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ROLE OF THE PUBLIC HEALTH SERVICE

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ABSTRACT

The Public Health Service must assume the role of the overall Public Health Coordinator, seeking to afford the highest level of health protection both to the nearby population as well as to the more distant groups. Data will be given relative to the limited experience the PHS has had in the removal of populations from areas of suspected hazards. Problems inherent in the evacuation of civilians of all ages will be discussed.

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The privilege one feels in being able to participate in an event of this kind always is heightened when he also is a member of the sponsoring organization. I trust my estimation of the value of this symposium is not biased by my dual capacity. I am convinced that our efforts here have been greatly needed.

In the first place, we have needed this symposium to help us lay the basis for the health and safety guidelines we must have for the large-scale peaceful application of nuclear explosives. This event is providing us, furthermore, with a much needed opportunity to examine problems which may arise as the promise of this new technology unfolds.

I am going to talk about the role of the Public Health Service in the large-scale use of nuclear explosives for peaceful purposes. It will become clear, as I proceed, that woven through this talk is a theme, which, however often you may have heard it at this symposium or elsewhere, deserves to be repeated. It is that the public health role in assuring the protection of the health and safety of the public is absolutely critical to the future of projects for the peaceful uses of nuclear explosives.

My symposium presentation will be made in two parts. The first part, which is applicable to the detonation phase of Plowshare projects, will be devoted to a case-history narration of two events illustrating public health protection on a large scale.

The second of the two principal parts of this presentation is a discussion of the role that the Public Health Service should have in evaluating each Plowshare project from a public health viewpoint both for the operational and post-operational phases.

We will begin our narration by discussing the case histories of two events which represent a rich source for guidelines to Plowsahre safety. The events were quite different in many respects. In fact, in one of them, chlorine gas, rather than radiation, was the agent of potential health impairment or, possibly, death. In one very important respect, however, the events were quite similar and it was because of this similarity that they were chosen for this talk. In both events neither serious injury nor death was caused by hazardous agents against which protective action was taken; yet, in each case, measures were adopted which represented something close to the ultimate in precautions for safety, including the evacuation of hundreds of people.

Each action program, in other words, rather completely reflected the Public Health Service viewpoint of what one should do when confronted with a potential for the impairment of human life on a large scale. One should prepare for the worst. One should cover, or try to cover, every eventuality. One should recognize that public health protection can be exercised only when adequate plans have been developed and tested. The Salmon Event of Project Dribble was the detonation of a five-kiloton nuclear device 2,720 feet underground in a formation known as the Tatum Salt Dome near Hattiesburg, Mississippi, in the fall of 1964. The PHS, under a Memorandum of Understanding with AEC, had certain responsibilities for the civilian population who lived adjacent to the active test site. These responsibilities were not different from those we exercise here at Nevada.

I shall not detail all the preparations here. These included a great amount of environmental surveillance, the collection and analysis of meteorological data, studies of milk from the area's dairy industry, the establishment of communications networks for the rapid dissemination of information to operating personnel and the public.

Most of our work with people was in conjunction with the evacuation of 451 persons, representing 105 families, from portions of the off-site area selected on the basis of fallout predictions for the anticipated weather conditions and ground motion. We called on every family which was to be evacuated. We knew the first and last names and, sometimes, the nicknames of each member of every evacuee family. We knew who was sick and what ailed them. We made almost daily checks on the condition of the ill and the enfeebled elderly, knowing how this may change hourly. Incidentally, the change may come in forms one may not always anticipate, as when a married daughter in one family decided to come home to have her baby just before the shot.

We knew how and where we were going to move each sick person, having made arrangements with his physician and, when necessary, with hospitals. It was decided to have the sick moved not only by personnel trained in

this work but by local people who would have moved the ill in this community in any emergency. This proved a wise decision, since the appearance of familiar faces on moving day had a calming effect on patients. It is necessary to emphasize, I think, that planning for the evacuation and care of people must take into consideration the individual needs of each evacuee.

