State-based Public Health Laboratory Biomonitoring Program for the Four Corners States (Arizona, Colorado, New Mexico, Utah) Biomonitoring Consortium

PROTOCOL

Research Team
Sanwat Chaudhuri, Ph.D., Principle Investigator for the 4CSBC program, Utah Public Health Laboratory (UPHL),
Sam LeFevre, Co-Principle Investigator, Environmental Epidemiology Program,
Carrie Butler, 4CSBC Program Manager and the Utah Project Coordinator (UPHL).
Greg Williams, MPH, Epidemiologist, Megan Broekemier, MPH, Health Educator, UEPHTN and Nathan LaCross, Ph.D., Epidemiologist, APPLETREE, Environmental Epidemiology Program, Utah Department of Health

Contact (for this IRB)
Sanwat Chaudhuri, PhD
Scientific Advisor of Chemical and Environmental Services Program
Utah Public Health Laboratory
4431 South 2700 West
Taylorsville, Utah 84119
(801) 965-2470
Email: schaudhu@utah.gov

Introduction and Background

Prevention and control of environmentally related health concerns is an essential part of public health's role and obligation to the public. Environmental health concerns result when hazardous environmental conditions and exposure potential are present. Public health surveillance collects, analyzes and interprets data related to the presence of hazardous agents, human exposure, and adverse outcomes, to help communities and policy makers understand, prioritize, develop interventions for, and evaluate actions related to environmentally related health concerns (Thacker et al. 1996). Biomonitoring is an established tool to collect data about the exposure component of the "hazard-exposure-outcome" axis. Without a complete knowledge about exposure, communities, policy makers, and public health practitioners are handicapped in their ability to make informed science-based decisions regarding the prevention and control of environmentally related health concerns. Recently, the call for development, improvement and increased use of biomonitoring capacity has been heard in the public health community (Albertini et al. 2006; CSTE 2013; Hendrick and Farquhar 2010; Paustenbach and Galbraith 2006; Sexton et al. 2004).

The state public health agencies in the states of Arizona, Colorado, New Mexico, and Utah have a history of collaborating and working together on environmental health concerns that are common in the region covered by the four states. Common to these states are public concerns related to environmental and industrial hazards of mining, air quality, private wells, and pest control chemical use near residential areas. To address these concerns, Arizona, Colorado, New Mexico, and Utah have organized a "Four Corners States Biomonitoring Consortium" (4CSBC) to address persistent environmental health concerns that have been raised by the public and legislative policy makers. The 4CSBC framework is an adaptation of the larger and successful Rocky Mountain Biomonitoring Consortium that functioned from 2001-2008.

The four corners states are home to over 16.9 million people (6.6 million in Arizona, 5.3 million in Colorado, 2.1 million in New Mexico, and 2.9 million in Utah). These states share a variety of geologic ecologies including the arid and semiarid deserts, forested and alpine mountains, canyon lands, and mid-west plains. The four corners states area covers more than 271.7 million acres (72.9 million in Arizona, 66.6 million in Colorado, 77.8 million in, New Mexico, and 54.3 million in Utah). The economics of the four corners states have a common basis in tourism, recreation, mining, logging, and agriculture. Over 35% of the land area is used as agricultural range land, 33% is forest land distributed in 32 forest units, 27% is cultivated farmland and 4% is in orchard crops. There are over 92,500 farms or ranches in the four states. Quantification of pesticide usage in the four states is limited. Colorado estimates that 31 million pounds of pesticides are used per year in that state. Utah estimates that there are over 6,800 licensed pesticide applicators in the state. Approximately half are actively applying pesticides either for agricultural or domestic pest control. Arizona has approximately 7,500 licensed pesticide applicators. Pesticide usage is known to be impacting some ground water in these states. The National Pesticide Information Center reports that 635 inquiries originating from the four corners states were made about pesticide exposure and health risks during 2013. Nationwide, pesticide exposure is the 10th most common cause of poisonings managed by poison control centers.

