

The Role of the States in a Nationwide, Comprehensive Surveillance System for Work-Related Diseases, Injuries, and Hazards

**A Report from the
NIOSH-States Surveillance Planning Work Group**

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Executive Summary

Surveillance is vital to the prevention of occupational diseases, injuries, and fatalities. It provides information necessary to document the magnitude of workplace health and safety problems, to set research priorities, and to target and evaluate interventions to improve worker safety and health. While there have been substantial improvements in surveillance of occupational diseases and injuries in the United States over the last decade, surveillance remains inadequate. There is no comprehensive, nationwide system of surveillance for occupational diseases, injuries and hazards. Current surveillance activities are fragmented, and there are significant surveillance gaps. Recognizing that States play an important and unique role in surveillance, NIOSH has provided financial support and technical assistance to State agencies since the early 1980's to assist in establishing and enhancing their occupational health and safety surveillance programs. Improved planning and coordination of surveillance activities is essential to more effectively use limited occupational safety and health resources.

In 1998, NIOSH embarked on a process to assess current surveillance needs and to identify goals for the next decade. The Council of State and Territorial Epidemiologists, with support from NIOSH, established a Surveillance Planning Work Group to provide state input to this strategic planning process. Work Group findings and recommendations are summarized in this report.

Role of the States in the Surveillance of Work-Related Diseases, Injuries, and Hazards

State health agencies that have access to a wide variety of public health data systems and are recognized as a central force in public health have a critical and complementary role to play in surveillance of occupational diseases, injuries and hazards. They are in a unique position to:

- Provide critically needed data on occupational diseases.
- Generate information necessary to evaluate the conventional occupational injury data sources.
- Actively link surveillance findings with intervention efforts at the State and local levels.
- Integrate occupational health into mainstream public health practice.

Vision of State-Based Occupational Health Surveillance

A comprehensive nationwide surveillance system for occupational diseases, injuries and hazards is a conceptual framework that incorporates and coordinates existing and new surveillance systems for occupational health conditions and their determinants at the federal, state and local levels. The system is constructed to take advantage of existing data systems where possible, while building new data systems to fill identified gaps

In a comprehensive system, all States will have the capacity to conduct surveillance of occupational injuries, diseases, and hazards. At a minimum, this capacity will include personnel

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and resources to carry out surveillance of occupational health indicators using existing data systems, and develop working relationships with federal, state and local partners in both the public and private sectors. States will also conduct in-depth surveillance, follow-up, and intervention for specific, targeted diseases, injuries and/or hazards. Targeted conditions will vary from state to state.

Perspectives on Resource Allocation for State-Based Occupational Disease, Injury and Hazard Surveillance

The ongoing CSTE Occupational Health Surveillance Work Group identified the following priority areas for allocation of federal resources for state-based surveillance in the future:

Core Occupational Health Programs

Within this category, states would have an opportunity to compete for funds to support core occupational health programs, which include essential functions of surveillance, intervention and policy development. Ideally, in the long run, funding for core occupational health programs would be available to all states.

Capacity-building for States without occupational health programs

In this category, resources would be made available states without occupational surveillance programs to build their capacities to conduct occupational health surveillance. It is important to reserve capacity building resources for “new” states, because states without established surveillance programs find it difficult to compete with other experienced states for funds.

Condition-Specific In-depth Surveillance and Intervention

Within this overall category, state occupational surveillance programs would have an opportunity to compete for resources to pilot and implement surveillance and intervention programs for targeted diseases, injuries, or hazards. Priority conditions for targeted, in-depth surveillance would be identified periodically through a collaborative process involving NIOSH, states and other partners. Funds would be allocated within the context of the comprehensive surveillance plan that includes, for example, criteria for geographic distribution and industrial mix in the consideration of awards. There is consensus that funding should be provided to all interested states to conduct surveillance of elevated blood lead levels in adults using the ABLES model.

Emerging Issue Projects

NIOSH would reserve a proportion of the available surveillance resources to address new and emerging problems. This could include projects addressing new diseases or new causes of

previously recognized diseases or injuries. Candidate problems/projects would be identified by a jointly by NIOSH and the states.

Priority Conditions for Surveillance in a Comprehensive Nationwide Occupational Health Surveillance System

Following the approach used previously by CSTE in planning surveillance in other public health domains, Work Group members identified priority occupational health conditions to be placed under surveillance. For each priority condition, a profile including a surveillance case definition and goals for surveillance was developed. The list of priority conditions is as follows:

- | | |
|---|--|
| - Work-related asthma | - Pneumoconioses |
| - Occupational Cancers | - Elevated blood lead levels in adults |
| - Elevated blood and urine levels of arsenic, cadmium and mercury | - Work-related musculoskeletal disorders of the upper extremities and low back |
| - Noise-induced hearing loss | - Occupational skin diseases |
| - Occupational pesticide-related illnesses and injuries | - Occupational exposure to blood-borne pathogens |
| - Fatal occupational injuries | - Non-fatal occupational injuries |
| - Work-related cardiovascular disease | |

Cross-Cutting Issues and Recommendations

The Work Group also identified a number of surveillance issues that cut across the priority health conditions. These issues and recommended solutions are summarized below. They are divided into short-term and longer-term priorities.

Short-term priorities

- **Issue - Technical advisors for priority conditions under surveillance:**
Recommendation: NIOSH should designate individuals who have, as a significant part of their regular duties a lead technical advisory role for each specific condition under surveillance.
- **Issue - Technical assistance to States:**
Recommendation: NIOSH should develop and support effective mechanisms for providing technical assistance to States for occupational health surveillance core capacity building.
- **Issue - Integrating occupational health into mainstream public health:**
Recommendation: NIOSH support for core capacity building should require collaboration with environmental, injury prevention, maternal and child health, and other relevant public

health programs at both the federal and State levels.

- **Issue - Links between surveillance and research/intervention:**

Recommendation: Surveillance findings should be better used to identify research and intervention priorities within NIOSH and within the NORA priority areas.

- **Issue - Coordination among federal agencies:**

Recommendation: There should be increased collaboration among federal agencies involved in surveillance including NIOSH, MSHA, OSHA, BLS, EPA, NCHS, and other institutes within CDC. An ongoing working group of the key agencies should be established to coordinate surveillance activities among agencies and resolve interagency issues.

- **Issue - CDC surveillance coordination:**

Recommendation: NIOSH should work with other federal partners to develop and enhance a public health surveillance system for occupational injuries, diseases, and hazards which has data elements that are defined, collected, maintained, and transmitted in identical ways.

- **Issue - Occupational Health Information Systems**

Recommendation: NIOSH should take an active leadership role in encouraging the inclusion of industry and occupation information in federal and State health, vital record, and census data systems

- **Issue - Surveillance Research Methods:**

Recommendation: NIOSH and CDC should provide support and technical assistance to states in developing sound approaches to surveillance system evaluation.

Long-Term Priorities

- **Issue - State-specific analysis of national data sets:**

Recommendation: NIOSH should conduct analyses of national data systems to produce surveillance data that are useful for States and collaborate with States in developing State profiles.

- **Issue - Coordination of NIOSH-funded activities at the State level:**

Recommendation : To the extent possible, NIOSH-funded research and training awardees should be encouraged — as part of their requirements under contracts, cooperative agreements, and grants — to collaborate with State agencies conducting surveillance and intervention, particularly when research and surveillance are conducted in related topical areas.

- **Issue - Special populations at risk:**

Recommendation: At both the State and Federal levels, occupational safety and health

surveillance systems should be developed and surveillance data should be analyzed to document the magnitude, distribution, and trends of workplace injury, disease and mortality among special populations of at-risk workers.

