Second Nutrition Report on the CDC website;
- CDC's efforts to ensure DLS maintains its funding and continues to serve as a unique national resource, particularly in light of the severe cut to the preparedness budget; and
- the potential for the food industry to utilize and pay for DLS's laboratory services (e.g., a model similar to the cruise ship industry paying for VSP's services).

The BSC congratulated DLS on its exciting new laboratory methods that will have national significance and also will serve as a solid approach to evaluate the impact of public policy.

Updates by the BSC Federal Experts

Dr. Ryan opened the floor for the BSC Federal Experts to provide updates on recently completed or ongoing EPH activities of their respective agencies. The updates are summarized below.

John Decker, CIH, RPh

Senior Scientist, Office of the Director
NIOSH/Centers for Disease Control and Prevention

Dr. Decker reported that similar to NCEH/ATSDR, NIOSH also is facing critical budgetary uncertainties. The NIOSH Educational Resource Centers (ERCs) train health/safety and occupational medicine professionals, but this activity has a \$0 line item in the FY2012 President's budget. If NIOSH's budget is not sustained in FY2012, the number of ERCs will dramatically decrease from 23 to ~5 and the occupational medicine specialty will cease to exist.

The budgets of NIOSH's longstanding Forestry, Fishing, and Agriculture Sector Research Programs also have been eliminated. Similar to ATSDR, NIOSH also conducted an internal evaluation of each of its divisions to prioritize and align activities to the goals of the National Occupational Research Agenda.

NIOSH's recent and upcoming publications include:

- a titanium criteria document that recommends an exposure limit for nanoscale titanium for the first time;
- a report on asbestos, beryllium and butter flavorings that have caused severe respiratory health effects in workers;
- a current intelligence bulletin on carbon nanotubes; and
- a new document on derivation values that are immediately dangerous for life and health.

NIOSH currently is conducting ~12 risk assessments of various substances (e.g., magnesium, welding fumes and propionaldehyde). NIOSH has undertaken a full review of its cancer policy and will hold a public meeting in December 2011 to obtain input on this issue. NIOSH will reassess its current approach to classify substances as "carcinogenic." Efforts are underway to more closely align NIOSH's carcinogenicity policy with the National Toxicology Program (NTP) policy. Based on feedback given during the public meeting, NIOSH will explore the possibility of also aligning its policy with the International Agency for Research on Cancer policy.

NIOSH allocated additional resources to examine the relative importance of various modes of transmission for influenza virus (e.g., airborne versus nose droplet transmission). This initiative has implications for whether healthcare professionals should wear personal protective equipment to protect themselves against influenza. NIOSH and the Department of Veterans Affairs launched a large three-year study to analyze various rates of influenza transmission in occupational settings.

NIOSH is analyzing indium tin oxide that is used in the production of LCD panels and has been shown to cause severe health problems. The renewal of the World Trade Center Monitoring and Treatment Program describes a number of significant changes in NIOSH's operation of this initiative and requires NIOSH to produce certain types of reports. For example, NIOSH must determine whether carcinogenicity would be a covered health impact among workers. NIOSH was given lead responsibility for the Ryan White HIV/AIDS Renewal and Extension Program to ensure notification is given when emergency responders are exposed to HIV/AIDS.

Bonnie Richter, PhD, MPH

Senior Epidemiologist, Office of Health and Safety
U.S. Department of Energy (DOE)

Dr. Richter reported that DOE is not a public health agency, but its activities impact the health of workers and communities with chemical and radionuclide exposures. DOE's overarching mission targets three major areas: (1) scientific excellence in new technology, research and design, nanotechnology and human genomes; (2) nuclear security (e.g., responsibility for the maintenance of the entire nuclear weapons complex); and (3) environmental restoration of all chemicals and radionuclides remaining from the Cold War by disassembling bombs and

cleaning up large pits of chemical mixtures. However, DOE's 30 sites across the country have established individual missions and areas of focus.

Similar to its federal partners, the FY2012 President's budget proposes a major cut to the DOE budget. DOE is extremely concerned about the external implications of the reduction in funding. Most notably, DOE has a extensive history of collaborating with and allocating funds to several NCEH/ATSDR and NIOSH programs. DOE's initial funding of \$17 million to CDC, ATSDR and NIOSH dramatically decreased to ~\$1.2 million in FY2011.

DOE has enjoyed a cooperative and collaborative relationship with ATSDR over several decades by funding PHAs at numerous NPL sites: Oak Ridge Site (Tennessee), Savannah River Site (Georgia), Hanford Nuclear Waste Processing Plant (Washington State), Rocky Flats Site (Colorado), Monticello Mill Site (Utah), and Paducah Gaseous Diffusion Plant (Kentucky). DOE also has provided funding to ATSDR's ToxProfiles™ to obtain information to guide the development and implementation of PHA activities. These initiatives have focused on uranium, trichloroethylene and plutonium.

DOE's longstanding partnership with and funding to NCEH have focused on environmental dose reconstructions of offsite exposures from DOE effluents at numerous sites: Hanford, Savannah River Site, Los Alamos (New Mexico), Fernald (Ohio), and Idaho National Engineering Laboratory (Idaho). DOE hopes to resolve its budgetary constraints to continue its critically important partnerships with CDC, ATSDR and NIOSH in the future.

Hal Zenick, PhD

Director, National Health and Environmental Effects Research Laboratory
U.S. Environmental Protection Agency

Dr. Zenick reported that EPA undertook a tremendous effort of redesigning its entire research portfolio within one year. The focus areas of the research portfolio include air, climate and energy, safe and sustainable water, sustainable healthy communities, and chemical safety and sustainability. EPA's overarching goal is to integrate sustainability into its decision-making for all activities in general and the research portfolio in particular.

EPA's stronger focus on sustainability covers chemical design, materials, production processes, life cycle analyses, and community decision-based sustainability. EPA's efforts are designed to solve problems by sustaining natural resources, stimulating the economy, and decreasing human or societal risks. EPA's approach reflects a partnership between the two powerful movements of EJ and sustainability.

