Nothing about environmental health and protection is simple anymore.

When I first entered the field with the job title of County Sanitarian in 1950, the field and its organizational setting were much better defined. Public Health Physicians were god-like creatures who reigned supreme over all matters of public health, and Sanitary Engineers were the final answer to all problems relating to sanitary engineering and sanitation. The term "environmental health" was not commonly used. Sanitarians were acceptable as long as they worked under the supervision and control of physicians and engineers, and constrained their activities to routine inspection and surveillance.

Perhaps I was an unruly upstart, but I began questioning the physician-engineer pecking order within a few weeks after I took my first job as County Sanitarian at $225 dollars per month. However, few others were willing to either question this tradition or even discuss it, so I kept my frustrations to myself for many years. But I finally learned that the mantle of leadership falls to those who earn it, so I no longer find the pecking order worthy of great discussion.

Within a few years after becoming engaged in the field of public health, I also began to have second thoughts regarding the traditional textbook pattern of organization and delivery of environmental health services at the state and local level. Had I been the only person having such concerns, I would probably have retired at an early age or changed careers. But I found that many of my most respected peers were having similar questions. I recall contacts with some of the visionary environmental health "giants" in California. I had discussions with Walter Mangold. I recall a number of discussions regarding this issue with Harry Bliss. And I was privileged to frequently discuss such issues with Charlie Senn personally and through correspondence from the 1950's through the early 1960's. I was frequently enthralled by the oratory and vision of California State Sanitary Engineer Frank Stead. And I communicated and visited with leaders elsewhere and this was invaluable in helping me to develop my concepts about the future of environmental health at that time.

All of these discussions helped me to formulate my concepts, and had a direct bearing on my role in developing the nation's first local environmental health department in Albuquerque, the New Mexico Environmental Improvement Agency (the most comprehensive in the Nation), the still-unique and comprehensive New Mexico Scientific Laboratory System, the New Mexico Public Health Agency, the New Mexico Health and Environment Department,
and my testimony presented to President Nixon's Committee on Executive Reorganization regarding the scope and organization of EPA.

By now, many of you are wondering if I'm here to talk about the past or the future of environmental health and protection. I have mentioned the past as it is essential to understand the past in order to work for the future.

We must collectively understand that organizations, programs and public expectations are not static, and that changes will continue to take place.

We must understand that are no final answers and that changes will continue.

We must note that public and environmental "healthers" have tended to resist rather than lead changes in programs, organizations, and personnel.

We must believe that anything as important as environmental health and protection deserves and demands organizational support, visibility, and effectiveness which may translate into organizational change, and environmental constituents frequently demand such change.

We must understand that every community and state has many "health agencies", while only one is actually titled a health department.

We must recognize that environmental health and protection may be more effectively served in agencies separate from health care.

We must understand that the public health in some jurisdictions is being subsumed by health care, and that it takes a high degree of fantasy to develop a working relationship between health care and hazardous waste management.

We must encourage environmental health professionals to seek key leadership roles in all environmental health and protection agencies, whatever their titles.

We must insure that academic environmental health science and protection programs are insuring that graduates have the competencies to be knowledgeable and effective in programs for today and tomorrow.

But now, a few more specifics regarding the future of environmental health and protection. And I'll start with The Institute of Medicine Report on the Future of Public Health.

The IOM Report of the Future of Public Health provides thoughtful discussions which should be mandatory reading for every public and environmental health professional. The emphasis of the report is on personal health, health care, and relationships to the medical community with occasional, though significant reference to the importance of environmental health and protection. Environmental health and protection agencies outside health departments were not
visited or included in the IOM study. By relying on the Public Health Foundation Data, the IOM report may contribute to misunderstanding of, and inadequate emphasis on, environmental health and protection by the public health community and others.

The IOM document provides, in my opinion, inadequate emphasis regarding the complexity and magnitude of environmental problems facing our Nation and the World. The study was conducted under the auspices of the Institute of Medicine, and more specifically it IOM Division of Health Care Services. Only two of the 22 Committee members were well-known environmental health and protection experts. I do not find that consultation was developed with any of the various national environmental health and protection associations.

The IOM Report discusses the issue of poor relationships with the medical care profession, but is silent of the equally important relationships with planning agencies, transportation authorities, environmental groups, engineering societies, developers, manufacturers, educators, and economic development officials with whom environmental health and protection programs must network.