- **Issue - Occupational health indicators for local public health planning:**
Recommendation: To the extent feasible, occupational health surveillance data should be collected in such a way that it is available for local level assessment efforts.
- **Issue - Employment data:**
Recommendation: NIOSH should work with the Bureau of Labor Statistics and other relevant partners to systematically identify and provide accessible information about alternative sources of state and local level employment data and the strengths and weaknesses of these data sources.
- **Issue - Rapid response to emerging problems:**
Recommendation: NIOSH and States should collaborate to develop a formalized plan to rapidly implement surveillance systems for emerging problems and also to coordinate and optimize rapid responses to emerging problems identified at the Federal and/or the State level.

Preface

This document contains the recommendations of the NIOSH-States Surveillance Planning Work Group. This Work Group was established during the summer of 1998 to make recommendations to NIOSH concerning State-based surveillance activities for the next decade. There were three events that led to the creation of the Group. First, NIOSH included development of a surveillance system for major occupational diseases, injuries and hazards as one of the agency's four goals in its strategic plan for 1997-2002 prepared in response to the Government Performance and Results Act (GPRA). This plan included a specific 1999 objective — to undertake a comprehensive surveillance planning process with NIOSH partners at the State and Federal levels to establish surveillance priorities and define roles for various agencies.¹ Second, the States presented their perspectives on State-based occupational safety and health surveillance activities at the meeting of the NIOSH Board of Scientific Counselors in February 1998. The unique role, contributions, and needs of State agencies in conducting occupational safety and health surveillance were discussed. Third, in response to State concerns voiced at the February meeting, representatives of NIOSH and selected States met in April 1998 to discuss surveillance issues and future directions. NIOSH committed to actively include State representatives as part of the NIOSH surveillance planning process and to establish a NIOSH-States Work Group for surveillance planning.

The States needed a formal mechanism for collectively providing input to NIOSH. This issue was discussed at the annual SENSOR-ABLES meeting in June 1998. The general sense of that meeting was to work through the Occupational and Environmental Committee of the Council of State and Territorial Epidemiologists (CSTE). With the help of CSTE, ten volunteers from the States were recruited to participate in the NIOSH-States Surveillance Planning Work Group. The State participants included individuals from geographically diverse States with surveillance programs in different stages of development. States with and without NIOSH surveillance funding were represented. The nine NIOSH members of the Work Group included individuals from each of the NIOSH Divisions, as well as the NIOSH Surveillance Coordinating Group. A member of CSTE staff also participated. From September 1998 through February 1999, the Work Group held two working meetings, had several conference calls, and completed a variety of assignments and writing tasks to prepare this planning document.

The Work Group acknowledges the contributions of the technical reviewers who provided comments on condition-specific profiles included in this report and of the many individuals within NIOSH and in the States who commented on the draft document. These individuals are acknowledged by name in Appendix 1. Thanks are also extended to Geneva Cashaw, Lyn Bell, Sally Brown, and Shantel Brown at NIOSH and to Kathy Getz and other staff of CSTE who assisted with organizing the Work Group meetings and preparing this report.

This planning process provided a rare and rewarding opportunity for Work Group members to take a step back from day to day surveillance and research activities and reflect on the long range occupational health and safety surveillance needs of the States and the nation. Work Group members worked with a tremendous spirit of collegiality and a shared commitment to surveillance as an essential component in the overall effort to prevent work-related illness, injury and death.

An initial draft of this report was submitted to NIOSH in June, 1999 and contributed substantially to the *NIOSH Surveillance Strategic Plan* published in August 2000.² This report was updated and finalized for publication by the CSTE in July 2001.

I. Introduction

Surveillance is vital to the prevention of occupational diseases, injuries, and fatalities.³ It provides information necessary to draw attention to the magnitude of workplace health and safety problems, to set research priorities, and to target and evaluate interventions to improve worker safety and health. While there have been substantial improvements in surveillance of occupational diseases and injuries in the United States over the last decade, surveillance remains inadequate. There is no comprehensive, nationwide system of surveillance for occupational diseases, injuries and hazards. Current surveillance activities are fragmented, and there are significant surveillance gaps. Recognizing that States play an important and unique role in surveillance, NIOSH has provided financial support and technical assistance to State agencies since the early 1980's to assist in establishing and enhancing their occupational health and safety surveillance programs. Examples of current State-based surveillance programs sponsored by NIOSH include the Sentinel Event Notification Systems for Occupational Risks (SENSOR), the Adult Blood Lead Epidemiology and Surveillance System (ABLES), and the Fatality Assessment and Control Evaluation (FACE) program. (See Appendix 2). These limited State-based surveillance activities are neither nationwide in scope nor involve a full spectrum of priority conditions for surveillance. The existing State surveillance systems, which are largely federally funded, tend to reflect federal priorities and do not necessarily reflect the priorities of the States. Improved priority setting and coordination of surveillance efforts is essential to more effectively use limited occupational safety and health resources currently allocated to surveillance and to enhance opportunities for obtaining additional resources in the future.

The NIOSH States Surveillance Planning Work Group was established to make recommendations to NIOSH concerning State-based surveillance activities for the next decade. Early in the process, Work Group members agreed that the surveillance planning process should be outcome driven, i.e., begin with the identification of occupational diseases, injuries, exposures and hazards to be placed under surveillance. The ongoing efforts of the Council of State and Territorial Epidemiologists (CSTE) to develop an over-arching system for all public health surveillance activities provided an important framework for the Work Group planning activities. CSTE, in consultation with CDC, has traditionally determined the list of infectious diseases and other conditions, including some injuries and environmental exposures, to be placed under nationwide surveillance. In December 1994, CSTE called for the creation of a National Public Health Surveillance System (NPHSS) to expand, coordinate, prioritize and standardize approaches to public health surveillance nationally and across disciplines, e.g., communicable disease, injury control, chronic disease, and occupational health. To establish the NPHSS, CSTE issued a call to public health epidemiologists in different fields to identify which conditions (e.g., health events and determinants) should be placed under surveillance and how surveillance should be carried out.⁴ The NIOSH States Surveillance Planning Work Group, therefore, embarked on a process that would provide input to NIOSH and, at the same time, generate a set of profiles on priority occupational illnesses, injuries, and hazards that would eventually be recommended by CSTE for inclusion in the NPHSS.

In addition, the Work Group discussed short-term and long-range visions for State-based surveillance activities and various approaches for allocating limited NIOSH funds to the States. Work Group members also identified a number of surveillance issues that cut across specific conditions and have included recommendations to address these issues in the report. While NIOSH members participated fully in all discussions and development of the profiles on proposed priority conditions, comments in this document regarding funding and recommendations to address crosscutting issues are solely attributable to the State members of the Work Group.

This document should be seen as a work in progress. The profiles for priority conditions to be placed under surveillance are in draft form and are subject to further input from public and private partners and to editing for consistency of content and format. As of May 2001, an ongoing CSTE Occupational Health Surveillance Work Group is in the process of defining specific measures - occupational health indicators - for these priority conditions that should be placed under surveillance in all States. (See Box on this page.)The Work Group anticipates that the list of priority conditions and specific occupational health indicators will evolve over time. Surveillance methods will likewise change as changes in the health care delivery system and information technology provide new opportunities for data collection.