At the end of November 2011, EPA plans to publish a condensed version of its research priorities for the public and initiate a comprehensive outreach effort with its federal partners and other stakeholders to obtain feedback. EPA created a planning map that describes the nature of its sustainability projects, emphasizes interactions with program partners, highlights goals and outcomes of its various products, and outlines a budget execution process.

EPA released its 2014 EJ document that continues the agency-wide commitment to incorporate EJ issues into all decision-making processes, including web development. This effort will be launched during an upcoming APHA symposium. The NAS recently published the *Green Book*

to guide EPA in undertaking and fully embracing sustainability. Although no federal mandate exists, EPA leadership has strongly supported sustainability.

EPA is continuing its solid partnership with ATSDR to enhance the Integrated Risk Information System. EPA recently released its final study plan for hydraulic fracturing. The initial results are expected to be reported in 2012 and the final report is expected to be published in 2014. EPA's study plan examines environmental issues related to hydraulic fracturing, but does not address health issues.

Kristina Thayer, PhD

Director, NTP Office of Health Assessment and Translation
National Institute of Environmental Health Sciences

Dr. Thayer reported that NTP redesigned its program and expanded the scope to be more question-driven. To support this effort, NTP changed the name from the "Center for the Evaluation of Risks to Human Reproduction" to the "Office of Health Assessment and Translation." The "question-driven" focus includes literature-based syntheses of various topics (e.g., diabetes, environmental contaminants and obesity); new approaches to increase transparency in weight-of-evidence evaluations; and labeling of non-carcinogens.

NTP's research component has several functions (e.g., provide context to high-throughput screening data, identify testable hypotheses to examine physiological systems, and develop animal and human models). NTP's new question-driven approach has resulted in the redesign of its review processes. The specific evaluation process is tailored to a certain question. NTP believes that this approach will improve capacity and provide more opportunities to leverage resources across agencies.

Update on ATSDR's Site Activities at Camp Lejeune, North Carolina

David Williamson, PhD

Director, Division of Health Studies
Agency for Toxic Substances and Disease Registry

Dr. Williamson presented an update on ATSDR's site activities at the USMC Base at Camp Lejeune, North Carolina. ATSDR initiated its health study at Camp Lejeune in response to the Water Sampling Program's detection of volatile organic chemicals (VOCs) in several wells in 1980-1985. VOCs were detected in three of Camp Lejeune's eight water distribution systems.

Although the highly-contaminated wells were shut down by February 1985, ATSDR initiated a historical reconstruction of drinking water contamination due to the lack of historical contaminant-specific water sampling data and the need to identify and characterize the levels of exposure in individuals. ATSDR began this effort by performing an extensive literature search to gather data on Camp Lejeune's groundwater and water treatment and distribution systems.

The data were extracted and interpreted to reconstruct the migration of selected groundwater contaminants to supply wells and distribution within water treatment plant service areas.

ATSDR designed its water models to estimate monthly mean concentrations of contaminants in water treatment plant service areas and assign exposure levels to the study participants.

Dr. Williamson summarized ATSDR's four ongoing studies at Camp Lejeune. The "Adverse Pregnancy Outcomes Study" was designed to evaluate maternal exposure to contaminated drinking water as a risk factor for preterm birth, small size for gestational age, and mean birth weight deficits. The cohort included >12,000 singleton live births at Camp Lejeune in 1968-1985. After these data are reanalyzed with monthly modeled contamination levels, ATSDR will release the study in June 2012.

The "Specific Birth Defects and Childhood Cancers Study" was designed to survey parents of children born in 1968-1985 to mothers who lived on Camp Lejeune at any time during their pregnancy. Of 12,500 births, the cohort included 52 confirmed cases of birth defects: 15 neural tube defect cases, 24 oral cleft cases, and 13 childhood cancer cases. In-depth parental interviews were conducted in 2005 to obtain exposure information through residential histories and risk factor data through family histories. After these data are analyzed with monthly modeled drinking water contamination levels, ATSDR will release the study in June 2012.

The "Mortality Study" was designed to evaluate two populations: (1) Marine and Navy personnel who began their service after March 1975 and were stationed at Camp Lejeune any time from April 1975-December 1985 and (2) civilians who began their employment with the Department of Defense after March 1974 and were employed at Camp Lejeune any time from April 1974-December 1985. Camp Pendleton was used as a comparison population. ATSDR currently is identifying deaths that occurred in 1979-2008 and obtaining cause of death data. To date, ~38,000 deaths have been identified during the study period.

The "Morbidity Study" was implemented in response to the National Defense Authorization Act that became effective in January 2008. The law required ATSDR to develop a health survey of individuals who potentially were exposed to drinking water contaminants at Camp Lejeune.

Because all persons who may have worked or lived at Camp Lejeune cannot be identified, ATSDR used three existing data sets for this study: (1) Marine and Navy personnel stationed at Camp Lejeune any time from April 1975-December 1985; (2) civilians employed at Camp Lejeune any time from April 1974-December 1985; and (3) families that participated in ATSDR's 1999-2002 survey. Camp Pendleton was used as a comparison population for Marine and Navy personnel and civilian worker groups.

The morbidity study was designed to collect data on cancers and other diseases and gather information on locations where individuals lived and worked at Camp Lejeune. ATSDR began mailing surveys for the morbidity study in June 2011 and will complete this effort in December 2011. The in-depth survey asks extensive questions about residential and work histories, race/ethnicity, potential exposures and risk factors (e.g., smoking and alcohol consumption). To date, ~200,000 surveys have been mailed to the entire target population of 300,000 persons. Medical records will be used to confirm diseases reported by the survey participants.

Disease and mortality rates will be compared between Camp Lejeune populations with levels of exposure, Camp Lejeune and Camp Pendleton populations, Camp Lejeune and the U.S. population, and Camp Pendleton and the U.S. population. Camp Pendleton was selected as

the comparison site because Marines and sailors typically are healthier than the general U.S. population. Moreover, with the exception of contaminated drinking water, the Camp Pendleton population is as close to the Camp Lejeune population as possible. ATSDR recognized the important need to account for the “healthy worker effect” and ensure that potential effects from exposure to contaminated water are not underestimated in the studies.