There are seven aquifers that are shared by two or more states in the four corners region. Five additional major aquifers are located in one of the states of the consortium, along with numerous smaller mountain alluvial aquifers. These aquifers supply ground water

to the majority of the population in these states. As many as five percent of the rural homes use private drinking water wells as the primary source of water. These states are known for their mineral-rich geology. This is exemplified by the more than 884 active mines and 471 active processing plants in these four states including the largest open pit copper mine (Bingham Canyon copper mine in Utah) in the nation. Forty-five (45) of the active mines are for metals (primarily beryllium, copper, gold, molybdenum, rhenium, silver and titanium). Utah has an industry that mines magnesium from the Great Salt Lake. In addition, there are over 119,000 known abandoned mines including over 5,000 abandoned hard rock mines. While water quality of the aquifers across these states is considered very good some areas experience high levels of dissolved metals in the water. For example the arsenic levels in some areas in Millard County, Utah average 180 ug/L.

Source of Funding

This project is being funded by a grant from the Centers for Disease Control and Prevention (CDC) entitled "The 4 Corner States are Collaborating to Develop and Enhance Biomonitoring Capability to Assess Human Exposure in this Region (1U88EH001153-01)." The Budget Period for the 4CSBC grant is September 1, 2015 through August 31, 2016. The Project Period for this grant is September 1, 2014 through August 31, 2019.

Other IRB Reviews Conducted: Yes.

This IRB proposal is for continuation of the project. The project was approved by the UDOH IRB on December 23, 2014 [IRB Project #407 – State-based Public Health Laboratory Biomonitoring Program for the Four Corners States (Arizona, Colorado, New Mexico, Utah) Biomonitoring Consortium]. See Attachment 1.

This project is the Utah component of the 4CSBC. Each of the other states (Arizona, Colorado, and New Mexico) has previously received IRB approval in their respective states and will be submitting essentially the same proposal to their respective institutional review boards for IRB for continuation approval. The project requires approval by all four state IRB boards.

Research Questions/Objectives

Objective: The primary objective of the consortium is to generate science-based information that will lead to relevant public health policy to address several Healthy People 2020 Environmental Health objectives to improve to ensure safe drinking water, reduce pesticide exposure, and reduce exposure to metals including arsenic, cadmium and mercury. The 4CSBC proposes to use data collected through this biomonitoring project to:

(1) develop and enhance regional collaboration between the states' laboratories and environmental epidemiologists to implement biomonitoring activities relevant to state and regional needs;

(2) develop increased capability and capacity to conduct biomonitoring and risk and exposure assessment through the shared regional capacity, experience, and knowledge;

(3) develop science-based knowledge about environmental exposure that can be used to respond to current relevant public health concerns common to the region;

(4) empower communities, collaborating action committees, public health policy makers, and state legislatures to develop appropriate and science-based public health policy and programs to mitigate those health concerns; and

(5) ultimately reduce or eliminate exposure to environmental chemicals by helping at-risk populations assess risks and intervention programs.

Research Questions: Through biomonitoring of urine collected from targeted potentially higher risk components of the state population, this project proposes to understand the level of exposure to the following five environmental analyze for five specific environmental exposure concerns. These five exposure concerns were selected because they are common in all four states of the consortium, are current, and have been articulated by the public or by policy makers. The metabolites of all of these exposure concerns can be measured in urine samples. These concerns are discussed individually next.

(1) Heavy metal contaminates from private well drinking water.

(a) Analytes of interest:
1. arsenic (speciated),
2. mercury
3. uranium
4. cadmium
5. manganese, and

6. selenium.

(b) Public health purpose: Previous ground water inventory testing has indicated that ground water in these states can have high concentrations for some or all of these metals. Some states have no or limited requirements for regular testing of private owned drinking water wells that are using ground water. This biomonitoring project will inform state initiatives to improve either requirements or recommendations for testing of private drinking water wells for heavy metals.