Surveillance indicator: *A surveillance indicator is a construct of public health surveillance that defines a specific measure of the health (i.e., the occurrence of a disease or other health-related event) or a factor associated with health (i.e., health status or other risk factor) among a specified population. Surveillance indicators bring consistency to comparisons between different populations. It should be clarified that CSTE action placing an indicator under national public health surveillance is advisory to the States. It represents a professional consensus that the indicator is important, and that meaningful data can be collected at the State level. Implementation is necessarily dependent upon availability of fiscal resources, and epidemiological capacity, as well as State priorities.*

II. The Role of the States in the Surveillance of Work-Related Diseases, Injuries, and Hazards

State health agencies, which are vested with legal authority to require disease reporting and collect other health data, play a central role in public health surveillance. Whereas public health surveillance was once focused on infectious disease, it has expanded in recent years to include surveillance of the full range of health outcomes and their determinants, e.g. chronic diseases, injuries, and health behaviors.⁵ In the domain of occupational safety and health, however, national statistics on occupational injuries and illnesses have been generated largely outside of the public health infrastructure and rely heavily on data reported by employers. State health agencies, which have access to a wide variety of public health data systems and are recognized as a central force in public health have a critical and complementary role to play in surveillance of occupational diseases, injuries and hazards.^{1,5} They are in a unique position to:

- **Provide critically needed data on occupational diseases.**
It is well recognized that the most widely used occupational health data sources, namely OSHA logs and workers' compensation records, substantially undercount occupational diseases. State agencies, which have legal authority to require disease reporting, can access or augment existing health data systems to fill this information gap. As shown in Table 1, a variety of public health data sources are being used by State agencies to document work-related diseases. Additionally, occupational disease surveillance is contingent upon physician recognition that disease is work-related. State-based surveillance systems and physician reporting requirements provide important vehicles for physician education.
- **Generate information necessary to evaluate the conventional occupational injury data sources.**
Both the Annual Survey of Occupational Injuries and Illnesses and the recent OSHA Data Initiative are based on employer reports of occupational injuries and illnesses. There has been long standing concern over the accuracy of records maintained by employers.⁶ Increased reliance on these data to target regulatory activities has prompted greater concern about their adequacy and underscored the need for evaluation. Do OSHA logs undercount occupational injuries? Do the official estimates systematically undercount certain types of workplaces or certain populations of workers? Similar questions can be asked about who does and who does not get counted in State workers' compensation statistics. Because State surveillance programs generally use multiple data sources to document health outcomes, these data can be used to provide answers to these questions. The answers are important in targeting interventions and in better understanding the full economic and human burden of occupational diseases and injuries.
- **Actively link surveillance findings with intervention efforts at the State and local levels.**
Surveillance findings, to be meaningful, must be actively linked to intervention and prevention efforts. Intervention is, in large measure, local. It involves interacting with individuals, establishments, and organizations in the community. State agencies have in-

ⁱ Jurisdiction for data collection and surveillance will typically overlap between State agencies and interagency collaboration is necessary. The lead occupational health surveillance agencies in States will vary depending upon the state infrastructure. For example, in some States, Labor Departments have authority to collect physician reports of work-related diseases and injuries.

house intervention resources and maintain day-to-day working relationships with a wide range of potential “interventionists” — at both the State and community levels — who can use surveillance data to take action, quickly and directly. These range from State and Federal OSHA staff, and occupational health care providers, to school nurses and local boards of health. Colorado, for example, has used State restaurant inspectors to disseminate information about preventing work-related burns; Massachusetts works with school nurses to provide information to youth about health and safety in the workplace. A number of States work with engineering faculty at their State universities to identify and disseminate information about technological solutions to hazards identified through the FACE program. In addition, whereas national data are typically anonymous, State-based systems often identify individual workers and individual establishments and allow for individual and worksite follow-up. State health agencies may refer identified workplaces to State or Federal OSHA offices for enforcement action or conduct research-oriented investigations of workplaces, providing technical assistance to employers. They often go beyond case-by-case intervention to synthesize lessons learned across workplaces. These lessons are, in turn, translated into educational materials disseminated widely to relevant industry and labor and professional groups throughout the States. Aggregate surveillance data are likewise used to target industries, populations, and communities for educational and policy interventions.

- **Integrate occupational health into mainstream public health practice.**

Building surveillance programs at the State level that are actively linked with intervention efforts provides an invaluable opportunity to integrate occupational health into mainstream public health. Most occupational health experts are more likely to have interfaced with OSHA and labor department staff than with public health practitioners in State health agencies. Most public health practitioners, have had very little formal training in occupational health and few links with occupational health professionals in their States. However, the public health infrastructure provides numerous opportunities, many as yet untapped, for occupational health practice. Examples range from conducting indoor air investigations in schools and development of vaccination policies for daycare workers to licensing migrant labor camps. The public health infrastructure provides a particularly important opportunity to reach special populations of workers whose needs have not been well addressed through the more conventional approaches to occupational health.

Table 1. State Data Sources Used for Occupational Health Surveillance*

Data Sources	Health Outcomes												
	Asthma	Silicosis	Teen work injuries	Amputations	Pesticide-related illness	Noise-induced hearing loss	Carbon monoxide poisoning	Dermatitis	Carpal tunnel syndrome	Hospitalized burns	Agricultural injuries	Cancers	Lead/cadmium exposures
Case Reporting Sources													
Physician reports	4	4			4	4	4	4	4		4		4
Emergency department logs					4		4				4		
Hyperbaric chamber reports							4						
Burn center reports			4										
Poison control reports					4								
News clippings										4	4		
Department of Agriculture reports					4						4		
Agriculture extension program reports					4								
Data Systems													
State hospital discharge data	4	4			4	4				4			
State outpatient surgery data									4				
Workers' compensation records	4	4	4	4		4		4	4	4			
Emergency department logs			4										
Hospital billing data			4										
HMO data systems	4												
State trauma registry			4	4									
Clinical laboratory reports													4
Death certificates		4			4						4	4	
Cancer registry data												4	

* Partial listing. For example, data sources used for surveillance of fatal occupational injuries are not included.

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III . Vision of State-Based Occupational Health Surveillance

A comprehensive nationwide surveillance system for occupational diseases, injuries and hazards is a conceptual framework that incorporates and coordinates existing and new surveillance systems for occupational health conditions and their determinants at the Federal, State and local levels. The system is constructed to take advantage of existing data systems where possible, while building new data systems to fill identified gaps. Data collection and data management efforts are standardized to the extent possible to allow for linkages across systems that enable the development of a composite picture of the occupational health status of the population. The system involves collaboration and information sharing between public health and other agencies at all levels of government. It likewise involves collaboration with a wide range of private sector partners - health care professionals and providers, insurers, industry and labor - responsible for both generating health data and using surveillance findings to improve worker safety and health.

In a long range vision of a comprehensive nationwide occupational health surveillance system, State data sources are used both to augment national sources and inform national prevention priorities, and to target State and local prevention efforts. In a comprehensive system, all States will have core occupational health programs with the capacity to conduct surveillance of occupational injuries, diseases and hazards. At a minimum, this capacity will include personnel and resources to carry out surveillance of occupational health indicators using existing data systems, and to develop working relationships with Federal, State and local partners in both the public and private sectors. States would also conduct in-depth surveillance, follow-up, and intervention for specific, targeted diseases, injuries and/or hazards. In-depth surveillance provides opportunities for direct intervention and evaluation in specific workplaces. It is recognized that it is not feasible, given inevitable resource constraints, to conduct in-depth surveillance of all conditions (diseases, injuries, hazards) in all States. Federally funded support of in-depth surveillance activities at the State level would be determined within the context of the comprehensive nationwide system that takes into account existing national data systems and surveys, and surveillance priorities that have been established collaboratively by State and federal partners and their constituents. This plan would be reviewed and updated periodically. The nationwide system would be flexible enough to respond to both State and federal surveillance priorities and include the capacity to readily mount State-based surveillance of new and emerging problems.