ATSDR established the Camp Lejeune Community Assistance Panel (CAP) in 2006 to ensure the community is extensively engaged and involved in all site activities. The CAP meets quarterly to make recommendations to ATSDR on all aspects of the Camp Lejeune project. The CAP is represented by 7 former active duty Marines, sailors and dependents, 2 scientific experts, 1 USMC/Department of Navy representative, and ATSDR staff. The Community advocacy groups nominated the community members and external scientists.

The survey phase of the morbidity study will be completed in December 2011. The final reports of the birth defects and childhood cancer study, adverse pregnancy outcome study, and mortality study will be released in June-July 2012. The final report of the morbidity study will be released in 2014.

Dr. Williamson and other NCEH/ATSDR leadership and staff provided additional details on the Camp Lejeune health studies in response to the BSC’s specific questions. The discussion topics included:

- power calculations in the morbidity study to observe various health effects at 20%, 30%, 40% and 50% survey response rates; and
- the rationale for answering basic science questions in a dose reconstruction of the Camp Lejeune cohort due to uncertainties related to the mixed nature of exposures; different groups of individuals with different water supplies at different times; and the large number of confounders with a young and healthy population compared to an older or occupational cohort with a higher level of exposure and disease.

The BSC advised ATSDR to consider one issue before releasing the Camp Lejeune health studies. ATSDR should use its July 2012 deadline to release the first report of the mortality study. Because the young and healthy Camp Lejeune cohort will have low rates of cancers and deaths, this population will need to be followed over time and a series of reports will need to be produced.

With no further discussion or business brought before the BSC, Dr. Ryan recessed the meeting at 4:07 p.m. on November 4, 2011.

Opening Session: November 4, 2011

Timothy Ryan, PhD

Associate Professor, School of Public Health Sciences and Professions
Ohio University, College of Health and Human Services
BSC Chair

Dr. Ryan confirmed the presence of a quorum and reconvened the BSC meeting at 8:34 a.m. on November 4, 2011. He had no announcements to make and yielded the floor to the first presenter.

Overview of the ATSDR 2012 Science Symposium

Benjamin Gerhardstein, MPH

Public Health Analyst, Program Development Team
NCEH/ATSDR OD

Mr. Gerhardstein presented an overview of the “Future of Science at ATSDR Symposium” that will be held in 2012. The objectives of the symposium will be to evaluate ATSDR’s scientific approach to assessing health risks at sites and generate action-oriented ideas to improve activities. The symposium will focus on a key recommendation in the National Conversation Action Agenda for ATSDR to review and improve its scientific methods that are used in community settings.

ATSDR has adapted to a changing EH landscape over time. When ATSDR was established, concerns were expressed over health impacts of exposures to hazardous waste. Traditional risk assessment and epidemiological methods were utilized. An assumption was made that science would provide helpful answers to communities.

At this time, broader understanding exists of social and environmental determinants of health. Additional methods and tools are available and can be brought to bear in ATSDR’s site activities (e.g., the use of biomonitoring and cumulative risk assessments). The need to involve communities to improve science and build local capacity is recognized.

ATSDR will convene the two-day symposium at its Atlanta headquarters in March 2012 and invite 25-30 multidisciplinary experts and stakeholders (e.g., 4 BSC members, ATSDR staff, and NCEH/ATSDR observers). The participants will reflect expertise in toxicology, risk assessment, epidemiology, community-based participatory research, and ATSDR’s history and methods.

The key topics that will be addressed during the symposium fall into two major categories. The “site-specific” topics will focus on analyzing multiple exposures and cumulative risks at sites; evaluating and addressing health disparities in communities; and engaging communities in ATSDR’s science. The “research” topics will focus on streamlining ATSDR’s chemical hazard review process to be consistent with other federal agencies; prioritizing the CERCLA list of hazardous substances and exploring strategies to potentially change the list; and determining when to expand site assessment activities to conduct additional studies.

Due to the breadth and scope of the site-specific and research topics that will be covered during the two-day symposium, ATSDR will disseminate brief background papers to the invitees in advance. The topics of the papers will focus on the PHA process, development and application of minimum risk levels, decision-making process of launching a health study, CERCLA priority list of hazardous substances, ToxProfile™ review process, and potential implications of

ATSDR's reorganization on its science. ATSDR also plans to call for critiques and ideas for selected invitees to improve each key topic in conjunction with ATSDR co-authors.

Overall, the symposium is timely and closely aligned with the outcomes and opportunities embedded in ATSDR's reorganization. Similar to the reorganization, for example, the symposium also will focus on Science Innovation Fellows, the integration of toxicological and epidemiological expertise, and a stronger regional presence.

Mr. Gerhardstein concluded his overview by requesting the BSC's input on three key questions: (1) What are the most important topics to address during the symposium? (2) What important scientific issues faced by ATSDR are not included? (3) Would hands-on utilization of PHAs, ToxProfiles™ or other ATSDR products help to ensure that actionable recommendations emerge from the symposium?

Mr. Gerhardstein and NCEH/ATSDR leadership provided additional details on the symposium in response to the BSC's specific questions. The discussion topics included:

- ATSDR's ongoing technical assistance and other efforts to build capacity in communities to better understand the science from a risk communication perspective and serve as their individual advocates;
- ATSDR's new Health Understanding Grants (HUGS) with other CDC National Centers and federal partners to form a multidisciplinary public health team and provide resources to help communities build capacity at the local level to address EH concerns; and
- the use of analytical tools to compile data from the 5,000 sites ATSDR has visited in the past to implement lessons learned, apply best practices, and improve site assessment capabilities at future sites.

The BSC proposed a number of suggestions for ATSDR to consider in the planning process of the symposium.

