

ENVIRONMENTAL PUBLIC HEALTH TRACKING IN WEST VIRGINIA

ASSOCIATION OF STATE AND TERRITORIAL HEALTH OFFICIALS
EPHT FELLOWSHIP REPORT

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INTRODUCTION OF 'TRACKING'

In 2001, the Pew Environmental Health Commission recommended to the U.S. Congress that a systematic method of collecting information on environmentally related health threats was needed in the United States. Subsequently in 2002, the Center for Disease Control and Prevention expanded their efforts at controlling existing diseases, and at reducing the occurrence of new cases of preventable diseases in the U.S population. The **CDC's** expanded efforts involve a Program focusing upon detecting a potential relationship between the levels of Public Health and the experience of a group with specific aspects occurring in the environment. The Program is known as the Environmental Public Health Tracking Program, at times, more briefly referred to as the Tracking Program.

The West Virginia Office of Environmental Health Services submitted an application to the Association of State and Territorial Health Officials (ASTHO) for participation in the State-to-State Peer Fellowship in the Environmental Public Health Tracking Program, in March of 2010. In April of 2010, the West Virginia application was accepted by ASTHO.

The focus of the Tracking Program is collection of information from observations (data). The **Tracking Program is "Observational"**, meaning that manipulations, interventions, or assignments, are not employed, only observations of events occurring naturally are gathered. Observations are collected over multiple times, in multiple locations, on multiple subjects. A subject is an individual person or a group of individuals, a place or places, a time or many times, or objects, in whom at least a single consistent factor is observed and measured. Observations describe the values obtained from measurements of a single factor or multiple factors observed in multiple subjects. Observations describe measurements of any number of factors for many and all the subjects.

The general factors of interest in Tracking are listed in the full title for the Tracking Program. The factors considered by the EPH Tracking Program are certain specific aspects observed to **occur in a State's environment** together with a factor represented by a summary measure of health status occurring in the population of that State at the same time when the environmental factor was observed and measured. These observations of simultaneously occurring values of each factor provide the information about cases of disease occurring in a group (the "Public Health factor") and information about simultaneously occurring experiences of the environment by that group having or not having the disease being observed (the "Environmental factor").

At times, a disease may occur after many years of exposure to a factor in the Environment. **In this case, a "lag time"** exists, during which the disease is developing or incubating to a point when the disease is detectable by laboratory testing or physical examination. **The lag time can affect the Tracking Program's ability to detect a** potential association.

The Tracking system does not utilize the incidence rate of a disease, although it may, but considers the prevalence rate of a disease, to detect potential associations between experiences of the environment and the disease.

Experiences of the environment mean experiences of a specific aspect of the environment, such as aspects of water, air, food, objects, or places. All environmental aspects are contacted and experienced through **encounters with (termed "exposure")** the environment. The experiences result in some **"dose"** being received from the environmental contact / exposure. **Although the "dose"** may not be specifically measured in the Tracking Program, the dose is the expected dose based on an average amount received by many individuals. **The issue of "amount actually received"** by individuals is always a fundamental consideration.

Public Health occurring over the same time as the experience with the environmental factor is another general factor observed by the Tracking Program.

All observations of the factors are collected, and reflect the variation of the Public Health-factor as experience with the environment-factor varies. "Public Health factor", is a summary measure of all individuals' health status in a population, at a time, in a place. **"Public Health" is the health status** observed in groups.

The values of each of the observed factors occurring together and considered group-by-group, are recorded. The values of both factors occurring over specific time intervals in one place and involving "a subject", **meaning** a portion of the population or a "group", are considered together to reveal the amount of association between the factors, over all of the observations.

The pattern of variation in the observations of both factors considered simultaneously, reflects the relationship between the factors. The Tracking Program considers Public Health and environmental experiences as separate and distinct factors that are considered at a time, and over multiple times. The variation in both factors simultaneously over all of the observations, reflect the relationship, if any, between the factors. This relationship is

demonstrated through a specific, well established, and useful method of investigation known as an **“Ecologic Investigation or Study”**.

All Ecological investigations are based upon considering the experiences of groups. A particular group is observed to possess a group-summary measure of each factor considered in an Ecologic investigation. Individuals are not observed nor measured in an Ecologic investigation.