Most of us will support many of the IOM recommendations, and all of it provides excellent "food for thought" even if one disagrees or notes flagrant gaps or inadequate emphases.

Healthy People 2000: Disease Prevention and Health Promotion Objectives for the Nation, is another well-publicized and timely national report worth noting. But a few details regarding the Year 2000 Report are worth iterating.

The first draft of the environmental health component was not only dismal, but counter-productive to the cause of environmental health and protection. There were glaring inadequacies and errors pertaining to professional education, air quality, and hazardous wastes. And a list of the issues overlooked in the draft was, at the same time, a list of some of the priority areas in environmental health and protection. Those not included were: solid waste management, water supply, water pollution, noise pollution, food protection, radiation protection, vector control, institutional and recreational environmental health; as well as the environmental health aspects of energy production, transportation systems, land-use, resource consumption, and overpopulation. And finally, the draft did not include such global environmental health and protection issues as global warming, ozone depletion, desertification, deforestation, and planetary toxification.

On behalf of the American Public Health Association Section on Environment, I transmitted written criticisms and concerns regarding the draft Year 2000 Report to the U.S. Public Health Service Office of Disease Prevention and Health Promotion, and had a number of conversations with personnel in that Office. For the most part, I was pleased with their timely and positive reaction. The environmental health chapter was entirely revised and changes were made that addressed many of my concerns. The environmental health objectives in the final document are certainly not perfect, but they are much improved while still lacking some in comprehensiveness.
But another instructive episode occurred following adoption and distribution of the Year 2000 Objectives. The USPHS National Center for Health Statistics developed a draft of criteria for selecting health status indicators for the use of federal, state, and local health agencies. This was an eight page document which may have been useful for disease prevention, health promotion, and health care. However, once again, the PHS had effectively ignored any reference to anything dealing with environmental health, environmental quality, environmental standards, environmental regulations, air, water, water supply, food, solid wastes, hazardous wastes, toxic chemicals, occupational health and safety, noise, radiation, environmental health and protection personnel, environmental health and protection laboratories, and global environmental problems.

So, once again I responded to this draft on behalf of the APHA Section on Environment requesting inclusion of the afore-mentioned issues. My communication caused the APHA to respond to the draft criteria stating in part: "One of our members has suggested that several additions be made to the criteria to make explicit the inclusion of the environment. We hope your working definition of "health" will include the quality of the physical and social environment. In addition, the criteria themselves should include a statement such as, "Include global measures of environmental quality". Environmental health standards should be added to the list of examples."

To make a long story short, guess what? The final criteria have been distributed and do not include any of our recommendations. It is as if the USPHS didn't know or care that the environment exists!

And to further my thesis of neglect, I cite the September, 1990 PHS Conference "Healthy People 2000", designed to discuss and publicly announce the Year 2000 Objectives. The Conference provided an interesting case study regarding attitudes toward public and environmental health.

- I called four major program participants prior to the conference requesting they give some balance, some indication of support, interest, or recognition of the environmental health objectives. None of them even mentioned the words.
- There was no workshop on environmental health.
- There was no program participant charged with discussing environmental health.
- I did not identify any participant from EPA, the nation's lead environmental health agency.
- Few of the speakers, even in workshops, even mentioned public health, but chose to talk about "health care". You certainly won't find anyone in environmental health and protection identifying with health care —, the one-on-one treatment or rehabilitation of a patient.
- A Year 2000 film was shown depicting health status in the Year 2000, but not a frame or
word thereof was devoted to air, water, wastes, food, or any other environmental health issue.

- Perhaps the most significant environmental health experience at the Year 2000 Conference was the invited EPA band.

Perhaps these examples have something to say about high-level public health interest in environmental health within the U.S. Public Health Service.

But despite these few seemingly negative comments, the future of environmental health and protection is bright for those professionals who have the necessary knowledge, skills, demonstrated leadership ability, and understand the organizational changes which will continue to take place. Those who are inflexible and rely on past accomplishments, the status quo, and organizational turf inflexibility will be numbered among extinct species.

- We must recognize that there is confusion regarding priorities, goals, resources and means required to achieve goals, the necessity of designing and implementing preventive programs, and determining which agencies should be responsible, despite the fact that huge sums are being spent to solve environmental problems.

- We must recognize that the Nation does not have an environmental health and protection system, but a patchwork of often overlapping and competing agencies having different and sometimes conflicting missions and varying priorities.