- *Question 3:* ATSDR should convene small breakout groups to provide an opportunity for the participants to utilize its products.
- ATSDR should ensure that scientists with a history of conducting community-based projects are invited to the symposium.
- The symposium does not appear to be particularly transparent or include the community perspective. ATSDR should host a follow-up webinar to the symposium to provide an opportunity for community residents to participate. Consideration also should be given to changing the name of the symposium (e.g., "The Future of ATSDR's Science in the Community").
- ATSDR should provide an opportunity during the symposium for the participants to help design a risk communication toolkit for communities. The toolkit should describe resources to help communities address EH issues.
- ATSDR should expand the scope of the symposium to formally include NCEH's expertise, particularly in the area of biomonitoring.
- ATSDR should review NIOSH's materials to gather additional ideas about the symposium during the planning process. NIOSH convened the "Health of Science" Workshop to discuss retention of the quality of science in the presence of flat or

declining budgets and strategies to increase innovation in science and research (e.g., conducting more “high-risk/high-reward” research). NIOSH formed two workgroups to discuss the scientific rationale and identify criteria to determine whether research and biomonitoring should be conducted following a disaster. Dr. Decker would provide Mr. Gerhardstein with the workshop report, the research workgroup’s paper that was submitted for publication, and other NIOSH materials.

- The BSC members proposed additional sessions and topics for ATSDR to consider including in the symposium:
 - a risk communication session to provide guidance on translating scientific messages into language for laypersons and advise communities on taking action when a study has found no health outcomes;
 - a session on the emerging interface between EJ and sustainability and the incorporation of sustainability into decision-making for legacy or future land use, economics, societal health and environmental implications;
 - a session on ATSDR’s efforts to address its budget cuts (e.g., the Public Health Priority Level Guidance for Site Triage Table).
 - a discussion on the role of science in explaining the disconnect between community expectations and actual delivery of products and services; and
 - a brainstorming session on emerging trends and a systems approach to the concept of “community resilience” to help communities recover from environmental stressors.

Overview of ATSDR’s Hydraulic Fracturing and Other Natural Gas Activities

Tina Forrester, PhD

Director, Division of Regional Operations
Agency for Toxic Substances and Disease Registry

Dr. Forrester presented a public health perspective of ATSDR’s hydraulic fracturing and other natural gas activities. ATSDR and EPA attended numerous listening sessions in Colorado, New York, Pennsylvania and Texas in which thousands of community residents complained about risks posed by the natural gas industry. The communities were extremely angry that industry has caused health effects to their families by contaminating private wells and polluting the air.

Hydraulic fracturing is a process in which tremendous volumes of water are mixed with hundreds of chemicals to liberate gas from deep strata of shale deposits. Shale deposits are in locations across the entire country. The steps in the hydraulic fracturing process include water acquisition, chemical mixing of different agents to release gas from shell strata, well injections, flowback and water production to store recovered water, and wastewater treatment and waste disposal. Hydraulic fracturing ideally should occur deep within the earth’s crust to ensure zones that produce water and gas are not intermixed, but operations are not always conducted in this manner.

The production of natural gas in the United States is projected to increase from 14% in 2009 to 45% in 2035. Of 6,583 permits that were issued in Pennsylvania in 2010, 2,755 wells have been drilled. Pennsylvania issued a number of oil and gas citations in 2010. These violations included releases to waterways, impermeability of impoundments, and failure to securely plug

wells. Dr. Forrester presented slides with aerial views of a rural site in Washington County, Pennsylvania. The “before” photographs were vastly different than the “after” photographs of the site with pits, drilling pads and gas impoundments.

The public health exposure concerns related to hydraulic fracturing that are most important to ATSDR include private and public drinking water contamination and air emissions in terms of local and regional air quality effects. Additional public health concerns include the sharp increase in the demand for local emergency response services due to deaths from accidental explosions, radiological concerns to communities and workers, and beneficial use applications of excess hydraulic fracturing materials. ATSDR has identified nine potential environmental release pathways for hydraulic fracturing:

1. volatile organic air releases from containment ponds;
2. air releases from drilling operations, blowouts, accidents, compressors and diesel engines;
3. liquid releases from containment or flowback ponds;
4. releases from drilling operations near the surface and on the drilling pad;
5. liquid or gas releases from casing failures;
6. liquid or gas releases from hydraulic fracturing due to the ability of fissures and pressure to push material to the surface;
7. transportation incidents;
8. dewatering and purifying of natural gas products through off-gas and waste production; and
9. public water supply degradation as a result of high levels of trihalomethanes and total dissolved solids.

Drinking water issues can occur during all five steps of hydraulic fracturing operations. During the water acquisition and chemical mixing processes, the use of high amounts of water can deplete water sources in rural areas and accidents can occur. During the well injection process, migration to aquifers can occur when materials do not directly travel to the zone where hydraulic fracturing is targeted. During the flowback and produced water process, accidental spills can occur. During the wastewater treatment and waste disposal process, the treatment of wastewater and solid residuals can be incomplete and wastewater transportation accidents can occur.

Hydraulic fracturing fluids contain many chemicals that have limited toxicologic and health effects data. These chemicals include acids, friction reducers, surfactants, gelling agents, scale inhibitors, breakers, cross-linkers, corrosion inhibitors, biocides and foaming agents. Standard water quality assessments typically do not test for these chemicals.

ATSDR and its partners conducted drinking water evaluations. At the Pavillion, Wyoming site, an assessment was performed of the drinking water quality of 41 private wells that were in close proximity to gas development activities. The contaminants of concern that were identified included total petroleum hydrocarbons, methane and other light hydrocarbons, magnesium, lead, sulfates, sodium, arsenic and nitrates. Other compounds also were tentatively identified: adamantanes, 4-chloro-3-methylphenol, and diethylhexyl phthalates. ATSDR concluded that at least 21 wells at the site needed an alternative water supply.

At the LeRoy Township, Pennsylvania site, an assessment was performed to determine the impact of a well-head blowout on seven private drinking water wells. ATSDR concluded that one well had a ten-fold increase in methane and various salts consistent with natural gas activities. ATSDR recommended an alternative water supply and further evaluation of the affected wells before, during and after natural gas activities. The 2011 Osborn, *et al.* study reported methane contamination of drinking water that accompanied gas-well drilling and hydraulic fracturing.