In 1995, CSTE, working in collaboration with NIOSH, published general guidelines regarding State-based activity in occupational safety and health.⁷ These guidelines identified surveillance, intervention and policy development as three essential functions of a “core occupational health program” at the State level. The level of activity (core/minimum vs. comprehensive) in each of these functional areas depends upon the stage of program development.

IV. Perspectives on Resource Allocation for State-Based Occupational Disease, Injury and Hazard Surveillance

Periodically, surveys have been performed to determine State Health Department activity in occupational health.^{8,,9,10} These surveys have shown that the majority of States have limited ongoing programmatic activity in occupational health. A small number of States such as California and New Jersey have active, predominantly State-funded programs; while another small group of States, such as Massachusetts, Ohio, and Texas have active programs predominantly funded through NIOSH Cooperative Agreements and grants.

The Centers for Disease Control and Prevention (CDC) provides funding for a large percentage of public health activity at the State level. A typical State health department receives over half of its public health budget from the CDC. For example, CDC provides all States with funding for surveillance of both infectious diseases, such as tuberculosis, sexually transmitted disease and AIDS, and chronic diseases. No similar nationwide CDC funding for occupational health has been provided. In the occupational health arena, the federal infrastructure consists primarily of OSHA and MSHA, the regulatory bodies; BLS, which provides employment and injury statistics; and NIOSH, a predominantly research-oriented institute. There is, in short, a “gap” in the federal infrastructure with respect to providing core support for public health practice in occupational health at the State level.

To accomplish the long range vision of a nationwide occupational health surveillance system, funds for State-based surveillance need to be significantly increased. Funding is needed by all States to support the basic infrastructure of State-based programs. The CDC budget process should include funding to support core occupational health programs in all States, similar to support CDC provides States in other public health areas. These funds would be used by States to establish and develop core occupational health programs with activity not only in surveillance but also policy development and intervention.⁷ Additional funds are needed to engage a subset of States to work with NIOSH to conduct in-depth surveillance and intervention relating to specific diseases/injuries/hazards, including emerging issues. The specific States doing in-depth surveillance and the number of States would vary depending on the condition. NIOSH and States should partner with other federal agencies to identify additional sources of funding for State-based surveillance activities. NIOSH and the States also need to work closely with colleagues in other public health disciplines to assure that occupational health surveillance is integrated into an overarching public health surveillance system. NIOSH and State occupational health surveillance activities need to be coordinated with ongoing CDC/CSTE efforts to build a comprehensive, integrated, electronic public health surveillance system operational at the local, State and National levels.

In the initial June 1999 draft of this report, the Work Group recommended that NIOSH adopt a proportional allocation approach to funding State surveillance activities, and divide the pool of then currently available surveillance resources among the three categories identified below:

- Capacity building, and core surveillance programs
- In-depth surveillance of targeted conditions
- Emerging problems

As of May 2001, NIOSH has increased funding available for ABLES and FACE programs, continued funding of a number of targeted conditions, and initiated a new program to support the development of

model core occupational health surveillance programs. The ongoing CSTE Occupational Health Surveillance Work Group has identified the following priority areas for allocation of federal resources for State-based surveillance in the future:

Core Occupational Health Programs

Within this category, States would have an opportunity to compete for funds to support core occupational health programs, which include essential functions of surveillance, intervention and policy development. Surveillance activities would include at a minimum surveillance of occupational health surveillance indicators using existing data sources (List currently under development). Ideally, in the long run, funding for core occupational health programs would be available to all States.

Capacity-building for States without occupational health programs

In this category, resources would be made available States without occupational surveillance programs to build their capacities to conduct occupational health surveillance. It is important to reserve capacity-building resources for “new” States, because States without established surveillance programs find it difficult to compete with other experienced States for funds.

Condition-Specific In-depth Surveillance and Intervention

Within this overall category, State occupational surveillance programs would have an opportunity to compete for resources to conduct and model in-depth surveillance and intervention programs for targeted diseases, injuries, or hazards. Funds could be channeled through the existing FACE, SENSOR, and ABLES programs. Priority conditions for targeted, in depth surveillance would be identified periodically through a collaborative process involving NIOSH, States and other partners. Funds would be allocated within the context of the comprehensive surveillance plan that includes, for example, criteria for geographic distribution and industrial mix in the consideration of awards. There is consensus that funding should be provided to all interested States to conduct surveillance of elevated blood lead levels in adults using the ABLES model.

Emerging Issues Projects

NIOSH would reserve a proportion of the available surveillance resources to address new and emerging problems. This could include projects addressing new diseases or new causes of previously recognized diseases or injuries. Candidate problems/projects would be identified by a panel of State and Federal representatives who meet on an annual basis.

Additional Funding Issues

Several additional funding issues were discussed by the Work Group. The possibility of regional surveillance centers located in select State agencies was considered but determined not feasible given: a) the difficulty in sharing confidential data, necessary to target local interventions, between States; and b) the limits on State employees’ day-to-day involvement in activities that extend beyond the State. (At the

same time, States recognized that periodic, regional meetings provide important opportunities for States to share strategies and experiences.)

The option that NIOSH impose a requirement for State matching funds in their cooperative agreements was also addressed. Some States felt that a matching requirement, or a progressive matching requirement over time, would provide leverage to access State support for occupational health surveillance activities. Other States, in which there is less potential support for occupational health activities, felt that a matching requirement could preclude their application for NIOSH funding. This issue was not resolved. The Work Group also discussed the need to explore alternative funding mechanisms to provide continued support for targeted, condition-specific surveillance to assure continuity over time.

V. Priority Conditions for Surveillance in a Comprehensive Nationwide Occupational Health Surveillance System

Early in the planning process, the NIOSH-States Surveillance Planning Work Group agreed that planning should begin with the identification of priority conditions to be placed under surveillance. Prior to the first meeting of the Work Group (August, 1998), alternative approaches to selecting and ranking priority conditions were identified through a review of the literature and discussions with CDC Centers, State Health Departments, and other non-governmental organizations. Based on these discussions, a process for selecting priority conditions was adapted from Washington State for use by the Work Group. Washington had relied heavily on a Canadian model for establishing surveillance priorities.¹¹

A list of conditions identified in a prior joint meeting of State and NIOSH representatives (April, 1998) was used as the initial list of conditions. The list consisted of forty items recognized as important targets of concern (See Appendix 3). Each Work Group member was asked to review and rank each condition according to the following criteria: magnitude, severity, intervention effectiveness/preventability, emergent condition, public concern, economic impact and feasibility of surveillance. At the first Work Group meeting, rankings were summarized and discussed. Thirteen priority health conditions were identified for surveillance. The Work Group views this as an initial list that will be revised and updated based on periodic review by State, Federal and other partners. It is anticipated that priorities may change or that new problems may surface as surveillance capabilities are expanded.

The list of priority conditions includes some very specific health events, such as elevated blood lead levels in adults, as well as broadly defined conditions (non-fatal injuries and musculoskeletal disorders). Infectious diseases were also considered but not included on the list because they are already under nationwide surveillance. This is not to say that State surveillance programs for some infectious diseases would not benefit from additional attention to occupational aspects of these diseases. Occupational exposure to blood-borne pathogens is the only hazard currently on the list. The importance of hazard surveillance, in general, was well recognized and addressed, to some extent, under specific health events.