- We must recognize and show professional leadership in the creation of the new EPA's throughout the Nation, instead of being viewed as defensive bureaucrats. The trend to organizationally separate environmental health and protection agencies from health departments will continue in response to the demands of environmental advocates, as well as understandable organizational reaction to many health departments becoming substantially involved in health care issues.

- We must increasingly become effective in dealing with problems of the natural ecosystem which will ultimately impact human health. In the real world, there is little distinction between human health risks and ecological risks. Over the long term, ecological degradation either directly or indirectly degrades human health and the economy. Human health and welfare ultimately rely on the life support systems and natural resources provided by healthy ecosystems.

- We must recognize that environmental health and protection personnel must communicate with and, as appropriate, join forces with other environmental groups and agencies.

- We must recognize that no matter the titles or organizational arrangement, lead environmental health and protection agencies should be comprehensive in programmatic scope; staffed by appropriate professionals; have program design and priorities based on
sound epidemiology, toxicology, and risk assessment data; and have adequate analytical, data, legal, and fiscal resources to be effective.

- We must recognize that environmental health and protection personnel must develop constructive relationships with such activities and agencies as land-use, energy production, resource development and utilization, conservation, engineering, design, education, public health, economic development, and product design and development.

- We must recognize that a wide variety of personnel from routine surveillance and inspection level through management, policy, education and research levels are essential to modern environmental health and protection efforts.

- We should remember that only 11% of the environmental health and protection work force have formal education in environmental health science and protection, and the Public Health Service has estimated a need for 120,000 additional professionals to address problems in several key areas. Individuals with little or no knowledge of epidemiology, biostatistics, toxicology, public policy, risk assessment, risk communication, and environmental health and protection technical issues are filling key positions where such knowledge is essential.

- We should remember that environmental health and protection problems associated with the modern environment are complex and ever-changing. Personnel who do not take affirmative steps to remain current and keep looking to the future are soon out-of-date and ineffective.

- We must address the dearth of leadership. It may well be that leaders and potential leaders are not attracted to the field due to lack of professional identity, adequate financial reward, lack of challenge, lack of responsibility, or lack of adequate career opportunity. Or, perhaps the lack of properly designed, available, targeted, effective education and training to insure leadership development is not available.

 Leaders should:
  - be addressing current and emerging issues.
  - be leading rather than resisting progressive changes in organizations, priorities, goals, and programs.
  - be directing public and political attention to science-based, rather than emotionally perceived, priorities.
  - be developing and effectively implementing necessary public policy.
  - be seeking and capably filling exempt roles at levels where policy is proposed, debated and adopted.
  - be practicing the art of networking and constituency development.
  - be sought by civic and political leaders for their expertise.
  - insure that alleged problems are adequately defined prior to designing programs and proposing expensive solutions.
  - understand and communicate the net environmental, health, economic, ecological and social impacts of proposed programs.
Some of the major challenges which we face include:

- Inadequate emphasis on prevention, as differing from curative efforts and clean-up.
- Inadequate ability to effectively impact the process of public policy development and implementation, and to develop a constituency.
- Inadequate managerial and organizational behavior skills.
- Inadequate knowledge of epidemiology.
- Inadequate knowledge of risk assessment.
- Inadequate knowledge and skills regarding risk communication.
- Inadequate knowledge of environmental economics.
- Inadequate knowledge of global environmental health and protection issues.
- Inadequate abilities to consider the need, net impact, and the effectiveness of proposed control measures.
- Inadequate use of the public health model, rather than the medical model for allocating resources.

Now, I wish to spend the rest of my time discussing the issue of risk and priorities.

There continues to be widespread discussion about priority environmental health problems. Globally, these include species extinction, global warming and stratospheric ozone depletion, wastes, and (most importantly) over-population, which is at the root of the other problems. Excessive population contributes to environmental degradation including famine, rain forest destruction, global environmental degradation, pollution, mining of water in the western United States, and is a major factor contributing to resource and energy shortages.

A 1990 Roper poll found that, in terms of public perception, at least 20 percent considered hazardous waste sites to be the most significant environmental issue. Public perception converts to political reality. But contrary to public perception, the 1990 report of EPA's prestigious Science Advisory Board, Reducing Risk, listed ambient air pollutants, worker exposure to chemicals, indoor pollution, and drinking water pollutants as the major risks to human health. Inasmuch as EPA priorities are confined to EPA responsibilities, I would add food protection and lead poisoning, which are PHS responsibilities, to the list of priorities.