In addition to water quality, hydraulic fracturing operations also can contaminate air quality through the use of compressors, storage ponds and pits, storage tanks, drilling machinery, flaring, diesel trucks and generators. Investigations have identified air quality issues as a result of natural gas drilling activities. At the DISH, Texas site, environmental sampling detected elevated levels of sulfur compounds and VOCs. The health department drew blood from community residents and determined that their blood VOC levels were similar to the upper 95th percentile of the U.S. population.

At the Garfield County, Colorado site, organic compounds related to the petroleum industry were found to be higher in rural areas than in urban areas. Although the overall conclusion of the investigation was an "indeterminate hazard," the risk from exposure to benzene was found to lead to a theoretically increased risk of cancer and 85 compounds in the air were found to be of concern. Of these 85 compounds, 65 have no toxicity value and cannot be appropriately screened.

In Pennsylvania, short-term screening-level air quality assessments were completed near drilling pads, compressor stations, a well site with active flaring, and a surface impoundment. The assessment found VOCs and sulfur-containing compounds (e.g., methyl mercaptan) in the air surrounding these facilities.

Communities in close proximity to hydraulic fracturing facilities across the country have self-reported numerous health complaints: exacerbation of asthma and other breathing issues, unusual rashes, particularly on the scalp, headaches, severe nosebleeds, diarrhea and other gastrointestinal issues, burning eyes and throats, metallic taste in the mouth, sore throats, elevated arsenic urine levels, and health issues, decreased reproductive rates and deaths among livestock. Many community residents have reported a disappearance of these health issues after moving from the affected areas.

In addition to health issues, communities also have complained of quality of life and stress concerns: high volumes of truck traffic, impacts on the infrastructure, noise and light pollution, odors, influx of temporary employees, increased crime, increased rental property prices, and higher seismic activities.

ATSDR is aware of numerous unanswered questions related to hydraulic fracturing operations. What is the full chemical exposure profile and toxicity to which communities are being exposed? What is the relevance for community exposures of radioactivity of produced water and drill cuttings? What are "acute" versus "long-term" health concerns? Do these concerns change over time with the life cycle of the natural gas industry? What health conditions should be prioritized and tracked? What are the impacts of hydraulic fracturing on the overall health system?

Several activities are underway in an effort to answer these questions. The EPA National Hydraulic Fracturing Study will assess water impacts and public health at several sites to determine a relationship between the oil and gas industry and drinking water. The University of Pittsburgh Center for Healthy Environments and Communities and the Heinz Foundation are assessing public health and environmental impacts in Western Pennsylvania.

ATSDR and CDC are evaluating clinical and environmental data for three families in Washington County, Pennsylvania. The Health Resources and Services Administration is exploring the possibility of studying the impact of the natural gas extraction industry in Pennsylvania on safety net providers. ATSDR initiated an exposure investigation of air impacts from compressors or impoundments in Pennsylvania. ATSDR is reviewing additional well data from the Pavillion, Wyoming site.

Dr. Forrester concluded her overview by requesting the BSC's input on the following questions.

1. What approaches should be recommended to evaluate health effects to individuals in areas impacted by natural gas well drilling and completion activities? What approaches should be taken to address non-specific symptoms? Would developing a case definition of "exposed community members" be a productive approach?
2. What is the best approach for environmentally characterizing community exposures over highly variable exposure timelines? Evidence suggests that exposures change over different stages of well development.
3. What is the best strategy to evaluate the air exposure pathway in areas impacted by natural gas well drilling and completion activities (e.g., at the source or at the exposure point)?
4. Would the BSC recommend that ATSDR determine a suite of non-traditional contaminants to assess for air, water and biota contaminants? What approach should be taken to address information gaps for which toxicological information is insufficient?
5. Is it an important or useful priority to provide guidance on biological testing for health professionals and researchers who are currently collecting and evaluating human exposure data in areas impacted by natural gas well drilling and completion activities?

In addition to the specific questions Dr. Forrester posed, Dr. Portier noted that answers also are needed at this time to determine whether the problem is limited to poor performance and lack of knowledge of a few hydraulic fracturing operators or if the problem is widespread or systematic across the entire approach utilized by the natural gas industry as a whole. He emphasized that several issues are unique to hydraulic fracturing compared to other operations: water contamination, methane gas in the water and air, radioactivity, and drilling in communities.

Dr. Forrester and other NCEH/ATSDR leadership provided additional details on hydraulic fracturing and other natural gas activities in response to the BSC's specific questions. The discussion topics included:

- federal and state regulatory oversight of the natural gas industry, particularly in light of the exemption of hydraulic fracturing from the Safe Drinking Water Act;
- hydraulic fracturing as an EJ issue because drilling occurs in poor, rural communities;
- the inability to strengthen knowledge of and systematically gather data on hydraulic fracturing due to the proprietary nature of chemicals associated with these operations;
- the failure of governors, policymakers and other state officials to recognize health effects and other problems associated with hydraulic fracturing due to the role of natural gas drilling activities in stimulating local economies and the inability to “prove” health problems without solid data;
- wide variability in hydraulic fracturing problems across sites;
- the critical need for public health agencies to take a proactive approach at this time and not wait to determine whether affected communities will develop diseases from hydraulic fracturing chemicals in the future;
- NIOSH’s efforts to address occupational hazards to workers who are exposed to high levels of contaminants during the course of hydraulic fracturing operations; and
- the need for interdisciplinary collaboration and cooperation among public health, industry and the private sector.

The BSC made a number of comments and suggestions on potential next steps in ATSDR’s public health approach to hydraulic fracturing and other natural gas activities.