Ecologic Tracking Investigations provide results that only suggest a possible association or suggest a possible relation between the environmental factor and the disease factor that are observed to occur simultaneously in a location (a State, or a certain specified location within a State) to a group over multiple times. Ecologic investigations do not prove an association, but suggest an association. Ecologic investigations suggest a possible relation between group-based measurements, not individual-based measurements. An Ecologic-derived association provides direction to further investigations of the association demonstrated.

The function of the CDC in the Tracking Program **is a “data-clearinghouse”** or data repository for all information collected by various particular States, bringing all of these observations of **“standard”** factors together or integrating observations into a single overall collection displaying all factors (common to the multiple States **because the factors are “standard”**) for all groups, in every State.

CDC’s Tracking Program permits data-owners (agencies or departments in a State) to securely share their information with other data-owners of different data, through a **“Tracking Partner portal”**. The Tracking Partner then shares the entire information with a **“central”** agency (the CDC) gathering all the information, **through a “gateway”**. The result is a combination of all the shared information in a single location or a single overall database. The information of each of the data-owners describes a different factor. Combining information provides more than simply a large number of observations, but increases the number of factors that are observed. Combining information concerning common factors observed in comparable groups, in various locations, allows associations to be made between the factors observed in all the locations at the time of observations of a certain group.

However, Ecologic investigations have **limited “generalizability”**. **“Generalizability”** means applying results from observations, to future or un-observed events or predicting events, and consequently making valid associations. Consider observing a group, which necessarily involves individuals who are most probably not all identical (not a homogenous group) and

are not each individually “measured for” the aspect of investigative Tracking interest, but are measured only for group-membership criteria and disease burden criteria. So, an unknown amount of variation exists within a group, except on group membership criteria which usually involves only one or two factors. Ecologic investigations are based upon group observations, or a single observation-value describing a level or amount of a factor which is representative of the expected value for an entire group. Individuals are not observed nor described in an Ecologic investigation; instead groups are observed and described. The values of factors, in an Ecologic investigation, are group-based values for the factors, not individual-based values for the factors. The Ecologic variable represents an important aspect of any Ecologic investigation because the Ecologic variable contains unknown variation.

But Ecologic investigations allow frugality of resources because collecting information on Ecologic factors is less rigorous, less expensive, and quicker. Other types of investigations, not Ecologic, describe individually based observations and are more expensive, more effort consuming, more intrusive, longer, but provide results **having greater “generalizability”** or applicability to un-observed cases or events.

“Limited generalizability” means that results of an Ecologic investigation may not be true when applied to an individual who has not been observed by the original Ecologic investigation. The explanation of the limited generalizability obtained from Ecologic investigations is that individuals have not been observed but groups of individuals have been observed. Utilizing group-values, in effect, does not consider the individual variability in the **group’s measurement** which is a single value. Considering individuals, the variation of each individual’s value, is summarized using statistics, as the **“central value”** and the spread of all individual values around the central value, for an entire group. Considering groups, a group value usually is taken as the mean value of all members of a group or a single value representing many individual group-members. The amount of variation in an Ecologic variable, is not considered.

Additionally, groups are usually defined and distinguished by a small number of “group membership criteria” and consequently the group includes disparate individuals on other non-measured factors besides the group-membership criteria, possibly differing on these important but non-measured values.

The intention of the Tracking Program is acquiring group-based data. Group-based data means that the measurements of a factor are observed from, or observed in groups, not individuals. The same factor is observed and measured in each and all of the groups. But,

the summary value of the factor in each group is different or varies from group to group. The observed variation in the summary value of the factor in all groups is considered in relation to the variation in value of another and different but simultaneously occurring factor observed in all of the same groups. The pattern of "co-variation" between multiple summary values of factors, in groups, supports a suspicion of a relationship between Public Health and a particular environmental factor. In other words, the pattern in the variation provides direction to the consideration (suspicion) of an environmental factor's effect upon Public Health, in situations that are not actually observed.

