

MEMORANDUM OF AGREEMENT
between the
CENTERS FOR DISEASE CONTROL AND PREVENTION
and
THE UNITED STATES GEOLOGICAL SURVEY

THIS MEMORANDUM SETS FORTH THE TERMS OF AGREEMENT BETWEEN THE DEPARTMENT OF HEALTH AND HUMAN SERVICES, PUBLIC HEALTH SERVICE, CENTERS FOR DISEASE CONTROL AND PREVENTION AND THE U.S. GEOLOGICAL SURVEY

I. INTRODUCTION

The Centers for Disease Control and Prevention (CDC) and the U.S. Geological Survey (USGS) share a common goal--the reduction of risks to human health from hazardous chemicals and disease causing organisms. The agencies use a different approach to meet this goal. The USGS collects and provides information on the occurrence of toxins and pathogens in water, soil, and air and the environmental factors affecting fate and transport of these agents. The CDC conducts public health surveillance, epidemiologic investigations, and applied research to detection and prevention of human diseases. Both agencies recognize that a partnership which pools their expertise and resources will help them detect and prevent waterborne diseases. Attachment 1 contains a few examples of related studies.

II. PURPOSE

This memorandum of agreement (MOA) establishes a collaboration between the USGS and the CDC (referred to as the "Parties") for addressing public health problems. An MOA will provide a mechanism to allow the agencies to work together. The MOA informs USGS and CDC staff that an agreement exists between the agencies to collaborate on projects. The MOA also encourages collaboration.

III. SCOPE

The USGS and CDC agree to provide support within the area of their scientific expertise and financial resources. The USGS has expertise in hydrologic and environmental analysis and characterization, chemical, biological and geochemical analysis and characterization, transport mechanisms, geographic information system (GIS) applications, and review of technical reports. The CDC has expertise in public health surveillance, epidemiological investigations, and analysis of pathogens and toxins in human and environmental samples. The CDC also conducts field studies and assessments of the public health impact of natural and technological disasters.

IV. MECHANISM FOR REQUESTING ASSISTANCE

The USGS or CDC staff may directly call staff of the other agency for assistance. The CDC can call the nearest USGS office or the USGS Environment Theme Coordinator as the national point of contact in the Office of the Director. The USGS can initiate a request by calling the designated CDC points of contact. Attachment 2 lists these contacts. Requests for assistance that may exceed the resources and expertise of the office contacted will be evaluated by both agencies. Additional staff and resources may be asked to assist with accommodation of this request.

V. FUNDING

For collaborative studies, the USGS or CDC will fund their activities for the project. There may be occasions when the requesting agency must fund all activities for the project. In these instances, the requesting agency may need to provide funding support for the servicing agency for the expenses incurred for the delivery of those services. This MOA does not constitute a financial commitment on the part of any of the Parties. Financial support for activities should be covered in separate agreements. An Interagency Agreement will be initiated between USGS and CDC for each specific request requiring the transfer of funds and will specify the scope of work, deliverables, and mode of funding. Any fund transfer must follow appropriate procedures and be authorized for the purpose of the contract, cooperative agreement, or grant. Performance of either party under the terms of this MOA is subject to the availability of funds and personnel resources.

VI. EFFECTIVE/TERMINATION DATE

This agreement is effective upon the signature of the Parties and shall remain in effect until terminated. This agreement may also be canceled by either party upon giving at least 30 days written notice.

VII. APPROVALS

In witness whereof, the Parties have executed this MOA on the day, month and year indicated:

U.S. Geological Survey

By: Thomas J. Casadevall
Thomas J. Casadevall
Acting Director

Date: JUL 28 1998

Centers for Disease Control and Prevention

By: Stephen B. Clarke
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Date: 8/27/98

Background Information on USGS and CDC

I. Description of Agency Activities

A. USGS

For over 100 years, the USGS has measured the quality and quantity of the Nation's water resources. Under its Drinking-Water Initiative, the USGS characterizes the geologic, microbiological, and hydrologic features of watersheds and aquifers. This information provides a sound scientific basis for water quality regulations and studies of public health. The USGS conducts nationwide assessments of contaminants and infectious diseases in biota of various types and assesses major eruptions of illness and death caused by these agents. The USGS also describes and documents chronic and catastrophic hydrologic, environmental, and geologic hazards (i.e., floods, earthquakes, volcanoes, and environmental contamination by natural and synthetic pollutants) for the sustained environmental health and well-being of our population. The USGS is accustomed to mobilizing and dispatching emergency teams anywhere in the world to assess damage from natural disasters such as hurricanes, earthquakes, floods, and volcanoes.

B. NCEH

As part of the CDC, the National Center for Environmental Health (NCEH) investigates the health effects associated with human exposure to environmental hazards and natural disasters, nationally and internationally. A primary objective of the NCEH is to develop and evaluate strategies for preventing human exposure to environmental hazards and to minimize the effects of such exposures. The NCEH accomplishes this objective by identifying etiologic agents responsible for disease outbreaks, and by determining the health effects of hazardous agents. In collaboration with state and local health departments and other organizations, the NCEH conducts surveillance, epidemiological studies, and applied laboratory research to identify environmental risk factors for specific health problems.