- *Question 4:* ATSDR should identify a suite of non-traditional contaminants to assess for air, water and biota contaminants.
- Federal and state agencies should make efforts to collect baseline hydraulic fracturing data by collecting samples from a pristine site and comparing the samples to a control site that has not been “geologically violated.”
- Emphasis should be placed on taking immediate public health actions to help communities affected by hydraulic fracturing (e.g., increased access and referrals to Community Health Clinics, physicians and other health services, provision of filtered water, and ongoing risk communications about explosions and other dangers of drilling facilities).
- ATSDR and its federal partners should launch a campaign to educate policymakers and other officials who are in a position to change legislation regarding hydraulic fracturing. New legislation would help public health agencies to take a proactive, precautionary and preventive approach rather than a reactive approach.
- ATSDR and CDC should apply its expertise to conduct ongoing surveillance of hazard assessments of hydraulic fracturing operations. The data should be used to develop and provide best practice guidance, model language, model surveillance programs and templates to communities, state legislators and state permitting agencies. For short-term surveillance, the guidance should focus on using an early detection system for hazards to trigger complete cessation or modification of hydraulic fracturing operations. For long-term surveillance, the guidance should focus on collecting baseline and long-term trend data. Guidance also should be provided on minimal criteria for surveillance of private wells, municipal water systems, air quality, and appropriate sampling schemes to embed into ongoing hydraulic fracturing operations. Resources should be allocated to incorporating this guidance into the permitting process for hydraulic fracturing and requiring industry to comply.

In response to Dr. Portier's request, Dr. Ryan polled the BSC and confirmed that all of the members in attendance were in favor of ATSDR prioritizing hydraulic fracturing as a major public health problem. The BSC emphasized the critical need for ATSDR to extensively engage its federal partners in this effort, but several members noted that ATSDR should take leadership and serve as a champion to address health effects associated with hydraulic fracturing. The BSC also advised ATSDR to characterize the seriousness of hydraulic fracturing as a top priority at the levels of the HHS Secretary and CDC Director.

Based on the BSC's comments, Dr. Portier confirmed that he would present an update during the next BSC meeting outlining the next steps in ATSDR's public health approach to hydraulic fracturing. He clarified that NCEH/ATSDR does not believe hydraulic fracturing is unsafe, but specific aspects might be unsafe. Data need to be collected to make informed decisions.

Dr. Portier announced that George Washington University would host a scoping meeting in Washington, DC over the next few months for the participants to discuss ongoing efforts, gaps and available data related to hydraulic fracturing.

PANEL PRESENTATION: CDC'S GLOBAL ENVIRONMENTAL HEALTH ACTIVITIES

A panel of NCEH leadership presented two overviews on CDC's global EH activities. The presentations are summarized below.

Overview of the Lead Poisoning Outbreak in Zamfara State, Nigeria

Mary Jean Brown, ScD, RN

Chief, Healthy Homes/Lead Poisoning Prevention Branch, NCEH, EEHS
Centers for Disease Control and Prevention

Dr. Brown presented an overview of the lead poisoning outbreak in Zamfara State, Nigeria. The outbreak was the largest and most serious incident of lead poisoning in modern times. When CDC was initially notified of the outbreak in April 2010, the childhood mortality rate for children <5 years of age in two villages in Zamfara State who had symptoms consistent with lead poisoning was six times higher than the indicator that is used to characterize severe health problems in a refugee camp (e.g., ~12/10,000 per day in Zamfara State versus >2/10,000 per day in a refugee camp).

A holistic and strategic plan was implemented in June-September 2010 to resolve the issue of childhood lead poisoning in Zamfara State. For coordination of activities, the Zamfara Ministry of Health established a Rapid Response Team (RRT). CDC and New York City provided high-level training to 4 RRT members in New York City on comprehensive lead poisoning prevention.

For case management, the average BLL of children in Zamfara State was 165 µg/dL with a range of 100-400 µg/dL. Of these children, ~50% died. The Nigerian government granted

CDC's request for expedited approval to chelate children with oral succimer. The World Health Organization (WHO) funded Doctors Without Borders/Médecins Sans Frontières (MSF) to provide succimer to treat >350 children <5 years of age. The case fatality rate of children who had seizures and coma in MSF field hospitals decreased from ~43% at the start of the outbreak to <1% after 3 days of administering chelation therapy. The RRT traveled to 7 other villages and identified >100 additional cases of symptomatic lead poisoning.

For soil lead testing, the United Nations Environmental Program and the RRT tested soil samples from the 7 additional villages. All of the samples exceeded the EPA soil lead standard of 400 ppm. For village and home cleanup, TerraGraphics led this effort in both of the surveyed villages. Lead-contaminated surface soil was replaced with clean soil and dust inside lead-contaminated compounds was removed.

The cleanup of Zamfara State was complicated because villagers are fundamental Muslims. Women are not allowed to leave their family compounds from the age of puberty to menopause. However, religious leaders were extremely supportive of the cleanup efforts and gave special permission to lift some of the restrictions. Women were allowed to leave the compound and male non-family members were permitted to enter the compound for the cleanup. After the compounds were remediated, children were treated as outpatients. To date, ~2,500 children in Zamfara State have been treated in this manner.

For lead poisoning public health messaging, UNICEF led social mobilization and advertisement campaigns. Key messages that were conveyed included "move gold ore processing from the villages," "clean up before returning home," "wash your hands," "keep children away from gold ore processing sites," and "allow your children to be tested for lead." Gold ore that was contaminated with lead was found to be cause of the outbreak in Anka, Bukkuyum and Maru in Zamfara State, but most of the gold ore processing sites have been moved from the villages. The CDC team returned to Zamfara State in November 2010 and identified contamination as a result of elevated soil lead levels or BLLs in ~50% of 75 additional villages.

CDC developed a plan with multiple strategies to mitigate the effects of artisanal gold ore processing. Sustainable public health programs will be created to identify lead-poisoned children and provide needed medical interventions. To achieve this goal, CDC plans to conduct population-based sampling to estimate the extent of the exposure. Efforts are underway to develop a stratified cluster sampling protocol.

In villages that will serve as randomized cluster samples, children 1-5 years of age, soil and house dust, and livestock will be tested. Discussions have been held to pilot a program to integrate blood lead testing into other medical services (e.g., immunization). MSF is continuing to dedicate its individual resources and efforts to developing local treatment capacity due to the absence of a formal public health infrastructure in Zamfara State.

High-priority contaminated areas will be identified and remediated. CDC is using Google Maps as a resource in this goal. The remediation plan for village compounds will cover surface soil, particularly sleeping and cooking areas where children frequent; surface soil in ore processing areas; drinking water wells near contaminated areas susceptible to contamination from surface runoff; drinking water wells with elevated lead levels; and food preparation areas and equipment

that have been contaminated with lead or suspected of having been used in gold ore processing.