Following the approach used previously by CSTE in planning surveillance in other public health domains, Work Group members drafted profiles on each priority conditions to be placed under surveillance. Each profile includes the following sections:

- Goals for Surveillance -- local, State, and National
- Case Definition
- Information System(s) to Collect and Aggregate Data
- Partner Organizations/Other Agency Domains

Strategic Planning

For each condition, minimum and desirable surveillance activities are specified in the profile. Minimum activities are those activities that are necessary, at a minimum, to implement a nationwide occupational health surveillance system. Implementing the minimum level of activity for all of these priority conditions on a nationwide basis would for certain selected conditions require substantial resources. Desirable activities indicate directions for expanding surveillance beyond the minimal level. Recommendations for allocating limited funds to State-based surveillance activities in the short term have been discussed previously under State Perspectives on Resource Allocation.

The proposed minimum and desirable surveillance activities for all of the priority conditions are summarized in a matrix in Appendix 4). The profiles themselves are also included in this Appendix. These profiles are in draft form and are subject to further input from public and private partners and to editing for consistency of content and format. As mentioned previously, an ongoing CSTE Occupational Health Surveillance Work Group is in the process of defining specific measures (surveillance indicators) for the priority conditions that should be placed under surveillance in all States.

For all the priority conditions, there is the need for aggregation and analysis of data on both the national and State levels and the dissemination of these data in periodic reports — analogous to the annual release of data from the BLS. It is essential that occupational illness and injury data be regularly updated and released to foster prevention activities to reduce the incidence of these conditions and improve worker safety and health.

VI. Cross-Cutting Issues and Recommendations

The Work Group identified a number of surveillance issues or concerns that cut across the priority health conditions. In the spirit of going beyond problem identification to problem resolution, concrete solutions were also discussed. These issues and recommended solutions are presented below. They are divided into short term and longer- term priorities.

Since the initial draft of this report was provided to NIOSH in June 1999, NIOSH has directly responded to a number of these concerns in the *NIOSH Surveillance Strategic Plan*.² The relevant *Strategic Plan* objectives are noted below where applicable.

Short-term priorities

- **Issue - Technical advisors for priority conditions under surveillance:** A central point of contact within NIOSH does not exist to provide technical assistance and coordination of surveillance for each specific disease/injury/exposure identified as a priority surveillance indicator in this report.

Recommendation: NIOSH should designate individuals who have, as a significant part of their regular duties, a lead technical advisory role for each specific condition under surveillance. The functions of the lead technical advisors should, at minimum, include:

- Conduct ongoing analyses of available national and regional data to identify national and

State surveillance and prevention activities;

- Facilitate standardization of data collection across States;
- Produce a periodic report on the specific condition, to include available State-based data aggregated across States; and
- Serve as a central clearinghouse for information on the specific condition.

These individuals should be provided adequate resources to carry out the above functions. These individuals will need to work closely with other federal agencies and State partners.

- **Issue - Technical assistance to States:** CDC has a long history of providing technical assistance to States in developing public health surveillance/infrastructure. This has been accomplished through training programs, consultations, EPI-AIDs, assignment of employees to long-term details in the States, promotion of the EIS program, and various other exchange programs. In the occupational health arena, assignment of NIOSH staff to States has occurred rarely and only in a haphazard manner. Provision of such technical assistance is especially needed for States that have limited or no occupational health surveillance programs.

Recommendation: NIOSH should develop and support effective mechanisms for providing technical assistance to States for occupational health surveillance core capacity building, as well as for investigation and intervention activities.

[NIOSH Surveillance Strategic Plan Objective 2.2]

- **Issue - Integrating occupational health into mainstream public health:** Although occupational health issues sometimes overlap with other public health concerns, e.g. environmental health concerns, programs within State and Federal governmental agencies do not always communicate with each other. There is no organizational infrastructure that ensures the collaboration, sharing of resources, and data to maximize the use of limited resources at the State level.

Recommendation: NIOSH support for core capacity-building should require collaboration with environmental, injury prevention, maternal and child health, and other relevant public health programs at both the federal and State levels. This collaboration should be two-way. That is, NIOSH should also encourage other federal agencies to incorporate occupational health interests into other mainstream public health programs. NIOSH should partner with other organizations such as CSTE and ASTHO to provide support/assistance to the States in establishing collaborative networks.

[NIOSH Surveillance Strategic Plan Objective 2.1]

- **Issue - Links between surveillance and research/intervention:** To be meaningful, surveillance findings must be linked to prevention efforts ranging from worksite interventions and educational programs to regulatory activities and research. Currently the links between surveillance and both research and intervention within NIOSH are inadequate.

Recommendation: Surveillance findings should be better used to identify research and intervention priorities within NIOSH and within the NORA priority areas. Concrete mechanisms for assuring that surveillance findings are forwarded to and considered by all NIOSH Divisions and NORA teams

should be established. *[NIOSH Surveillance Strategic Plan Objective 1.2]*

- **Issue - Coordination among federal agencies:** There is a lack of coordination at the federal level among the multiple agencies involved in surveillance of work-related diseases and injuries. There are a number of interagency issues, for example, sharing CFI data, that need to be addressed to improve both the efficiency and efficacy of national and State occupational disease, injury, and hazard surveillance efforts.

Recommendation: There should be increased collaboration among federal agencies involved in surveillance, including NIOSH, MSHA, OSHA, BLS, EPA, NCHS, and other institutes within CDC. An ongoing working group of the key agencies should be established to coordinate surveillance activities among agencies and resolve interagency issues. *[NIOSH Surveillance Strategic Plan Objective 1.1]*

- **Issue - CDC surveillance coordination:** State health departments collect public health surveillance data which are shared with a variety of different Centers of the CDC. With respect to surveillance pertaining to occupational injuries, diseases and hazards, similar or identical data may be requested by the National Institute for Occupational Safety and Health, the National Center for Injury Control, the National Center for Health Statistics, and the National Center for Chronic Disease Prevention and Health Promotion, along with other federal agencies, including the National Institutes of Health, the Agency for Toxic Substances and Disease Registry, and the Bureau of Labor Statistics. Differences in information coding and reporting create unnecessary burden on States with multiple surveillance systems and hinder their ability to efficiently collect, maintain, aggregate, and disseminate State-level data.

Recommendation: NIOSH should work with other federal partners to develop and enhance a public health surveillance system for occupational injuries, diseases, and hazards which has data elements that are defined, collected, maintained, and transmitted in identical ways. NIOSH should work with other Centers at CDC to ensure that these occupational surveillance activities are integrated as part of all public health surveillance activities at the State level. Integration and standardization are needed to reduce staffing, training, collection and analysis costs. NIOSH should continue to participate in the CDC surveillance coordination efforts and assure efforts across Centers are fused to develop a nationwide, comprehensive surveillance system for occupational injuries, illnesses, and hazards. *[NIOSH Surveillance Strategic Plan Objectives 1.1, 1.4]*

- **Issue - Occupational Health Information Systems:** The availability of information on industry and occupation in existing health and demographic data systems is severely limited. Many health information systems do not contain occupation and industry information; where this information is present, it is often not coded. The possibility of developing new sources of occupational health data need to be assessed in light of changes in the health care delivery system and advances in information technology. These changes provide new opportunities for efficient collection and standardization of coding occupation and industry data in health data systems.