The Tracking Program cannot truly "prove" the observed association between factor-values, because the Tracking Program is a type of investigation which observes groups of individuals as the subjects. Uncontrolled and even unknown variation within a group of individuals, explains the reason that the results from the Tracking Program do not allow for reliably applying the Ecologic results to individuals who have not actually been observed. However, the Tracking Program does provide the basis for "directing suspicions", not "proving suspicions", of results obtained from un-observed individuals. It is important to remember that the results from the Tracking Program may not be true when applied to individuals: the infamous "Ecologic Fallacy". The ultimate purpose of Tracking is to direct suspicions for, or direct further individual based investigations of, the relationship demonstrated among groups having varying environmental factor experiences and Public Health observed in the population.

The purpose of any Ecologic investigation is to provide a basis for a suspicion, sometimes called a **"hypothesis", that a certain disease may be related to** certain experiences of a particular environmental condition or factor. Ecologic investigations are, at times, called **"hypothesis generating" investigations.**

All of the factors are "measured" at each observation, in all groups. All the group-values or the summary results of measurements are considered as occurring simultaneously. Multiple observations are collected, each observation describes a different group. Each single observation involves the same identical specific time of measuring all factors, in the place where the factors occur, and the subject (a group) to whom the factors have occurred. One single value describes all the multiple individual values occurring in a group (a summary value). Multiple group-based factor-values are measured for each subject being observed, at a specific time, in a specific location, for all the factors being measured in **a specific "study subject or study-group" (subject means a person or a group in which the measurement or**

measurements have occurred), through the Ecologic collection method employed by the CDC.

“Tracking” means the surveillance or the observation of multiple and specific factors, occurring at one specific time and over multiple specific times, in a specific location and over multiple locations, and observed in multiple groups, that in the case of the EPH Tracking Program, are groups of people in a State, District, City, or Territory of the U.S, describing a certain factor or describing multiple factors.

TRACKING ACTIVITIES EXPERIENCED

ATTENDANCE AT THE 2010 NATIONAL TRACKING WORKSHOP

The annual national EPH Tracking Workshop convened in New Orleans, Louisiana, on April 26-28, 2010. The meeting was an opportunity for Tracking Stakeholders, active Tracking Partners, representatives from non-governmental organizations, and EPHT Program Fellows to personally meet Public Health professionals from various locations who are involved in Tracking activities. The Workshop included active Partners presenting summaries of their Tracking activities during the previous year. Topics discussed that peaked my interest, involved approaches to gathering health-related information in a manner based upon respect of individual privacy.

Attendance at the Workshop afforded multiple opportunities for observing the broad scope of on-going Tracking activities. During scheduled breaks in the meeting, personal introductions to individuals from various Tracking Partner States were possible. The roster of attendees included individuals from a variety of organizations directly involved with Tracking activities, such as the National Association of Health Data Organization, National American Association of Central Cancer Registries, and many others. These individuals appeared very willing to mutually cooperate. Mutual cooperation is the basis of teams, and multiple teams constitute the Partnerships that, in turn, constitute the EPH Tracking Network.

A memorable and motivating presentation was made by Michael A. McGeehin from the CDC early in the Workshop. Introduction to individuals representing ASTHO, who sponsored West Virginia Fellow's participation in the Tracking Workshop, were eventually made.

The meeting organization consisted of two general types of sessions. The Plenary Sessions were attended by all individuals at the Workshop, and involved topics of general applicability for any and all Tracking activities. Multiple Small Group Sessions were conducted that involved a more focused aspect of EPH Tracking, and were attended by a portion of the overall meeting attendees having an interest in the topic. Multiple and simultaneously occurring Small Group Sessions offered a variety of options where each option involved the discussion of a focused topic in the Tracking Program. Each Small Group Session was moderated by an active and involved Tracking Partner representative. Some individuals attending the Small Group Sessions, but not presenting at the Session, appeared to be familiar with the topics being discussed in the Small Group Session. These individuals most

likely were involved with the topic in their current work in the Environmental Health Departments from a State, City, or District.