C. NCID

The mission of the National Center for Infectious Diseases (NCID) is to prevent illness, disability, and death from infectious diseases. The NCID staff in the Division of Parasitic Diseases, in collaboration with the U.S. Environmental Protection Agency, has maintained a surveillance program since 1971 for collection and periodic reporting of data on the occurrence and causes of waterborne disease outbreaks. The surveillance system includes data about outbreaks associated with water intended for drinking and also about those associated with recreational water. CDC's and EPA's activities related to national waterborne disease surveillance have the following goals: a) to characterize the epidemiology of waterborne diseases; b) to identify the etiologic agents causing outbreaks and the deficiencies in water systems that allowed them to occur; c) to train public health personnel in methods for investigating waterborne disease outbreaks; and d) to collaborate with local, state, and other

federal and international agencies on initiatives to prevent waterborne disease. The data gathered through surveillance are useful for evaluating the adequacy of current treatment technologies for providing safe drinking and recreational water. Surveillance information influences research priorities and water-quality regulations. While state and local public health departments have primary responsibility for the detection and investigation of outbreaks, NCID staff frequently provide epidemiologic and laboratory diagnostic assistance to states. In addition, NCID staff design and implement epidemiologic studies to better define the risk of acquiring microbial infections from drinking water, seek ways to improve surveillance for waterborne diseases, and conduct laboratory research to develop and improve tests for detecting waterborne pathogens in humans and water.

D. NCCDPHP

The mission of the National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP) includes the prevention of death and disability from chronic diseases (such as cardiovascular and oral diseases) and the promotion of maternal, infant, and adolescent health (such as reproductive health and infant mortality surveillance).

II. Examples of Agency Capabilities

A. USGS

1. Access to national water-quality data bases
2. Capability to conduct scientific studies in the earth sciences (ground-water flow studies, contaminant-plume analysis, solute-transport modeling, stream-transport studies, pesticides and nutrient analysis, geochemical analyses, biologic inventory and identification)
3. Geographic analysis of information (GIS)
4. On-the-spot bacteriological analysis
5. Land-use
6. Remote sensing, i.e., satellite imagery
7. Training
8. Information from Water Resources Division, Biological Resources Division, National Mapping Division, and Geologic Division including laboratory capabilities (biota, chemical, etc.)
9. Field offices in every state and territory
10. Able to respond to emergencies quickly

B. CDC

1. Maintain a surveillance system for waterborne diseases
2. Provide experience in designing and conducting epidemiologic studies of infectious diseases, chemicals or toxins

3. Provide laboratory research skills and equipment for development of highly sensitive chemical assays
4. Provide laboratory research skills related to development of new diagnostic tests for infectious organisms or their antigens in blood, stool, urine, saliva or environmental specimens
5. Maintain infectious organisms in animal models or culture and ability to perform in vivo or in vitro drug sensitivity testing
6. Provide skills in the use and development of molecular diagnostic tools such as DNA probes for detecting and typing specific pathogens
7. Conduct bacterial sub-typing and phage typing
8. Provide personnel experienced in the use of electron microscopy for diagnosis of infectious agents
9. Establish communication networks with state health departments, major health-related organizations, and the drinking water industry

III. Examples of USGS and CDC common interests and expertise:

A. Investigations of outbreaks of waterborne and water-related disease

Since 1971, the CDC, U.S. Environmental Protection Agency (EPA), and the Council of State and Territorial Epidemiologists have maintained a collaborative surveillance program for detecting and investigating waterborne disease outbreaks. Data from the surveillance system help evaluate the adequacy of current treatment technologies for providing safe water for drinking and recreational use. The CDC surveillance summaries reveal that outbreak characterization and control can be enhanced by timely hydrologic information and more thorough assessment of the watershed for point and non-point sources of contamination. Delayed recognition of outbreaks is a major impediment to timely epidemiological investigations and rapid implementation of emergency disease prevention strategies. In the Milwaukee cryptosporidiosis outbreak of March 1993, there were 403,000 cases reported and more than 60 people died. The etiological agent and mode of transmission were not identified until two weeks after the outbreak was well underway. Although many of these outbreaks are rigorously investigated, the search for a causative agent is often limited, owing to the untimely collection of water samples, appropriate diagnostic specimens from humans, or lack of early evidence that inadequate water-treatment may have contributed to the outbreak. The USGS ongoing monitoring of wildlife health as well as contaminant and infectious-disease assessment may be of value for early recognition and prevention of outbreaks in human populations. A causative agent is not identified in more than 50% of outbreaks.