Recommendation: NIOSH should take an active leadership role in encouraging the inclusion of industry and occupation information in federal and State health, vital record, and census data systems. This effort should specifically address electronic data-bases, especially those established in accord

with the Health Insurance Portability and Accountability Act (HIPAA) electronic medical transaction standards. In addition, NIOSH should support efforts to standardize and automate the coding of industry and occupation in health and demographic information systems. NIOSH and the States need continued access to these health information systems. Finally, NIOSH needs to develop a surveillance capacity that utilizes the growing power of the worldwide web. *[NIOSH Surveillance Strategic Plan Objectives 1.1, 1.2, 1.4]*

- **Issue - Surveillance Research Methods :** In setting the National Occupational Research Agenda (NORA), NIOSH and its partners recognized the importance of surveillance methods research to evaluate and improve existing surveillance systems and to develop new surveillance systems to fill identified gaps. Objective evaluations of existing surveillance systems are needed to maximize the validity and utility of information, yet few resources are available to the States for surveillance system evaluation. There are also numerous potential sources of occupational disease and injury data within States that have not been fully explored nor utilized. The use of nontraditional data sources and linkages of data systems are virtually unexplored.

Recommendation: NIOSH and CDC should provide support and technical assistance to States in developing sound approaches to surveillance system evaluation. NIOSH should also encourage and support the development of methods for the utilization and modification of different existing data systems (trauma registries, hospital discharge data, emergency department records, private health insurers, and existing health or behavior surveys) at the State level, including evaluation of these existing data systems (capture, data quality, richness of data, and resource requirements) for providing State-specific information to set prevention priorities. In 2000, NIOSH awarded funding to support surveillance research efforts in several States. These awards were important steps towards this end. *[NIOSH Surveillance Strategic Plan Objectives 5.1, 5.2, 5.3]*

Long-Term Priorities

- **Issue - State-specific analysis of national data sets:** States do not necessarily have the expertise to analyze available national data sets. National data systems can provide important information for targeting surveillance and intervention efforts at the State level. These systems include for example, NSSPM, NHIS, NHANES, CFOI, Annual Survey of Occupational Injuries and Illnesses, BRFSS, IMIS, and NEISS.

Recommendation: NIOSH should conduct analyses of national data systems to produce surveillance data that are useful for States and collaborate with States in developing State profiles. Specifically, where the national data systems allow State level analyses, these data should be used to generate State specific findings which are made available to the States and used in the development of the State profiles. These findings should be accompanied by guidance on utilization of data for developing State intervention activities. *[NIOSH Surveillance Strategic Plan Objective 2.1]*

- **Issue - Coordination of NIOSH-funded activities at the State level:** There is a lack of coordination between NIOSH funded research and training activities in the States and NIOSH supported surveillance activities in the States - even when these address the same topical areas. As a result, there are many missed opportunities for collaboration and maximizing use of limited resources.

Recommendation: To the extent possible, NIOSH-funded research and training awardees should be encouraged — as part of their requirements under contracts, cooperative agreements, and grants — to collaborate with State agencies conducting surveillance and intervention, particularly when research and surveillance are conducted in related topical areas. For example, ERCs should be required to establish training opportunities for their students within State health departments. In turn, State-funded surveillance programs should be required to offer meaningful training opportunities to ERC students. As appropriate, evidence of collaboration should be included among the criteria used to evaluate research/training funding applications. Increased efforts to systematically inform researchers/surveyors of NIOSH-funded activities in their geographical areas should be undertaken.

- **Issue - Special populations at risk:** Certain populations of workers are more likely to experience increased risks of diseases and injuries in the workplace as a direct or indirect result of biologic, social, and/or economic characteristics such as age, race, genetic susceptibility, disability, language, literacy, culture, and low income. Essential occupational health surveillance and employment data on special populations of workers, for example, workers of color and low income workers, are limited. It is not known whether and to what extent groups of underserved workers are systematically undercounted in existing occupational health data systems such as the Annual Survey of Occupational Injuries and Illnesses and workers' compensation record systems.

Recommendation: At both the State and Federal levels, occupational safety and health surveillance systems should be developed and surveillance data should be analyzed to document the magnitude, distribution, and trends of workplace injury, disease and mortality among special populations of at-risk workers. These findings should be effectively disseminated so that resources for prevention can be appropriately targeted. In addition, major occupational health surveillance systems at both the State and Federal levels should be evaluated to assess possible systematic undercounting of special populations in these major health data systems. *[NIOSH Surveillance Strategic Plan Objective 3.5]*

- **Issue - Occupational health indicators for local public health planning:** There is an increasing reliance on community data and health status indicators for use in local priority setting and community health planning. Whereas a great deal of State public health data is now available for localities (e.g., birth rates, death rates, cancer rates), local data on occupational health outcomes are not typically available. Local occupational health issues can be misrepresented by the use of State-level data and information, and as a result, occupational health often gets left out of community-level public health assessment and planning activities.

Recommendation: To the extent feasible, occupational health surveillance data should be collected in such a way that it is available for local level assessment efforts. These data should, in turn, be made readily accessible for such community assessment initiatives, and guidance regarding use of the information should be integrated into ongoing health department efforts to facilitate effective use of health data for community public health planning. *[NIOSH Surveillance Strategic Plan Objective 2.1]*

- **Issue - Employment data:** Employment data that can be used to compute industry-specific occupational injury and acute illness rates at the State and local levels are limited. There are a variety of different sources of employment data, for example, the decennial US Census, the Current

Population Survey, and State unemployment data systems, each with its own strengths and weaknesses, and there is no standard method nor set of methods for using these data to compute estimates of risk.

Recommendation: NIOSH should work with the Bureau of Labor Statistics and other relevant partners to systematically identify and provide accessible information about alternative sources of State and local level employment data and the strengths and weaknesses of these data sources. These entities should work with the States in developing standard methods for using these data to generate estimates of risk and provide guidance to the States in using these methods. New data collection efforts to augment the limited employment data currently available should be considered.

- **Issue - Rapid response to emerging problems:** There are two separate issues with respect to emerging problems to be addressed. The first is developing surveillance systems for emerging occupational health and safety problems such as latex allergies. The second is developing rapid response to emerging problems identified through existing surveillance systems. The States generally have more flexibility in initiating rapid response than NIOSH. NIOSH has programs set up to respond to requests (i.e., the HHE program), but these responses tend to be reactive rather than based on systematic evaluation of the data. States should be using their data to identify emerging problems and should have the mechanism to respond in place.

Recommendation: NIOSH and States should collaborate to develop a formalized plan to rapidly implement surveillance systems for emerging problems and also to coordinate and optimize rapid responses to emerging problems identified at the Federal and/or the State level. *[NIOSH Surveillance Strategic Plan Objective 2.2]*

VII. Next Steps

The high toll of work injuries and illnesses is not unchangeable.³ Significant progress has been made in improving worker health and safety since the passage of the Occupational Safety and Health Act in 1970, but much remains to be done to address long-standing problems and new challenges associated with a changing U.S. workplace. Development of a comprehensive, nationwide occupational health surveillance system is central to the overall prevention strategy and to measure progress towards the Healthy People 2010 Objectives.¹² The States have a critical role to play in this comprehensive surveillance system. States agencies are at the front lines in both collecting data and using surveillance findings to take direct action to protect worker safety and health. States can provide data to augment national data sources and help set national prevention priorities. State data are also essential to target and evaluate prevention efforts at the State and local levels. In the long range vision of a comprehensive nationwide occupational health surveillance system, all States will have core capacity to conduct surveillance of occupational injuries, disease and hazards, and select States will conduct in-depth surveillance and follow-up of priority conditions. Priorities will be established jointly by NIOSH, the States and their public and private sector partners. This nationwide system requires a sustained federal commitment to provide funding and technical assistance to the States. The State agencies are fully committed to working with NIOSH toward these ends.