This component of the project contributes in part to Healthy People 2020 Objectives:
EH-4 Increase the proportion of persons receiving safe drinking water
EH-20.1 Reduce exposure to arsenic
EH-20.2 Reduce exposure to cadmium
EH-20.3 Reduce exposure to mercury
EH-22.3 Monitor disease or conditions caused by mercury poisoning
EH-22.4 Monitor disease or conditions caused by arsenic poisoning
EH-22.5 Monitor disease or conditions caused by cadmium poisoning

(c) Related health outcomes: Cancer, central and peripheral neuropathy, cardio-vascular damage and disease, kidney damage, osteomalacia, electrolyte imbalance.

(d) Target population: High risk populations are those where private well water contributes a significant proportion of drinking water in areas where there is known or suspected high levels of heavy metal contamination of ground water.

(e) Target timeframe: Year round for grant periods one through five, starting in the 3rd quarter of the first grant period.

(2) Domestic use of 2, 4-dichlorophenoxyacetic acid (2, 4-D)-containing herbicides.

(a) Analytes of interest: 2, 4-dichlorophenol (2, 4-DCP)

(b) Public health purpose: 2, 4-DCP is a precursor to and soil degradation product of 2, 4-D herbicide and other manufactured products. Because 2, 4-D containing herbicides are highly effective systemic herbicides for controlling broadleaf plants, these herbicides are commonly used in both residential and agricultural settings. The four-corner state residential areas are typically single unit dwellings with large yards dominated by lawns and gardens. 2, 4-DCP absorbs through the skin or by ingestion. Chronic exposure of expectant mothers may result in adverse birth outcomes.

This component of the project contributes in part to Healthy People 2020 Objectives:
EH-11 Reduce the amount of toxic pollutants released into the environment

(c) Related health outcomes: Adverse birth outcomes. There is sufficient evidence regarding whether or not exposure to 2, 4-DCP increases the risk of cancer.

(d) Target population: Rural and suburban populations.

(e) Target timeframe: Spring and fall starting in the second grant period

(3) p-dichlorobenzene (p-DCB) found in disinfectants, deodorants, or pesticides.

(a) Analytes of interest: 2, 5-dichlorophenol (2, 5-DCP)

(b) Public health purpose: 2, 5-DCP is a byproduct of a number of waste treatment and industrial processing activities. 2, 5-DCP can also be absorbed through the skin or by ingestion. In acute high dose exposures, 2, 5-DCP is cytotoxic by disrupting the cellular ability to manufacture ATP.

This component of the project contributes in part to Healthy People 2020 Objectives:
EH-11 Reduce the amount of toxic pollutants released into the environment

(c) Related health outcomes: Weight gain and obesity; possibly type 2 diabetes, insulin resistance, and chronic fatigue.

(d) Target population: Statewide

(e) Target timeframe: Year round for grant periods two through five.

(4) Phthalate contamination in food and domestic use products.

(a) Analytes of interest: There are many different kinds of phthalates in commercial use. This project proposes to look for exposure to 4 new generation phthalates: diisonyl phthalate (DINP), diisodecyl phthalate (DIDP), diisobutyl phthalate (DIBP), bis(2-ethylhexyl) phthalate (DEHP). To test for exposure to those environmental phthalates, the following 8 phthalate metabolites will be looked for in urine samples:

1. mono-isobutyl phthalate (MiBP)
2. mono-(2-ethylhexyl) phthalate (MEHP)
3. mono-(3-carboxypropyl) phthalate (MCPP)
4. mono-(2-ethyl-5-oxohexyl) phthalate (MEOHP)
5. mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP)
6. mono-(5-carboxy-2-ethylphentyl) phthalate (MECPP)
7. mono-(6-carboxy-2-methyheptyl) phthalate (MCOP)
8. mono-(7-carboxy-2-methyloctyl) phthalate (MCNP)
9. mono-benzyl phthalate (MBzP)
10. mono-ehtyl phthalate (MEP)
11. monobutyl phthalate (MBP)
12. mono-methyl phthalate (MMP)
13. mono-n-octyl phthalate (MOP)
14. mono-isononyl-phthalate (MiNP)
15. MCOCH
16. MHNCH