The remediation plan for areas outside village compounds will cover ore processing areas in the vicinity of surface water or drinking water sources; areas only accessible to young children <5 years of age and livestock; ore stockpiles and processing waste storage areas; and sediment in the vicinity of processing operations. A remediation plan must be built into each license that is granted to a corporation to work in Zamfara State.

Safe mining and ore processing practices will be promoted as part of worker safety and health. Dr. Brown had discussions with local and national Mining Association members, physicians, Ministers of Health, Environment Mines and Steel, and the U.S. Ambassador to Nigeria. She was pleased to announce that these groups were extremely engaged and interested in information from CDC. The Mining Association specifically requested an expert consultation with CDC to discuss worker health and safety in more detail.

Economic sustainability of better mining practices will be improved. The *Daily Sun* reported 4 deaths in Zamfara State from a mining pit that collapsed on October 28, 2011. Efforts are underway to locate secure facilities to lock the gold ore and prevent workers from taking the contaminated material home.

The Artisanal Gold Mining Council made recommendations to improve mining practices. The “crushing” process can be improved by reducing dust through the use of a hammer mill and jaw crusher rather than a flour grinder. The “grinding” process can be improved by adding water to eliminate dust as the main exposure pathway. This improvement is more efficient and profitable.

The “sluicing” process can be improved by using Vortex and centrifuge. This improvement is a step toward eliminating mercury use. The use of a retort can capture mercury smoke and is believed to reduce air pollution by 95%, but this approach needs to be tested. Reprocessing of tailings centralizes the waste stream, reduces lead exposure and recontamination, and is more profitable. The “amalgamation” process can be improved by teaching safety and not allowing women or children to perform this work. Dr. Brown showed photographs of the recommended improvements in workflow.

CDC acknowledges the need to address several unresolved issues in the plan to mitigate the effects of artisanal gold ore processing need to be addressed. The randomized cluster sample design may allow CDC to determine the relative contribution from drinking water, livestock and other foods. The use of ore processing waste as play materials for young children needs to be addressed.

An evaluation is needed to determine the contribution of lead-contaminated house bricks to blood and environmental lead levels, alternative ore processing methods and worker training. Special issues related to child labor need to be considered from both political and cultural perspectives. Technical expertise needs to be deployed in the field in Zamfara State.

Other significant lead sources in Nigeria include mines, lead paint, and eyeliner with 85% of lead used on children <5 years of age. The Nigerian Minister of Environment is collaborating

with the U.S. Ambassador to institute a country-wide ban on lead paint. CDC hopes to publish a joint paper in the *Morbidity and Mortality Weekly Report* with the new Nigerian CDC on elevated BLLs in children from eyeliner.

Drs. Brown and Portier provided additional details on the lead poisoning outbreak in Zamfara State in response to the BSC's specific questions. The discussion topics included:

- funding by the U.S. Agency for International Development to support CDC's response to the Zamfara State outbreak;
- the contribution of ~\$200,000 by the Zamfara State government for cleanup efforts;
- the rationale for NCEH rather than the CDC Center for Global Health leading the investigation of the lead poisoning outbreak in Zamfara State;
- uncertainties related to the proposed approach of integrating blood lead testing into immunization programs due to low immunization rates among children in Nigeria; and
- the possibility of providing EH training to Nigerian students during their attendance at universities in the United States.

Overview of Global Household Air Pollution and Health

Vikas ("Vik") Kapil, DO, MPH, FACPOEM

Chief Medical Officer and Associate Director for Science, NCEH/ATSDR
Centers for Disease Control and Prevention
BSC Designated Federal Official

Dr. Kapil presented an overview of global household air pollution and health issues. Biomass fuels are widely used for heating and cooking in low-income countries and serve as the primary fuel source for ~50% of the world's population. These fuels include dung, crop residues, wood, charcoal and coal.

The use of cleaner fuels (e.g., gas, alcohol, natural gas and electricity) has increased globally over the past few decades. However, low-income countries continue to use the traditional three-stone fire for cooking. Because this method occurs indoors and burns wood, both children and adults inhale incomplete combustion products and are at risk for serious burns. The three-stone fire has significant implications for air quality.

Dr. Kapil showed photographs to compare the city of Chicago on a day with poor air quality and the inside of a home in Guatemala with an open-air fire. The levels of exposure in these homes are much higher than ambient air pollution on the order of hundreds or thousands.

The "Randomized Exposure Study of Pollution Indoors and Respiratory Effects" (RESPIRE) was conducted in Guatemala and was designed as an intervention trial of a permanently installed cleaner stove with a chimney. The RESPIRE study reported measurable reductions in exposures to emissions in the participating homes and significant impacts on the health outcome of interest (e.g., childhood pneumonia). The RESPIRE study will be published in *Lancet* in the near future and will serve as the first publication of a controlled intervention trial.

Relatively strong evidence has been gathered to demonstrate a relationship between open-air fires in homes and pneumonia in young children, acute lower respiratory tract infections, chronic obstructive pulmonary disease, and lung cancer. Moderately strong evidence has been collected to show an association to tuberculosis, cataracts, asthma exacerbation, low birth weight in children, perinatal mortality, and otitis media. However, limited and weak evidence has been gathered to document a relationship to cardiovascular disease.

The global populations that primarily rely on solid fuel burning are in sub-Saharan Africa and Asia. The burden of associated diseases is extremely high in China, India and sub-Saharan Africa. WHO analyzed the impact of solid fuel burning on low-income countries and published these findings in its annual World Health Report. Of 10 leading risk factors in low-income countries, WHO ranked indoor smoke as fourth. WHO estimated that exposure to household air pollution and indoor smoke account for ~1.9 million deaths per year. The use of sub-optimal solid fuels in low-income countries is associated with socioeconomic status (e.g., poverty and income streams).