As a novice Tracking Fellow, I elected to attend a Content Work Group (CWG) Small Group Session that involved “environmental lead exposure assessment”. The collection techniques and the resulting data were discussed. During this Small Group Session, the lead-related exposure data from various States was noted to be un-comparable because information from each State involved measurement of different aspects of environmental lead in each Tracking Partner State. This un-comparability in the “lead data” was discussed as a representative instance of the importance for standardization of all of the measurements for any factor, meaning that any and all information collected by the Tracking Program, must be comparable between any and all States.

Representatives from The Association of State and Territorial Health Officials (ASTHO) were identified, and when their location was pinpointed, introductions were made with ASTHO-representatives. I had missed a dinner engagement the first evening of the Workshop because of time spent at the New Orleans airport arranging and waiting for transportation to the Workshop site.

The capabilities of a geospatial method for display of information was among topics at the Workshop. Specifically, utility of geospatial analysis for establishing associations between factors, where one factor is a location in space and another factor is a measurement, was demonstrated. Representatives from the manufacturers of software having geospatial capabilities attended the Workshop and were available for questioning.

UTAH TRACKING SITE VISIT

The Utah Department of Health is currently one of multiple States, one District, and one City, Departments of Environmental Health that are official Environmental Public Health Tracking Partners in the national Tracking Network. As a Tracking Partner, Utah regularly and mutually shares Utah-specific information with all other Tracking Partners who possess comparable information on a particular environmental factor. Sharing information benefits Utah by enabling a comparison of Utah-specific data to another **individual Tracking Partner's** data, or to all Partners' data (**the Network's data**). The sharing has a further consequence of enabling comparison of Utah-specific results to results observed in other individual Tracking Partners, or to results from all Tracking Partners considered together. Further, the sharing of data permits comparisons to be made of the use or the application of Utah-specific data with the use for **all other States' data**. "Sharing information" involves providing comparable information to, and receiving comparable information from, another Partner or Partners, through secure electronic modes of information transfer managed by the Stakeholder CDC. The entire process of communications through electronic modes or channels is controlled by the Stakeholder CDC. The Stakeholder CDC processes, filters, and directs all "data **sharing**" in a dependable and secure method. The Stakeholder CDC distributes or directs the data to the intended destination, or to a specified Tracking Partner who is the intended recipient. The Tracking Network enables all Partners to contribute information to, and receive information from, other Partners involved in the national Tracking Network of Partners, through the web-like "**Network**" of electronic pathways. The electronic channels are always securely controlled, and governed by the Stakeholder CDC.

Utah is prominent because of their development of an information system used for managing versatile sorts of information or information about various topics. The Utah information system is known as **an "Indicator Based Information System", or "IBIS"**. The IBIS system is an extremely versatile systematic method for considering various factors in any analysis of observations involving any factors or even trends in the values of any factor. The factor frequently is a component of, or entirely represents **an "Indicator"** which reflects information on Public Health or any particular topic of interest related to any theme. The factor, or the analysis results of this factor, is represented by **an "Indicator"**. The **Indicator-Based Information System' or IBIS**, is used by multiple Utah State Departments and Utah State Offices, for display and analysis of any information that is of specific interest. The **word 'Indicator' in the** phrase of Indicator Based Information System is intentionally non-specific and general, conveying the broad versatility of this information system. Any

pertinent factor or pertinent combinations of factors can be utilized **as an "Indicator"**. The amount of correlation **between an "Indicator" and** observed Public Health, reflects the worth **or value of a particular "Indicator"**, at least in observations of Public Health.

IBIS is used by many different Utah State Departments. Each Department in Utah deals with factors having different methods of measurement, different subjects measured, and different display methods. IBIS-PH is the IBIS system applied to Public Health.

An "Indicator" is defined for each IBIS application, by the user, as some factor or combination of factors, or trend of a factor, **whose value "indicates"** another certain and important subject of interest in Public Health. For example, racial origin would be a significant single **factor in an "Indicator" of prostate cancer**, for Public Health. Even though racial origin is not an environmental factor but rather a genetic factor, racial origin is a significant or important factor in development of, and clinical course for, the Public Health issue of prostate cancer.