(b) Public health purpose: Phthalates are a collection of dialkyl or aryl esters derived from phthalic acid. Phthalates are used in a large variety of products including plastic manufacturing, pharmaceuticals, gelling agents, lubricants, glues, agricultural soil treatment, personal-care products, paints, inks, and detergents. Nearly all people are exposed to phthalates.

This component of the project contributes in part to Healthy People 2020 Objectives:
EH-11 Reduce the amount of toxic pollutants released into the environment.

(c) Related health outcomes: Breast cancer, endocrine disruption, asthma, adverse reproductive outcome, and obesity

(d) Target population: Statewide

(e) Target timeframe: Year round for grant periods one through five, starting in the 4th quarter of the first grant period.

(5) Pyrethroid insecticides.

(a) Analytes of interest:
3-phenoxybenzoic acid (3-PBA)
Trans-Dichlorovinyl-dimethylcyclopropane carboxylic acid
4-fluoro-3-phenoxybenzoic acid (4F-3-PBA)

(b) Public health purpose: Pyrethroid pesticides are used for domestic insect control. The nation-wide emergency of West Nile Virus infections led to increased use of pyrethroids in residential area for mosquito abatement. Most people have an enzyme (glucuronidase) that metabolized pyrethroids entering the blood into harmless metabolites. A small group of people lack the enzyme and can experience neurotoxic effects from pyrethroid exposure. Additionally, pyrethroid exposure may trigger allergic or asthmatic reactions in sensitive people after inhalation exposure. 3-PBA is a metabolite of pyrethroid environmental degradation or exposure. 3-PBA is also used to manufactures certain dyes. 3-BPA is an endocrine disruptor and can adversely affect reproductive health and sexual development. In addition 3-PBA may be immunosuppressive

This component of the project contributes in part to Healthy People 2020 Objectives:
EH-10 Reduce pesticide exposures that result in visits to health care facilities
EH-11 Reduce the amount of toxic pollutants released into the environment
EH-22.2 Monitor disease or conditions caused by pesticide poisoning

(c) Related health outcomes: Neurotoxicity, endocrine disruption, adverse reproductive health, adverse sexual development, immunosuppression, allergic and asthmatic reactions.

(d) Target population: Populations in close proximity to bodies of waters treated for mosquito abatement.

(e) Target timeframe: Summer fall during the adult mosquito abatement period, for grant periods two through five.

Creatinine will also be assessed with each urine sample to quantify the relative urine concentration. Metabolite concentration will be reported in reference to the urine creatinine level.

Study Design and Procedures

Governance: This project will utilize four groups to provide governance to the project:

(1) The 4CSBC Core Team consists of the 4CSBC program coordinator, and each state's project coordinator, laboratory lead and epidemiology lead. The core team meets monthly by phone and semi-annually in person to finalize upcoming phases, to include designing and developing recruiting protocols, surveillance tools, sampling tools, etc., necessary to implement the next cycle of biomonitoring. Utah's membership on the core team include Carrie Butler (who serves as the 4CSBC program coordinator and Utah's project coordinator), Dr Sanwat Chaudhuri (laboratory lead), and Sam LeFevre (epidemiology lead).

(2) Each state has established an advisory panel. The role of the advisory panel is to help with the design of each cycle of the study, identify populations for recruitment, determine best recruitment approaches, and provide oversight to the project. In Utah, the Risk Assessment Advisory Committee (RACC) serves as the advisory panel for this project. The RACC consists of environmental health, laboratory and leadership representatives from UDOH, the Utah Department of Environmental Quality (UDEQ), and the Utah Poison Control Center (UPCC). Utah's core team members meet with and report to the RACC on a quarterly basis. Sam LeFevre (UDOH) and Scott Everett (UDEQ) are the co-chairpersons of the RACC.