Currently, the USGS is assisting in identifying areas in Kenya where Rift Valley Fever is a growing problem. The Eros Data Center (EDC) will be providing CDC, in the near term, with greenness maps of healthy vegetation derived from AVHRR digital satellite data for select areas. In addition, higher resolution satellite imagery (such as TM or SPOT) will be processed and analyzed to delineate "dambonees", which are areas affected by seasonal flooding. The EDC is

somewhat unique in that they have an on-site office of the United Nations (UNEP/GRID). The Data Center's mission centers around activities associated with managing many types and large volumes of global Earth observations data. Its mission includes developing and operating advanced computer systems to receive, process, and distribute earth-science data. The Science and Applications Branch is involved in a broad spectrum of projects that includes land cover characterization, topographic studies, research on the carbon budget, ecological mapping, establishing and supporting clearinghouse activities, land process studies, change detection studies, enhancing the Famine Early Warning System of USAID, and long-term environmental monitoring in Senegal, as examples.

The USGS could contribute significantly to effective assessment, containment, and control of outbreaks--as well as prevention of future outbreaks--by providing "real time" and historical data to health officials about the hydrology and biology of suspect water supplies. USGS scientists represent a broad range of expertise in the many fields of earth science and biology, and some level of expertise and support is available from one or more of the 185 offices distributed throughout the United States and Territories. Whereas experienced personnel having a specific hydrologic, geochemical, or biological discipline may not be available from a local office, technical input can be provided from a cooperating network of experts within the USGS.

The USGS can also assist the CDC in addressing outbreaks of waterborne and water-related disease by characterizing the hydrology and wildlife biology of the affected area, describing the prevailing aquifer and bedrock geochemistry, and applying technologies, scientific skills, and analytical tools required to assess the role of source water, processed water, and wildlife epidemiology in the outbreak. When a waterborne disease outbreak is reported by a state, territorial, or local public health agency, and hydrology appears to play a role, CDC may seek assistance directly from the local USGS State Representative (listed in Attachment 2). With multiple locations in every state and territory, the USGS can expeditiously mobilize a team of hydrologic scientists to the outbreak site to assist Federal and state health officials. Within hours of notification, USGS scientists could be available to answer questions, evaluate the existing information and begin the process of site characterization. Accordingly, plans for the timely collection and analysis of sediment, rock, animal tissue, and water samples can be developed to control the outbreak and contribute to the prevention of future outbreaks. This assistance will provide timely information needed by health officials to assess the potential role of source water in an outbreak and enable them to include quality hydrologic data in their final epidemiologic assessment and reports. Examples of possible USGS activities related to outbreaks are listed below:

Characterize the hydrology of the site. This includes determining baseline environmental conditions, contribution of rainfall to the outbreak, ground water flow direction, unusually elevated or depressed water levels in wells, abandoned wells or well fields near the outbreak area, changes in water use, changes in land-use practices, and point sources of stream pollution.

Investigate possible sources and magnitude of the contamination and the transport mechanism (route, direction, and rate-of-movement) of the contaminant into the water supply or recreational body of water. This includes water-tracer studies to determine if a specific water supply is epidemiologically linked to cases of infectious disease in a community.

Collect and analyze raw and treated water samples (chemical and biological) using mobile water-quality laboratories or the USGS National Water-Quality facilities in Denver and Ocala.

Review quality assurance and quality control of chemical and biological data.

Record the geographic distribution of information pertaining to the outbreak in a geographic information system for use in later epidemiological analysis.

Review and evaluate technical reports pertaining to hydrologic and biological aspects of the outbreak.

Assist in the investigation of water-system failures or inadequacies, distribution line deficiencies, and well-head protection.

Assess zoonotic diseases in wildlife and other sentinel populations.

B. Hydrologic studies related to drinking water and public health

By conducting joint investigations, the USGS and the CDC, in cooperation with state and local public health agencies, can begin providing cause-and-effect analyses of waterborne and water-related disease. Several compelling areas of collaboration are:

1. Correlation between blood chemistry from NHANES and the distribution of pesticides and herbicides in drinking water
2. The disruption of endocrine functions from exposure and accumulation of xenoestrogens present in water
3. Microbial contamination in water wells following flooding
4. Reproductive and developmental effects of disinfection by-products in water supplies
5. Spontaneous abortions and nitrate in water supplies
6. Health effects of low pH, anoxic ground water with its associated elevated concentration of metals in household water distribution of high sulfate ground water and diarrhea incidence

7. Distribution of chloroform and other trihalomethanes and the incidence of bladder and colorectal cancers

8. The incidence of acute myocardial infarction and the concentration of magnesium in drinking water

9. Spatial and temporal distribution of dengue fever cases in Puerto Rico

C. Methods development

Under the auspices of this MOA, the USGS and the CDC have a unique opportunity to develop more effective and accurate field and laboratory methods for the detection and analysis of newly recognized waterborne pathogens such as *Cryptosporidium* and *Cyclospora* that affect public health. Some of the collaborative projects include:

1. Define source areas for *Cryptosporidium* in the Atlanta metro area

2. Design and conduct field tests for laboratory analyses of *Cryptosporidium*

3. Improved detection and reporting of endocrine disrupting chemicals in the environment, pathogenic fungi in water supplies, disinfection by-products in the water supply, and zoonotic diseases

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