The Indicator may be a "trend-value" of a single factor, or a trend-value of a combination of factors, in relation to some other outcome-factor, such as a disease of interest. The subject **"indicated" by the "Indicator"**, may be a predicted or expected value of some interest-factor, or a trend of some factor of interest. **An analogy of an "Indicator"** is a predictor variable in a regression model, **where the predictor variable "indicates" a commonly** associated and therefore expected outcome.

The factor which is being indicated may be an **"Indicator" of Public Health**. The **"Indicator"** reflects, partially or wholly, a value of the real interest subject of Public Health (a disease), **in a particular situation**. An **"Indicator"** may be an Environmental factor which reflects the Public Health factor of real interest.

Within the individual State of Utah, a within-State Tracking Network exists consisting of individual **"sub"**-Partners who are Utah-based agencies or departments that each contributes relevant and different information about different factors, towards summarizing or predicting Utah-Public Health. For each State, a within-State hierarchy of relationships among all of the **"sub"**-Partners exists, comparable and similar to the hierarchy of Partners in the national EPH Tracking Program. A relationship exists between all of the individual States involved in the national Tracking Network, **similar to the relationship among "sub"**-Partners in a single State **forming the State's Tracking identity**. Within Utah, observations by each and all of the Utah Partners dealing with certain factors, are related to observations of other Tracking **"sub"**-Partners, so that all of the observations are communicated to Utah Environmental

Epidemiology Program (EEP). The EEP serves as the **“within-State clearinghouse” for data**. A single Tracking **Partner’s** activities are a small scale of the national **Tracking Network’s** activities, in the sense that both entities combine multiple observations of multiple factors into a single collection of observations, a database, through the communication channels of the EPHT Network. The EPHT Network communication channels involve various Partner States. **So, using the term “web” or Network, is appropriate to describe the multiple connections between Tracking “sub”-Partners in Utah and Utah to other Tracking Partners.**

The Environmental Epidemiology Program within the Utah Department of Health organizes information before the information is communicated to the Public in Utah or communicated to any other Tracking Partners inside or outside of the Utah-specific Tracking Program. Sharing of information **by a “sub”-Partner** with Environmental Epidemiology Program (EEP) in Utah Department of Health, is **“secure”**, meaning that intrusions from any party besides the two parties intending to communicate, are reliably prevented. Sharing of information by the State of Utah with the national Tracking **“Portal”** is also secure because the same security system is active at both levels of data-sharing or communication. Security of the Tracking Program affords reliable privacy of exchanged information, and preservation of proprietary legal rights, and controlled access to the Tracking System.

The information possessed by each individual Partner must be **“comparable information”** in all Partners **or “sub”-Partners**, so that valid comparisons can ultimately be accomplished with each of the other **Partner’s or “sub”-Partner’s** information. Comparability means that the subject being measured and described in the data of a particular Partner, can be meaningfully compared to the subject described in the data of other, and preferably all Partners. The methods used to obtain the measurements in each and all Partners must also be comparable to one another and across all Partners. Standards are used to ensure comparability. Standards may involve the measurement methods or standards may involve the subject being measured.

Utah continues to contribute significantly to the evolution of the national Environmental Public Health Tracking Program through other methods besides the information processing system of IBIS. Evidence for this statement is **Utah’s** participation in the ASTHO-sponsored Tracking Fellowship Program, where novices at Tracking are introduced to real world Tracking applications through time and efforts of the Utah Tracking Program.

THE WEST VIRGINIA FELLOWSHIP PROJECT

TRACKING INITIATION IN WEST VIRGINIA

The EPHT Fellowship Project submitted by West Virginia is a proposed plan, outlining steps for initiation of an EPH Tracking Program in West Virginia. An EPH Tracking Program in West Virginia ultimately means that West Virginia gathers and organizes information on environmental conditions and health, observed in groups of West Virginia citizens, and communicates this information through electronic channels, with other Tracking Partners, the CDC, and the Public.

The information describes an environmental factor judged to be of particular importance in West Virginia and a simultaneously occurring factor of health in the West Virginia population. Information concerning a factor is contained within a specific type of data file where values express the condition of each factor observed, using a "tailored" Indicator Based Information System format. The collected information in the appropriate format, is then shared with the Stakeholder CDC for analysis. The same format of expressing observations is used consistently over time, or perpetually. Results from data analysis may be shared with other States who are participating as Tracking Partners in the EPHT Network, and with the Public.