The surveillance strategic planning process has been a significant step forward. *The NIOSH Surveillance Strategic Plan*, together with this report, will guide NIOSH and the States to make better use of existing resources allocated to occupational health surveillance and enhance opportunities to garner additional resources for surveillance in the future. The continued State-federal collaboration will optimize our ability to use the powerful tool of surveillance to safeguard the health and safety of the nation's workforce. Towards this end, the following next steps should be undertaken:

- The CSTE Occupational Health Surveillance Work Group should be continued to provide a formal vehicle for ongoing input to NIOSH from the States. The Work Group should also take the lead in the development of specific occupational health indicators to be placed under surveillance in all States.
- The CSTE Occupational Health Surveillance Work Group and the NIOSH Surveillance Coordinating Group should meet together periodically to assure that State and federal perspectives on surveillance activities are successfully merged.-
- NIOSH should appoint an individual from a State health agency to serve on the NIOSH Board of Scientific Councilors to enhance communications between NIOSH and the States.

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Appendices

Appendix 1. List of Technical Reviewers and Those Who Provided Comments on the Draft

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Appendix 2. Description of State-based Surveillance Activities Funded by NIOSH as of 1999.

Adult Blood Lead Epidemiology and Surveillance (ABLES) Program

ABLES is a State-based surveillance system for identifying cases of elevated blood lead levels among adults living in the United States. The surveillance of elevated blood lead levels provides the public health community at local, State, and Federal levels with essential data for monitoring adult lead poisoning and for setting priorities for research, intervention, and education. Cases identified through ABLES are used by States to identify and target high risk industries and occupations, conduct follow-ups with physicians, conduct on-site inspections of work sites, and conduct hazard surveillance to identify exposure problems and solutions. Findings from ABLES data have been used to identify hazardous occupational exposures to lead in radiator repair shops, battery recycling operations, bridge repair, home remodeling, and residential painting. Cases are used by State and Federal OSHA programs for referrals for consultation and enforcement. Results from the ABLES program are published periodically in the CDC's Morbidity and Mortality Weekly Report. The ABLES program is a State-based system which is conducted in collaboration among various NIOSH Divisions, other CDC Centers (National Center for Environmental Health, National Center for Health Statistics), federal agencies (OSHA, HUD), non-profit associations (Council of State and Territorial Epidemiologists, Center for Protection of Worker Rights). In 1999, 27 State programs collected and analyzed blood lead level data from local health departments, private health care providers, and private and State reporting laboratories. States which received NIOSH funding to support ABLES activities in 1998 included Alabama, Arizona, Connecticut, Iowa, Maryland, Massachusetts, Michigan, Minnesota, New Jersey, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Washington, Wisconsin, and Wyoming. The total amount of NIOSH funding provided to these States for the ABLES Program in 1999 is \$449,038.

State-Based Fatality Assessment and Control Evaluation (FACE) Program

The State-based Face Program involves case identification of fatal occupational injuries and investigation of selected cause-specific fatalities. The objectives of this program include the identification of work environments which place workers at high risk for fatal injury, the characterization of potential risk factors, the development of appropriate prevention strategies and the dissemination of information pertaining to such strategies. State-base activities include the active surveillance of all external causes of occupational deaths and in-depth field investigations are conducted on selected fatal injuries which are determined by regional and national priorities. On-site investigations involve the use of a standard protocol and data collection instruments to collect detailed epidemiologic information pertaining to the circumstances, characteristics, and risk factors. Agent, victim, and environmental data are evaluated in relation to present, event, and post-event phases of the incident. The ability to combine case identification descriptions with information from on-site investigations results in data more detailed than that normally produced by other surveillance systems. States which received NIOSH funding for State-based FACE Programs in 1998 included Alaska, California, Iowa, Kentucky, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, Ohio, Oklahoma, Texas, Washington, West Virginia, and Wisconsin. The total amount of funding provided to these States for their FACE Programs in 1999 is \$1,352,901.

Sentinel Event Notification Systems for Occupational Risks (SENSOR) Program

SENSOR is NIOSH program with State health departments, or other State agencies in collaboration with

State health departments, to develop generalizable, condition-specific strategies for State-based surveillance of selected occupational diseases and injuries. Each surveillance system is linked to one or more prevention-oriented interventions, including educational, consultative, research, regulatory, and/or enforcement activities. SENSOR activities are relevant to Healthy People 2010 draft objectives pertaining to reducing work-related injuries, reducing cases of work-related hearing loss, reducing occupational skin disorders, and improving workplace injury and illness surveillance. Information pertaining to selected cases and recommended prevention strategies is of interest and utility to EPA, OSHA, and MSHA. Specific efforts in State-based activities include standardization of variables collected by State programs, enhancement of software to facilitate data collection, coding, and reporting, data compilation across States to facilitate aggregate analyses, comparison of SENSOR findings to other surveillance data, and further development of State-based prevention activities to surveillance. In 1999, 13 States are funded by NIOSH to develop or field test surveillance strategies for nine target conditions: amputations (Minnesota), work-related asthma (California, Massachusetts, and Michigan), burns (Kentucky, Utah), carpal tunnel syndrome (California), dermatitis (Oregon, Washington), silicosis (New Jersey, Ohio), youth injury/illness (Massachusetts) and acute pesticide health effects (California, Florida, New York, Oregon, and Texas) with EPA-support for follow-back case evaluations (California, New York, and Texas). The total amount of funding provided to these States for their SENSOR Programs in 1999 is \$2,135,447.

Appendix 3. Detailed Chronology of the Planning Process and Ranking Exercise

NIOSH State Workgroup

At the first meeting (September 23-24, 1998), primary authors were assigned to draft 13 condition-specific surveillance profiles. These occupational conditions included asthma, blood borne pathogen exposures, cancer, cardiovascular disease, dermatitis, fatal injuries, hearing loss, lead, other heavy metals (arsenic, cadmium, and mercury), musculoskeletal, pesticide poisoning, pneumoconiosis, and serious nonfatal injuries. After review and discussion of these profiles at the second meeting (November 3-4, 1998), the primary authors were asked to obtain a review of their profile from subject matter technical experts. These comments and feedback were used by the primary profile authors to revise the draft profiles, which were submitted to the Surveillance Coordination Activity (SCA) for compilation and review for consistency (Mid-January, 1999).

At the beginning of the surveillance planning activity, a Second Tier of relevant reviewers were also identified. The Second Tier consisted of Principal Investigators of the ABLES, SENSOR, and FACE programs along with 18 additional representatives (9 from NIOSH and 9 from the States). These individuals expressed interest in being involved in the planning process but many were not present at the September and November Workgroup Meetings due to resource limitations. The Second Tier of reviewers reviewed and commented on the preliminary draft of the Workgroup Report. Concurrently, the NIOSH Surveillance Coordination Group (SCG) received the Draft version of the Workgroup Report for review and comment. The draft material developed by the joint NIOSH-STATE Workgroup was considered by NIOSH in developing Surveillance Strategic Plan for the year 2010.