(3) Each state has identified key stakeholders and partners. The key stakeholders and partners are informed of the activities and progress of the consortium. In Utah, the key stakeholders and partners for all components of the project are the UDEQ, Epidemiology Affiliate Group (EAG, a consortium of UDOH and LHD epidemiologist and communicable disease prevention staff), and the Counsel of Local Health Environmental Health Administrators (CLEHA, consisting of the 13 Local Health Department Environmental Directors). Stakeholders for one or more components of the project may include the Utah Mercury Workgroup, the Utah Department of Agriculture and Food, the Governor's Pesticide Work Group, the Utah Mosquito Abatement Association, and the Utah Department of Health Chemical Threat Advisory Panel. In addition, as targeted high risk segments of communities are identified, the Mayors / City Managers or other political leaders, health care organization administration, may be included in this group. The CLEHA and the EAG are the primary reporting forums used by the project to keep the local health departments advised of biomonitoring activities and progress in their jurisdictions. Environmental Epidemiology Program (EEP) staff members interact regularly with the CLEHA and EAG to report EEP activities, including biomonitoring activities to those groups.

(4) The Centers for Disease Control and Prevention (CDC) will monitor the activities of the consortium through regular conference calls, annual site visits, and an annual workshop. The 4CSBC is required to provide semiannual and annual written reports to CDC.

Laboratory Preparedness: This project is a surveillance project for public exposure to environmental contaminates. All of the contaminates of concern are detectable (as analytes) in the urine either by direct excretion of the contaminate (i.e., the heavy metals) or excretion of metabolites of the contaminates (i.e., 2,4-D, p-DCB, phthalates and pyrethorids). For this protocol, the laboratory analytes refers to either the excreted contaminates or the metabolites of contaminates. The four state laboratories (Arizona, Colorado, New Mexico, and Utah) have the role of developing, certifying and implementing analytical methods for one or more of the analytes. The four states are sharing laboratory resources to improve efficiency in performance and cost. As part of the method development, all appropriate standardization, quality control, quality assurance protocols are implemented and adhered to. Where existing, Clinical Laboratory Improvement Act (CLIA) standards are being used to develop and standardize methods. For those methods where no CLIA certification process is in place, the labs are working closely with CDC to implement those methods.

Epidemiologic Study Design: This investigation will consist multiple cycles of investigation. Several cycles may occur simultaneously based on the optimal time for exposure assessment. Each cycle will consist of the following steps:

(1) Design: The Core Team will coordinate through conference calls, web-based meetings, or in person meetings to develop a sampling plan for each exposure scenario to be implemented in the cycle. This sampling plan will include the development of:

(a) sampling instructions,

(b) informed consent instructions,

(c) an exposure assessment survey tool,
(d) a standardized method of reporting results back to the test subject with appropriate explanation of results,
(e) health educational material about potential exposure and adverse health effect concerns, and
(f) guidance on how to act upon the results.

Attachments 2 and 3 presents products and examples for heavy metals sampling. The sampling plans are presented to the advisory panel for approval and to finalized decisions on the target population and recruitment method. Available environmental data are used to help guide these decisions. The sampling plans have been made available to key stakeholders.

(2) Recruitment: The project coordinator works with the RACC and key stakeholders to identify high risk populations for recruitment. The project coordinator works with the LHD and other key stakeholders to determine the best method for recruitment. Recruitment may occur in a variety of ways based on the identity of the target population and available resources. In year one, recruitment methods included word-of-mouth, posting invitations in local community buildings, and including UDOH employees aware of the project as participants. Other methods for recruiting may include door-to-door recruitment using the cluster method, partnering with a health fair, or coordinating to use employees or clients of a local business or clinic. Recruitment of participating families with a range of age groups and sexes is preferred.