The Tracking initiation plans of West Virginia essentially are emulations of the recently observed active Utah EPH Tracking Program and the Programs in other States, but "**Indicators**" are selected according to **West Virginia's unique circumstances** and ability.

Communication, or sharing information, on multiple security levels, is fundamental to Tracking Program function in any State. The ability to communicate the information is accommodated through **the Tracking "portal" and the Tracking "gateway"**. The Tracking Program is developed upon an ability to communicate data among the data owners, multiple data-organizing entities (the Tracking Partners), and the Stakeholder CDC.

The communication involves a two-way channel for the exchange of information having different security levels depending upon who is communicating. The security of all exchanged or transmitted information is assured by the Stakeholder CDC through the special communication channel developed by the CDC.

Utilization of the developed secure communication channel requires expertise in computer-based communication (data exchange) methods. The expert level electronic communication

ability requires participation of the West Virginia State Information Technology Department or Management of Information Systems Office.

Communication within West Virginia between the owners of various data and the West Virginia Office of Environmental Health Services (OEHS) Tracking Partner, is the first Tracking-related communication capability to be considered in planning requirements. However, **West Virginia's** function in the national Tracking Program involves more than just these entities in any communication. **West Virginia's Tracking capacity** involves communications with the West Virginia Public, the national Public, with Tracking Partners from other States, Districts, Cities, or Territories, with various owners of data, and with the Stakeholder CDC. Each of these multiple communications involves communicating information of a different detail-level, and different privacy-level of the information.

The sophistication in Information Management Technology of a Tracking participant is critically important for that **Partner's** ability to manage and share information with various entities. So, a work-group member representing Information Technology is an essential work-group member.

A basic requirement of a Tracking Partner for effective and productive use of information sharing is establishment of a "portal". **The "portal" is** the electronic channel permitting communication or sharing of information. The communication channel is an electronic or computer-based method of exchanging information between entities. The **"portal"** permits versatile two-way communication between a Tracking Partner and any other entity. Each communication has a specific security level of the information communicated, depending upon who is communicating with whom and upon the subject of the communication. The proposed WV EPH Tracking Program involves integration of many information pieces or parts arising from various organizations within a particular State, and between different States. Information integration combines the information arising among different States or Tracking Partners, into a common single collection of information, a Tracking database.

From a "West Virginia perspective", information arises within West Virginia from all WV data stewards, and is organized into a WV State-level database. The WV State-level database is eventually combined with information of different States, into the national level information, performed by the Stakeholder CDC.

In West Virginia, the foundation of information comes from multiple West Virginia sources. A portion arises from West Virginia environmental measurements, a part from WV Information Management Technology who determines the electronic methods of information

transmission, a part from information about WV population health or Public Health levels. All “parts” are assembled into a single collection of information **which is an electronic “location”** on the World Wide Web known as the State of West Virginia’s Tracking portal, containing the particular **State’s** health-environment factor database.

The West Virginia **“portal” is an electronic-based “window”** or a **“page” located on a State’s** web-site, through which exchange of public-level information occurs, **“sending data to” and “receiving data from” the Public.** The **“gateway” is another channel which involves** communications with the Stakeholder CDC and subsequently various different Tracking Partners that may be in-State or WV-specific Tracking entities, or the Public.

The West Virginia plan begins with assembling a work-group of representatives from key departments or agencies having an interest in Tracking. The work-group will plan the EPH Tracking member roster. The potential work-group members will be **‘briefed’ on** the EPH Tracking Program, then given time to develop questions and consider the benefits of Tracking, before being expected to provide a response on their willingness to participate on a work-group.

After establishment of a work-group, **the ‘work-group’** will direct the establishment of the **‘Tracking Program’** in West Virginia. The work-group will reach a consensus on the factors to be considered initially and in the future, and on a roster of initial data stewards, of the initial West Virginia information system, and on delegation of various responsibilities involved in Tracking establishment.