The Institute for Regulatory Policy recently conducted a survey of nearly 1300 health professionals in the fields of epidemiology, toxicology, medicine, and other health sciences. This survey showed that 81% of the professionals surveyed believe that public health dollars for reduction of environmental health risks in the United States are improperly targeted.

Considering the foregoing surveys and reports and dozens of others which many of us have studied, I am led to emphasize that the issue of "how" we assess, identify, define, understand, prioritize, communicate and manage risk, and deal with hysteria is itself among the most critical environmental problems which we face. Environmental health and protection professionals have significantly greater expertise in the technical program issues than in the
realm of assessment, epidemiology, prioritization, economics, communication, management, and public policy.

The following may help to bring our professional actions and attitudes regarding risk and priorities into better focus.

- We must recognize that the media feeds us an abundance of misinformation and a shortage of critical scientific inquiry behind many of the "catastrophe-of-the week" issues.

- We must recognize that if all the "environmental catastrophe" stories of the week were scientifically factual, we would have many times the current cancer morbidity and mortality rates. The interests served by numerical exaggeration are those whose funding or political importance varies with the hysteria surrounding a particular issue. As professionals, we must refute scare stories not based on sound epidemiology, toxicology, and risk assessment.

- We should question media stories which base a problem on finding one living example, e.g., one cancer patient near a hazardous waste site — capitalizing on the emotional appeal. Epidemiologists term this the "I know a person who ---" syndrome.

- We must beware of individuals and organizations using "science" to front and further their organizational and political objectives. Peer-reviewed science does not depend on media manipulation, Hollywood personalities, or slick public relations.

- We must beware of "predicted" morbidity and mortality figures pulled out of the air by some self-styled "expert" at a news conference.

- We must consistently be scientifically critical. Too many so called "professionals" are actually only regulators and functionaries, ever ready to accept, promote, and enforce the current party line or the misinformation fed us by the mass media and a few well-meaning, but misinformed, activist groups intent on furnishing their own treasuries. A few examples of environmental extremism surround the issues of radon, asbestos, alar, and the Waste Isolation Pilot Project in New Mexico.

- We must be wary of accepting problems based only on correlations rather than good epidemiological and toxicological cause-and-effect studies. Consider the following: If you consider only correlations, you will probably conclude that CARROTS WILL KILL YOU! After all,

- Nearly all sick people have eaten carrots. Obviously, the effects are cumulative.
• An estimated 99.9% of all people who die from cancer have eaten carrots.

• Another 99.9% of people involved in auto accidents ate carrots within 60 days before the accident occurred.

• Some 93.1% of juvenile delinquents come from homes where carrots are served frequently.

• Among the people born in 1839 who later dined on carrots, there has been a 100% mortality.

• All carrot eaters born between 1900 and 1910 have wrinkled skin, have lost most of their teeth, and have brittle bones and failing eyesight, if the ills of eating carrots have not already caused their death.

And keep in mind that,

STORKS BRING BABIES AND POLLUTION CAUSES CANCER AND BIRTH DEFECTS.

The number of storks in Europe has been decreasing for decades. At the same time, the European birth rate has also been decreasing. We would be foolish to accept this correlation as evidence that storks bring babies. The science of epidemiology tries to sort out from the myriad chance correlations those meaningful ones which might involve cause and effect. It is important to understand, however, that epidemiological methods are inherently difficult and that it is not easy to obtain convincing evidence. There are also many sources of bias. For example, because there are so many different types of cancer or birth defects, just by chance alone one would expect one or more of them to be at a higher frequency in any particular small community. The science of toxicology provides evidence as to whether a possible correlation is credible.

• We must recognize that there is usually a difference between science-based facts and public perception.

• We must remember that no public agency or program will be properly supported and effective without public involvement and understanding. This also underscores the need for effective risk communication.

• We must learn and practice the art of risk communication. Few (very few) environmental health and protection professionals understand and practice effective risk communication. Instead, we think of risk communication as a speech, a press release, or a leaflet. No wonder the public perception of risk is at variance with that of scientists.
We must always question, challenge, be creative, investigate alternative solutions, and analyze existing and proposed regulations and standards to determine the validity of their scientific base. Existing programs, standards, and regulations tend to be magical and take on a life of their own, and are seldom challenged. A standard in motion tends to remain in motion in a straight line unless impeded by an equal and opposite force. Environmental health and protection professionals should stand ready to provide the scientific "equal and opposite force" on overblown and emotional issues.

We must place a high value on scientific excellence and arrive at constructive public policy.