Key Surveillance Indicators Identified at the April 1998 NIOSH and States Meeting
(In order mentioned and not by priority)

- lead
- heavy metals
- asthma
- carpal tunnel syndrome
- pneumonconiosis
- radon
- noise-induced hearing loss
- carbon monoxide
- diesel
- cancer
- fatal injury
- teenage injury
- burns
- severe nonfatal injury
- silicosis
- pesticides
- back injuries
- amputations
- heart disease
- IMIS-MSHA citations > PEL
- bladder cancer
- musculoskeletal (upper extremity)
- fractures
- adverse pregnancy outcomes
- motor vehicle accidents
- head trauma
- hearing protection
- central nervous system disorders
- chemical releases (TRI)
- hepatitis
- eye injuries
- indoor air quality investigations
- energy sources
- dermatitis
- tuberculosis
- asbestosis
- stress
- infectious diseases
- machine guards
- respirator use
- assault/violence

- drownings
- kidney disease
- emergency medical service runs

Selecting Priority Health Outcomes for Surveillance

Criteria used to rank health outcomes

- **Magnitude of the problem: Incidence/prevalence** - How common is the condition in the workforce or retired workforce?
- **Severity: Morbidity** - How severe is the condition(e.g. acute illness, hospitalizations (number and length) disability, sequelae.
- **Severity: Mortality** - Consider how many deaths are attributable to the condition and the proportion of person with the condition who die (case fatality rate). It is not entirely clear what to do where a condition has low overall mortality, but a high case fatality rate. e.g., rabies. Use your judgment as to what is important.
- **Preventability/treatability** - What level of efficacy can be attained through prevention measures? Is the condition treatable?
- **What is the necessity for immediate public health response** - How important is it for health officials to act immediately upon learning of case in order to prevent further impact?
- **Policy/regulatory action** - Is this condition current being debated in the policy arena?

Would the surveillance information have important use in shaping public health or regulatory policy?
- **Economic impact** - consider the cost of the occurrence of the condition, such as medical care, respite care, support of long-term sequelae and lost productivity
- **Emergent condition:** To what extent is this condition newly recognized or likely to increase dramatically?

Appendix 4.

**Table 2. Matrix of Priority Conditions to be Placed under Surveillance:
Minimum (M) and Desirable (D) Surveillance Activities***

Condition under Surveillance	Federal Activities	State Activities
Work-Related Asthma	M. Periodic analysis of existing data sets (NHANES, NHIS, NOMS) M. Aggregation and analysis of State data	M. Include work variables in ongoing adult asthma surveillance efforts, where feasible. M. Periodic analysis of existing relevant data in all States. M. In-depth surveillance and follow-up in select States. D. In-depth surveillance and follow-up in all States.
Blood-borne Pathogen (BBP) Exposures in the Workplace	M. Aggregation and analysis of State data	M. Counts of BBP exposures reported annually from institutional reporters in select States. D. Further collection and analysis of BBP exposure data by industry, occupation and circumstance in select States.
Occupational Cancers	M. Counts of incident cases of mesothelioma and hemangiosarcoma of the liver using national cancer registry data. M. Periodic Analysis of NOMS data. M. Feasibility studies to assess utility of using cancer registry data for surveillance purposes, in collaboration with select States. D. Nationwide counts of non-smoking lung cancer cases with I/O information.	M. Counts of incident cases of sentinel occupational cancers: mesothelioma and hemangiosarcoma in all States. M. Feasibility studies to assess the utility of using cancer registry data for surveillance purposes in select States. D. Counts of incident cases of non-smoking lung cancer cases with I/O information.
Elevated Blood Lead Levels (BLLs) among Adults	M. Aggregation and analysis of State data D. Suggest revisions to State surveillance programs based on research	M. Mandate case reporting of BLLs >25ug/dl and conduct case follow-up in all States. D. Collect and analyze all BL tests in a limited number of States.

**Table 2. Matrix of Priority Conditions to be Placed under Surveillance:
Minimum (M) and Desirable (D) Surveillance Activities***

Condition under Surveillance	Federal Activities	State Activities
	re BLLs < 25ug/dl.	
Elevated Blood and Urine Levels of Arsenic, Cadmium and Mercury	M. Conduct feasibility assessment to determine extent of testing and available data.	Pending feasibility assessment
Work-Related Musculoskeletal Disorders of the Upper Extremities and Back	M. Analysis of ASOII data. M. Aggregation and analysis of State data.	M. Periodic analysis of existing data, e.g. workers' compensation data, in all States. M. In-depth surveillance and follow-up of specific conditions in select States. D. In-depth surveillance of specific conditions in all States

Noise-Induced Hearing Loss	M. Periodic analysis of existing data sets (NHIS/NHANES) M. Compilation of data OSHA & MSHA logs, NIOSH Hearing Loss Conservation Program. M. Aggregation/analysis of State data. D. Periodic audiometric and noise measurements by industry sector.	M. In-depth surveillance and follow-up in select States.
Occupational Skin Disease	M. Analysis of ASOII data. M. Periodic analysis of NHIS. D. Aggregation and analysis of State data.	M. Periodic analysis of existing data sources in all States. D. In-depth surveillance and follow-up in select States.
Pesticide-Related Illness and Injury	M. Aggregation and analysis of State data.	M. Mandate reporting and tabulate reports and conduct follow-up of symptomatic cases in all States. D. In-depth surveillance using additional data sources and more extensive case follow-up in 1 State in each EPA region. D. Hazard surveillance based on pesticide use data in select States.
Pneumoconiosis	M. Periodic analyses of NSSPM data. M. Periodic analyses of CW XSP, MSHA and ASOII data. M. Periodic analysis of OSHA/MSHA exposure sampling data. D. Aggregation and analysis of State data.	M. Periodic analysis of death certificate data. M. Periodic analysis of hospital discharge data. M. In-depth surveillance and follow-up, prioritized by age, in select States. D. Hazard surveillance in select States. D. In-depth surveillance and follow-up, prioritized by age, in all States.
Fatal Injuries	M. Aggregation and analysis of State data (CFOI & FACE)	M. Use of multiple data sources to identify all occupational deaths in all States and annual reports(CFOI). M. Some follow-up of all fatalities in all States. M. In-depth follow-up of select fatalities in select States including research oriented incident investigations and reports (FACE). D. FACE in all States.
Non-Fatal Injuries	M. Analysis of ASOII data; M. Maintain NEISS. M. Aggregation and analysis of State data.	M. Periodic analysis of existing datasets in all States. M. In-depth surveillance and follow-up of specific outcomes or special populations in select States. M. Broad-based surveillance of a spectrum of injuries using wider range of existing data sets in select States. D. Nationwide occupational injury surveillance system based on medical records.

Cardiovascular Disease (CVD)	M. Periodic analysis of NOMS and CFOI heart attack data. D. Secondary analysis of other existing data sets to profile CVD morbidity and mortality and CVD risk factors by industry and occupation (NHANES, NHIS, IMIS – hazard data)	M. BRFSS surveillance by industry and occupation in select States D. Analysis of hospital discharge/physician visit data by industry and occupation in select States.
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Key: **M:** Minimal level of surveillance; **D:** Desirable level of surveillance; desirable is “in addition to minimal.”

* Items noted in **BOLD** under State activities are under consideration as surveillance indicators to be placed under surveillance in all States.

Abbreviations:

ASOII: Annual Survey of Occupational Injuries and Illnesses

BRFSS: Behavioral Risk Factor Surveillance System

CFOI: Census of Fatal Occupational Injuries

CWXSP: Coal Workers’ X-ray Surveillance Program

FACE: Fatality Assessment and Control Evaluation

MSHA: Mine Safety and Health Administration

NEISS: National Electronic Injury Surveillance System

NHANES: National Health and Nutrition Examination Survey

NHIS: National Health Interview Survey

IMIS: Integrated Management Information System

NOMS: National Occupational Mortality System

NSSPM: National Surveillance System for Pneumoconiosis Mortality

OSHA: Occupational Safety and Health Administration

Notes: Federal activity “aggregation and analysis of state data” includes provision of technical assistance and guidance to states, including efforts to facilitate standardization of data collection across states.

Federal analysis of national data should generate State-specific information whenever possible that is forwarded to the States.

References to analysis of ASOII data imply more extensive analysis than is currently carries out b BLS.

The term “in-depth surveillance and follow-up” means SENSOR type of surveillance systems that involve use of multiple data sources, case follow-up and intervention.

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Appendix 5. Profiles on Surveillance Outcomes