The involvement of CDC and its partners in the global issue of household air pollution is critical to filling important health research gaps. A meta-analysis reported increased lung cancer risks in China. Other completed research includes a randomized controlled trial and the RESPIRE study in Guatemala. Research also is underway in Nepal, Ghana, India and Kenya.

Some of the most important health research gaps include dose/exposure responses to severe childhood pneumonia; the extent to which cleaner stoves are actually “clean” in low-income countries; dose responses to other acute health impacts (e.g., low birth weight); better understanding of chronic health impacts, particularly cardiovascular disease and lung cancer; and burn injuries and stove safety.

Cleaner and more efficient stoves that use less fuel have other benefits in addition to better health outcomes. The global climate would improve as a result of warming particles from burning these types of fuels. Women and children would not need to spend extensive amounts of time each day to collect wood. Injuries and violence against women would decrease as well. Other important issues also must be considered to reduce indoor air pollution in low-income countries (e.g., stove design and durability, various fuel options, sustainability and economics).

CDC is a founding member of the Global Alliance of Cleaner Cook Stoves and also leads the Health Workgroup of this initiative. The U.N. Foundation leads this 10-year public/private partnership to create a thriving global market for cleaner and more efficient stoves. The overarching goal of the Global Alliance is to save lives by reducing exposure, empowering women, and decreasing adverse climate impacts by mitigating black carbon and greenhouse gases.

CDC funded the Public Health Institute to conduct four major initiatives in FY2011 in Kenya, India and Guatemala. CDC is collaborating with the RESPIRE study investigators to conduct a field assessment of a new, promising stove and develop a registry of the existing RESPIRE cohort in Guatemala. A field training station was established to educate researchers in Africa and Asia with an interest in conducting stove studies.

CDC is using its existing collaboration in India to address high rates of childhood pneumonia and mortality associated with household air pollution. This issue is particularly serious in India due to its large population and the extensive number of persons who use solid fuels in this country. CDC and the India Ministry of Health and Family Welfare have met to discuss household air pollution on numerous occasions.

The Indian government has made a strong commitment to address this issue at the highest level and expects to launch a stove program. CDC is providing technical assistance to India on the health aspects of four stove-related intervention studies, biomarkers associated with these studies, and a characterization of a reduction in exposures with the stove interventions. The health outcomes of interest in the Indian studies include low birth weight and early childhood pneumonia, asthma exacerbation, cardiovascular health in adults, and chronic lung disease in women, particularly non-smoking women.

CDC is focusing on the reduction of household air pollution in Kenya and its role as a risk factor for childhood pneumonia, low birth weight and burns. CDC and its partners launched phase 1 of a study to determine the acceptability of cleaner stoves in the field in Kenya. Candidate stoves will be selected and evaluated for their acceptability. Exposures will be assessed and characterized in select homes in Kenya. Data from the health and burn surveys will be analyzed. Strategies will be explored to link to existing health surveillance capacity and health systems in Kenya.

Phase 2 of the study will focus on a scale-up of the selected stoves and an analysis of specific health outcomes of interest. The feasibility of introducing the stoves to the market will be assessed. The health impact of the stoves will be evaluated.

Dr. Kapil showed a series of photographs of the global stove industry and new technologies. An inexpensive stove used in Kenya was found to be more efficient in terms of using less wood, but emissions were reduced by only 10%-15%. A scientific organization in the private sector is interested in creating a retrofit, self-powered fan for the stove to greatly reduce emissions.

A nonprofit organization in Oregon designed a wood-burning "rocket" stove that significantly reduced emissions. A wood-burning rocket stove that is used in India also reduced emissions and improved efficiency. A stove that is used in India has a fan to create air turbulence and further reduce emissions by promoting hotter burning of fuel. A company currently is designing a fan that will be operated by heat generated from the stove and will not require a power source. In the future, villages with no reliable source of power or fuel will be able to use an institutional stove that burns wood or other crop wastes to autoclave surgical instruments.

Overall, CDC's primary role is to further validate the health benefits of improved stoves; investigate the effects of reduced household air pollution on health outcomes; integrate the stove implementation activities with other public health efforts; and evaluate the implementation of these initiatives from diverse perspectives over time.

In response to the BSC's questions, Dr. Kapil provided details on cultural, socioeconomic and regional differences related to the use of indoor fires for cooking. The BSC advised CDC to include questions about lower respiratory tract infections in the health surveys of global household air pollution.

Public Comment Session

Dr. Ryan opened the floor for public comments; no participants responded.

Closing Session

Dr. Andrea Kidd Taylor announced that her term expired in June 2011. She enjoyed her tenure as a BSC member and was pleased to meet several new colleagues over the past four years. She commended NCEH/ATSDR for its outstanding EH activities and encouraged leadership and staff to continue these important efforts in the future.

Dr. Kidd Taylor urged her BSC colleagues to continue to advocate for NCEH/ATSDR's EH programs. Most notably, an e-mail was recently circulated announcing that Congress eliminated the budget for the CDC Childhood Lead Poisoning Prevention Program. Dr. Kidd Taylor thanked NCEH/ATSDR for providing her with an opportunity to serve as a BSC member. Drs. Portier and Ryan thanked Dr. Kidd Taylor for her excellent participation on the BSC. She would receive a certificate of appreciation to acknowledge her outstanding service.

Dr. Portier thanked the BSC members for continuing to take time from their busy schedules to provide NCEH/ATSDR with valuable advice and guidance. He noted that future meetings would focus less on updates of ongoing activities and more on the BSC's role in the decision-making process prior to NCEH/ATSDR initiating or conducting activities.

Dr. Ryan thanked NCEH/ATSDR leadership (Drs. Portier and Kapil) and Office of Science staff (Ms. Sandra Malcom, Executive Coordinator for the BSC and Ms. Shirley Little) for their continued support to make the BSC meetings successful and productive. He also thanked the BSC members for their continued participation.

With no further discussion or business brought before the BSC, Dr. Ryan adjourned the meeting at 12:10 p.m. on November 4, 2011.

I hereby certify that to the best of my knowledge, the foregoing Minutes of the proceedings are accurate and complete.

Date

Timothy J. Ryan, PhD
Chair, Board of Scientific Counselors