The roster of the task oriented work-group shall include a small number of select individuals representing organizations that are expected to have significant interest in Tracking information. The I.T. (Information Technology) Department possesses critically important knowledge resources required by the work-group, and by the new West Virginia Tracking Program. Each individual member of the work-group is expected to possess a perpetual commitment to Tracking activities. The work-group will affect WV Tracking through enabling detection of the safeness or risk of West Virginia’s environment. Work-group members should possess knowledge of general Tracking methods used in West Virginia. Attributes of organizations that may have key Tracking Program start-up roles are listed in Figure 2.

The efforts of the work-group will be directed by a consensus of ideas among the individual members of this work-group. One purpose of the work-group is to reach conclusions on the usefulness of a potential data steward in the West Virginia Tracking Program. Another purpose of the work-group is to provide input based upon their perceived level of need in

the West Virginia environment for EPHT Program's attention. A work-group roster is displayed in Table 1. The general characteristics of work-group members are displayed in Table 2.

TABLE 1 POSSIBLE WORK-GROUP ROSTER

Representative from Offices within the Bureau for Public Health, such as Office of Environmental Health Services (OEHS), Office of Health Promotion (OEHP), Office of Health Statistics (OHS)
Management Information System Office (MIS) who possesses specialized knowledge of software systems
Office of Community Health Systems & Health Promotion, Health Educator, within WV DHHR
Department of Environmental Protection (DEP), extraneous to WV DHHR, having data concerning levels of hazards found in WV environment
Health Care Authority in West Virginia

TABLE 2 CHARACTERISTICS OF KEY WORK-GROUP MEMBERS

Understanding of the EPH Tracking system
Interest and commitment to Tracking
Recognition as a potential authority who is trusted and respected
Willingness to cooperate and compromise with other work-group members, to ultimately establish the EPH Tracking Program in West Virginia
Perpetuity in commitment to WV Tracking-development

The Tracking Program will have a financial cost associated with start-up of Tracking capability. The cost of Tracking must be considered in light of the benefits from Tracking provided to West Virginia's population health. It seems reasonable to expect that the financial cost of poor health far outweighs the costs associated with Tracking.

Realization of benefits from Tracking are expected to accumulate over time because of on-going development of Tracking capabilities. However, an immediate benefit is expected to be the accessibility by the WV Public to the information about a single factor, and will expand to involve multiple factors when the information on the other factors becomes available through the WV Tracking Program. Consequences or ramifications of the benefits involve enabling the Public to understand the relation between environmental conditions or factors and Public Health, through results of the West Virginia EPH Tracking Program.

The initial Tracking-factor to be considered will be agreed upon and determined by the work-group. Water Safety issues seem to be an excellent candidate for the original factor considered in the West Virginia Tracking Program. A health related factor may be health information on Emergency Department visits or physician visits involving acute gastrointestinal symptoms, or as a surrogate, number of days of school absenteeism because of illness.

The advantages of a West Virginia Tracking Program to all Tracking Partners nation-wide involve the additions that West Virginia will contribute to the variation in the observed relationship between Public Health and Environmental factors. The additional variation will increase the power of detecting a possible significant association between a particular environmental factor and Public Health in West Virginia.

Improvement of Environmental factors that are found to be associated with unfavorable levels of Public Health may result.

The potential disadvantages of a West Virginia Tracking Program involve financial cost, and financial drain from other significant problems faced by the West Virginia population. The Tracking Program in West Virginia first requires identification of the barriers, then objective consideration and evaluation of the real value of the perceived barriers. Continued commitment of resources to the identified interest factors of Public Health advancement, is required to support a Tracking Program in West Virginia.

A fundamental step in the process of establishing a Tracking ability is organization of partnerships involving "Data Stewards" or owners of pertinent information and a information **'storage' agent, the Office of Environmental Health Services**. A necessary capability is data exchange between these Tracking Partners.

Observing and recording of Public Health levels and simultaneous measurements of an environmental factor, in consistent groups of individuals in West Virginia, is the function of the West Virginia Environmental Public Health Tracking Program. Currently, information concerning each of these factors is maintained by a certain department in the State or agency external to the State. For example, the Environmental Protection Agency of the Federal Government may have information on measurements of various levels of different chemicals found in certain aspects of the environment in any particular State.