Individuals willing to participate are screened for inclusion in the study. For example, the intent of biomonitoring for heavy metals is to evaluate the health risks resulting from private well water use. Participating individuals will be screened to ensure a balance of person using private wells as their domestic water source versus those on a public water system. Selected participants are given a biomonitoring kit. Each kit contains:

(a) written instructions regarding the specimen collection process (see Attachment 3 for example),
(b) a patient consent form (see Attachment 2 for example),
(c) a patient rights statement (see Attachment 2 for example),
(d) a statement of unintended consequences that could result from participation in the project (see Attachment 2 for example),
(e) an exposure assessment questionnaire (see Attachment 2 for example), and
(f) sampling materials (e.g., urine cups, zip lock packing bags, ice pack, etc., see Attachment 3 for a packing list)

At the time of recruitment, a sampling team member (usually EEP staff, laboratory staff or LHD staff), under the direction of the project coordinator will review the written instructions and forms with the participant (or if a child the participants primary care-taker). The sampling team member will arrange for a sample pick-up time if necessary. The participants will be assigned a unique specimen identification number and the sampling materials and forms will be labeled with pre-printed stickers of that number. Households are linked by an additional household number that can be used to link environmental samples.

Minor participants are approved by their parent or legal guardian. References to the participant may include indirect application of the step with the minor's parent or legal guardian. For example, instructions and the exposure assessment questionnaire will be provide or administered to the minor's parent or legal guardian instead of directly to the minor participant.

(3) Community Trusted Partnerships: Where possible, the Utah field team will utilize community partnerships such as students from local schools of higher education, service oriented clubs (e.g., Boy Scouts of America), or local government entities to assist with participant recruitment and sample collection events. UDOH will not provide any financial compensation for the assistance provided by these groups.
The intent of collaborative partnership is to assist in expanding reach and local knowledge of potential exposure in communities of interest. The UDOH sampling team will provide these community partners with flyers containing information about biomonitoring and contact information of the UDOH sampling team to distribute in the community. Examples of other assistance will be to secure a sample collection site in their community, or assist during sample collection events by helping to set up the room for the collection event.
The volunteers will sign the "Project Staff Confidentiality Agreement" to assure confidentiality of information. The volunteers will not have access to any personal information of participants and related laboratory data.
An interagency agreement will be developed between UDOH and the agency assisting with services of their members, if needed.

(4) Environmental Sampling: Biomonitoring for heavy metal exposure may include concurrent environmental sampling of drinking water. If this occurs, the participant will also receive instructions and sampling collection kits for collecting environmental samples.
(5) Laboratory Analysis: All samples collected will be delivered to the Unified State Laboratories - Public Health (USL-PH or laboratory) for processing. The laboratory will either analyze the samples at the laboratory or ship samples to one of the other 4CSBC state laboratories for analysis. The laboratory may split samples for testing at separate laboratories as part of the quality control quality assurance process.

(6) Results to Participant: The results with an appropriate explanation and reference value will be provided back to the participant. When available an approved EPA or ATSDR reference value will be used. If no such value is available then the NHANES 95

percentile value will be used. A factsheet that will help the participant understand the results, describe the potential adverse health effects that may result from high exposures to the environmental contaminants of concern, and provide recommendations or guidelines for exposure reduction, will accompany the results for each exposure concern. If the results are above the reference value, the participant will be referred to their personal health care provider for consultation. Factsheets and other documentation from the Agency for Toxic Substances and Disease Registry (ATSDR), and the U.S. Environmental Protection Agency (EPA) will be used as the primary sources for developing the consortium fact sheets. Attachment 2 provides an example of the return letter and factsheets. Attachment 3 provides the decision threshold for each analyte.