We must remember that people tend to over-estimate rare but dramatic events, to under-estimate common events such as accidental deaths and injuries, slow homicide and suicide from tobacco, and disdain changing preconceived notions about risks and priorities. When evidence is presented that contradicts preconceived opinions, people are quick to dismiss the evidence as erroneous or biased.

We must understand the problem before proposing a solution, and fit the solution to the problem rather than the problem to the solution. There always seems to be plenty of groups having solutions just waiting for a problem.

We should realize that the proper standard for environmental health and safety is not "zero-risk", but "net benefit." Zero-risk may not be economically or practically attainable, and the cost of pursuing zero-risk for one issue may preclude resources for addressing other more important problems.

We must understand that an unnecessary, or poorly designed, or overly expensive program becomes even more difficult to stop or alter once a bureaucracy and an industry are developed to promote the program. The issues of asbestos removal and radon detection and management provide excellent examples.

We must understand that most Americans, and even some environmental practitioners, seem to exhibit a love for calamity. Some activists are applauded and profit from false predictions of environmental calamity — some of which becomes translated into public hysteria and public perception, thence into political action, and finally into expensive and unnecessary programs and public policy. Those promoting such hysteria bear no responsibility for their false statements and predictions.

We must develop improved methods to prevent environmental problems, as differed from curative efforts and clean-up. While the field of environmental health and protection identifies with prevention, a preponderance of effort is devoted to solving problems created as a result of earlier decisions and actions taken by the
public and private sectors. Environmental health and protection personnel must become effectively involved in the planning and design stages of energy production and alternatives, land-use, transportation methodologies, resource utilization; as well as design, development, and production of products which may negatively impact human health or delicate ecological balances.

- We must remember that the public health model takes the community, nation, or planet as the patient and, in principle, allocates resources to maximize health and environmental quality for all. However, the model which seems to be more commonly used is the individual physician model which, once a pathology is diagnosed, provides everything possible to cure that pathology without regard for resources, priorities, or effects beyond that particular patient. We must base our actions on the public health model.

Environmental Health in the Year 2000 will depend, not on the various currently popular national reports, surveys, and plans, but on the ability of environmental health and protection agencies and professionals to:

1. Assess and prioritize environmental problems on the basis of sound epidemiology, toxicology, and risk assessment rather than hysteria and reaction to self-serving advocacy groups. Prioritization among myriad complex and competing demands may be the most important responsibility of environmental health and protection professionals.

2. Exhibit a high titer of leadership and effectiveness in designing, promoting, gaining approval for, and implementing public policy. This may be the most difficult responsibility for most environmental health and protection practitioners as few have been trained or experienced in the public policy and constituent development process.

3. Assure the public and political leaders that appropriate, effective, priority services are provided.

Merely managing an environmental health and protection agency in accordance with legislative and executive branch dictates is comparatively easy. Such legislative and executive elected officials, understandably, have their own priorities based on the demands of their constituents. Environmental health and protection may or may not be among these priorities, but the relative priorities of environmental health would be much different if they were based on sound epidemiology, toxicology, and risk assessment rather than emotion and political perception. Frequently, it is not a matter of shortage of total budget, but rather how it is being spent, or in some instances wasted, on such relative non-issues as alar, asbestos, radon, or the Waste Isolation Pilot Project in New Mexico.
Well, no one ever said leadership or the road to improved environmental quality is easy and non-confrontational! The road to improved environmental health and protection is a rocky road. It requires a vision and steadfastness of purpose, as it is beset by emotional pressures, more comfortable detours, political surprises, and frequently offers no short-term gratification or pay-off. The benefits of decreased morbidity and mortality and the enjoyment of positive health and environmental quality will accrue far beyond the tenure of incumbent elected officials.

The foregoing will require that schools of public health and other programs educating environmental health and protection professionals insure that all graduates be competent in analytical skills, communication skills, policy development and program planning skills, cultural skills, basic public health sciences skills, and financial planning and management skills. It is also essential that incumbent personnel be "retreaded" with these skills through effective continuing education mechanisms.

We must do our collective and professional best to insure a quality environment — the place where we are all going to spend the rest of our lives.

Since I started delivering this presentation this morning, some 35 Americans have died from the slow, insidious, toxic, usually irreversible, and ultimately fatal effects of a devastating drug called tobacco. I offer this as a comment on public health priorities.

I hope this Conference is as rewarding for you as the preparation has been for me.