CONCLUSIONS FROM TRACKING EXPERIENCES

The EPHT State-to-State Peer Fellowship Program has demonstrated the value of State-based information, for judging effects of the environment upon health in a population. In West Virginia, the results of observations obtained from the West Virginia Tracking Program would enable the WV population, or the entire U.S. public, to observe information concerning the distribution of diseases occurring in West Virginia with respect to certain Environmental conditions occurring in West Virginia. Subsequently, an Environmental condition may be further investigated or studied, depending upon appropriate judgment of the costs, the expected benefits from manipulating the Environmental condition or factor, and the frequency of an environmental condition occurring in other Partner States. The effect observed in the Public would have significant weight in a **State's decision to intervene** into the root cause for the Environmental condition, when the environmental condition is related to Public Health. But, achievement of any EPHT-benefit to Public Health requires substantial commitment of resources in a State. The result **or 'return of investment' is** immediate in the way of information access by the Public, but not immediate in the way of altering the pattern of disease occurrences in the Public.

The capability of the Tracking Program, to share observations of disease occurring in a State, or to provide data to the Public, is especially valuable. Recently, several communities within West Virginia have expressed to their State government representatives their concern over a disproportionate burden of disease, or unfair distribution of health, apparent in their judgment in their particular community. Valid comparison methods, along with effective communication about these observations, are a salient feature of the Tracking Program. Beyond the observational value of the Tracking Program, the possibility or plausibility for associations between Public Health and Environmental conditions, is the ultimate result from the Tracking Network. Awareness of these associations is required before any manipulation of environmental factor intended to improve Public Health can be considered.

My experiences with the Tracking Program involved attendance at the Tracking Workshop in New Orleans, Louisiana, and visiting the Utah Tracking Program site. The experiences demonstrated through direct observation of actual Tracking efforts at the Workshop, the methods employed to achieve results from Tracking efforts. During the Utah Tracking Program site visit, the fundamental operation of EPHT Program activities were observed. An individual Tracking Program ultimately operates to benefit the public in a particular Tracking

Partner State, District, City, or Territory participating in the national Tracking Network. The major benefits resulting from Tracking involvement, are:

- **sharing or “pooling” of** observations among all Partners,
- sharing of analysis results from these observations,
- centralized or standard methods of handling and analyzing all observations,
- awareness of current ideas involving investigations to detect a possible relationship between the factors,
- possibilities that direct changes to improve Public Health.

The Tracking Program produces a State-based summary value for the factors observed by a State. Using the Indicator Based Information System of Utah, the State-based observation value can be regarded as **an “Indicator”**.

Standard analyses techniques by the Stakeholder CDC perform a consistent analysis across all States or Tracking Partners. Standard measurements are the value-expressions describing a factor in all the States involved with the Program. Standard Environmental factors and standard Public Health factors are attributes or characteristics measured and described by all Tracking Partners allowing comparability. **Using “standards”** assures comparability of Tracking results among all Partners.

The EPH Tracking Program is an Ecologic or group-based method for detecting potential associations among observed group-based observation values, permitting formulation of hypotheses about the relationship between observed population health and observed environmental experiences. Using the possible associations detected through the Ecologic investigation method of the Tracking Program, further individual-based investigations (Case-Control and Cohort studies) are guided or directed. The further investigations may ultimately produce scientifically valid conclusions about a relation.

Tracking conclusions directly applied to an individual are fraught with potential for error because Tracking conclusions are based upon group-values.

The plans of West Virginia to participate in the Tracking Program require utmost commitment of West Virginia to perpetual participation in the Tracking Network. Capacity development of a Tracking function requires careful and deliberate planning. Results from the Tracking Program, **or “the fruit of Tracking” efforts** are not immediate. Persistence in efforts, commitment of will, **willingness to participate on a “team”, and patience, are**

qualities required by the Public Health Professional and especially the Public Health Professional involved in Tracking.

The West Virginia Office of Environmental Health Services values the opportunity for involvement with the EPHT Program through the ASTHO-sponsored Tracking Fellowship Program. We, at West Virginia OEHS, look forward to participating as a team member in the national EPHT Program.