(7) Data Collection, Storage, and Sharing: See the Data Storage section below. For each person enrolled in the investigation, data from the exposure assessment tool will be stored in a participant exposure assessment database. These data will be linked to the laboratory data from urine analysis for each participant. Available, environmental sampling data also will be linked to the enrolled persons' record using a household link key. Because these data contains personally identifiable information (PII), the data will be maintained in the Utah EPHTN data warehouse. The UEPHTN data warehouse is maintained on a secure firewall protected data server maintained by the Utah Department of Technology Services. The UEPHTN data manager controls access to the data warehouse. Access will be granted only to project participants who have completed the appropriate UDOH HIPAA training and have completed EPHTN confidentiality agreement form.

De-identified enrolled participant data, with references to the participant's county and 5-year age-group will be made available to the consortium epidemiology workgroup for regional level descriptive statistical analysis and summarization.

(8) Statistical Analysis: Data collected will be analyzed for basic and stratified descriptive statistics and risk assessment after each collection cycle in order to help guide the next cycle. This will include measures of central tendency of exposure concentration for the population sampled stratified by age-, sex- and ethnic-groupings as feasible, and a univariate level assessment of exposure risk factors.

Sample size and number of samples: Urine collection will be in a standard clinical grade urinary collection cup (90 to 120 ml in size, depending on the vendor). In the second year, up to 220 samples, one each from recruited participant will be collected for heavy metals, 100 samples for phthalate and up to 50 samples will be collected for pyrethroid exposures. In some cases, one sample may be collected for several exposure components (i.e., a participant may agree to being tested for both heavy metals and for phthalate exposure).

Final Product: At the end of the grant project, the consortium will generated state and regional level reports for each exposure of concern, discussing the findings and providing recommendations, to include subsequent policies or activities that should be implemented. In addition, the consortium anticipates developing an online tool box accessible to the public to help inform future biomonitoring projects.

Methods to be used in obtaining consent (Informed Consent Form Should Accompany Proposal)

The informed consent form, statement of participation rights, and statement of unintended consequences are found in Attachment 2. This investigation will not result in any treatment to the participants. Participants will receive the results of all analyses conducting on urine samples they provide along with a fact sheet that describes the results and provides recommendations for reducing exposure.

Subjects

Human subjects: Human participants are used in this investigation.

Recruitment: Recruitment of participants will be determined by the potential for environmental exposure as described above.

Protection of Human Subjects (Title 45, Code of Federal Regulations, Part 46): Controlled data will be at scales where identity of the participants may be possible. Data about human subjects will be stored on the Utah EPHTN data warehouse server. The protocols for the Utah EPHTN will be used for access to the data. Those protocols include this IRB, current certification of HIPAA training, completion of the secure access application and completion of the nondisclosure agreement. Data from this investigation will not be made available to non-consortium researchers. Data provided to the partner states within the consortium be de-identified, and rescaled for geography and demographic scales.

Data Management & Analysis

4CSBC: Each state will establish a state database that will contain PII information about the subjects, their exposure and risk survey results, and will be linked to the laboratory results data. Each state will maintain their data in accordance to their state's legal requirements for protection of PII and confidential information. The states will work within their information technology (IT) infrastructure to establish a database within a protected database management system and ensure that the data is properly protected.

All persons working with the data will be required to have completed HIPAA training certification within their states and will have signed a non-disclosure agreement.

Utah Environmental Epidemiology Program: The EEP implemented a biomonitoring database as part of the Utah Environmental Public Health Tracking Network (UEPHTN). This data warehouse is maintained in an encrypted instance of PostgreSQL on a secure Utah Department of Information Technologies data server that is protected by appropriate hardware and software firewalls. The PostgreSQL data management system is shared by EEP and the communicable disease epidemiology programs for disease and injury surveillance purposes. Only the UEPHTN data warehouse manager can grant access rights to the UEPHTN data warehouse. This data will contained linked personal information, laboratory results and exposure risk information in an encrypted container within the data warehouse. Access will be limited to EEP personnel working on this project. An aggregated and summarized dataset with the PII removed will be used for the statistical analysis. Attachment 4 provides the data logistical model being used to collect and record data.

State and Regional Level Risk Analysis: Aggregated and summarized de-identified data from each of the states will be used to generate state and regional indicators and measures of exposure. These will include basic and stratified descriptive statistics and modeled risk assessment (i.e., Logistic Regression). The method will employ basic and well-founded statistical tests using SAS software. Analytical results will be presented in the form of summary tables and maps. Maps will be at a large geographic scale (county or health district level).

Confidentiality

Identifiable information: Identifiable information will be secured in the Utah EPHTN data warehouse for linkage purposes. De-identified and rescaled data will be used for statistical analysis and to generate all reports as described above.

Research Team HIPPA Training and Confidentiality Agreement: All members of the research team are employees of the Utah Department of Health, have received HIPPA training through the department, and have a signed the department confidential data nondisclosure agreement on file. Staff will be required to complete the requirements for access to the Utah EPHTN secure data portal as described above.

Implementation Plan/Timetable

1. First quarter is September 1 through November 30
2. Second quarter is December 1 through February 28
3. Third quarter is March 1 through May 31
4. Fourth quarter is June 1 through August 31
5. The grant project period is September 1, 2014 through August 31, 2019

4CSBC Key Milestones and Timeline

Key Milestones	Year 1				Year 2				Year 3				Year 4				Year 5			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Establish staff	x	x																		
Complete work plan	x	x	x																	
Establish Advisory Panel & Conduct Meetings	x	x	x	x		x		x		x		x		x		x		x		x
Semi-Annual 4CSBC meetings	x		x		x		x		x		x		x		x		x		x	
Monthly 4CSBC calls	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Obtain service contracts, materials, supplies and training	x	x	x	x	x	x	x	x	x	x	x	x		x	x		x			
Develop lab methodsQA/QC	x	x	x	x	x	x	x	x	x	x	x	x	x							
Develop/validate arsenic/ metals lab methods; study protocol/populations/IRB	x	x	x	x																

Collect/analyze urine samples for metals and arsenic-speciation(650)			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
Develop/validate phthalate metabolite lab method; study protocol/ populations/IRB	x	x	x	x																
Collect/analyze urine samples for phthalates				x	x	x	x	x	x	x	x	x	x	x	x	x	x			
Analyze Urine samples for Phthalates metabolites				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
Develop/validate 2,4-DCP, 2,5-DCP lab method; study protocol/populations/IRB	x	x	x	x	x	x														
Collect for 2,4-DCP, 2,5-DCP in urine samples					x	x	x	x	x	x	x	x	x	x	x	x	x			
Analyze 2,4-DCP, 2,5-DCP in urine samples					x	x	x	x	x	x	x	x	x	x	x	x	x	x		
Develop/validate Pyrethroid metabolite method; study protocol/populations/IRB			x	x	x	x	x	x	x	x	x	x								
Collect , analyze pyrethroid metabolite samples.								x	x	x	x	x	x	x	x	x	x	x		
Analyze, communicate results					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

References and Appendices

Albertini R, Bird M, Doerrer N, Needham L, Robinson S, Sheldon L, Zenick H. 2006. The use of biomonitoring data in exposure and human health risk assessment. Environmental Health Perspectives 114(11):1755-1762.

Council of State and Territorial Epidemiologists (CSTE). 2013. Biomonitoring in public health: epidemiologic guidance for state, local, and tribal public health agencies. Atlanta, GA: CSTE.

Hendrick S, Farquhar D. 2010. Biomonitoring: a best practices report for state legislators. Washington, DC: National Conference of State Legislatures.

Paustenbach D, Galbraith D. 2006. Biomonitoring and biomarkers: exposure assessment will never be the same. Environmental health Perspectives 114(8):1143-1149.

Sexton K, Needham L, Pirkle J. 2004. Human biomonitoring of environmental chemicals. American Scientist 92(1):38-45

Thacker S, Stroup D, Parrish G, Anderson H. 1996. Surviellance in environmental public health: issues, systems, and sources. American Journal of Public Health 86(5):633-638.