Having decided to move sick people by ambulance in advance of a shot, we soon had to make another decision, which was whether the sick were physically able to make the trip back home. Before-and-after conditions are not always the same. Furthermore, persons moved into hospitals are no longer home patients, but hospital cases. They are subject to hospital feeding, care, and routine and may be released only with the consent of their physicians or if they sign themselves out. One of our evacuees remained in the hospital for ten days.

All evacuation expenses were borne by the project, including, of course, payments for ambulance services, hospitalization, and other medical care. All evacuees were paid a specific sum per adult and a specific sum per child for each day they were away from their homes. Payments were made by check, and facilities were at hand for immediately converting checks into cash.

Surveys made of people in advance of their evacuation and in connection with the security of their properties provided excellent opportunities for the establishment of confidence, understanding, and personal relationships which provided a solid basis for our public relations program - and very often, in fact, were the major content of that program. During these discussions, people were individually informed concerning all project activities, and sometimes were informed by us before they had a chance to read about it in their newspapers. The value of these relationships cannot be overemphasized.

It cannot be overemphasized that the very best relationships must be established between State and local police, other public safety personnel, and the local medical community. People tend to have confidence, particularly in a relatively small community, in what they are told by the police chief or sheriff's deputy or the president of the local medical society. No outsider's communications skill can match a few reassuring words from a local authority who people know and often may regard as friend. The most significant non-technical finding produced by this public relations program was the knowledge that a comprehensive off-site radiological safety program can be conducted in a populated area provided the people's confidence in the operation is established and maintained.

Operation Safeguard provides my second case history of a large-scale action program for safety and public health protection. Six hundred and one persons, all of them ill and aged, were evacuated in this instance. The locale was Baton Rouge, Louisiana. The agent for death or health impairment was chlorine gas. The time of peril for tens of thousands of people ran for 64 days.

It started on September 10, 1965, when Hurricane Betsy, rampaging through the Louisiana capital, tore a barge from its moorings and swept it ten miles down the turbulent Mississippi River before it sank in 60 feet of water with a cargo of four 150-ton tanks of chlorine under pressure and in liquid form. The end came on November 12 when the barge, its cargo intact, was plucked from the Mississippi mud by a giant crane.

One hesitates trying to name all the public and private agencies involved during the 64 days spent protecting people and in the salvage operations. They included the Army, Navy, the State Departments of Welfare and Hospitals, and the Board of Health, the State Police, the Louisiana Civil Defense Agency, area hospitals, the Red Cross, medical societies, and the U. S. Public Health Service. Early in October 1965, the Departments of Welfare and Hospitals of the State conducted a three-day survey of the ill and the aged within an area extending five miles on all sides of the sunken barge. Between 500 and 700 patients were estimated to be there.

In late October arrangements were made with the Fourth Army to send two hospital trains with seven litter cars and one kitchen car each and five litter buses for evacuation. Twenty ambulances and five buses were supplied by the Department of Hospitals.

Around this period and for some time afterward, the fear grew that a small leak might develop in a valve in one or more of the tanks. Had this occurred, the resultant hydrochloric acid might have eaten away the remainder of the valve and 150 tons or more of potentially lethal chlorine would have been released, much of it blown as gas to the surface of the river. It was against this eventuality that Public Health Service personnel analyzed air and water samples approximately every 30 minutes around the clock.

In addition to planning for evacuation of the sick and the aged, preparations were made for a mass exodus of people. Evacuation routes were selected and maps were reproduced by newspapers and television stations. Shelters were set up at strategic locations and 40,000 cots and blankets were furnished from Public Health Service medical stocks.

It is unlikely that any potential, or even actual, disaster ever resulted in a communications system more complete than the one in use at Baton Rouge in the fall of 1965. To describe it would take more time than we can allow. Its existence was a recognition of the paramount importance of communications to efficient operations management, as well as to keeping the public quickly and accurately informed of developments at all times.

The first evacuation train left Baton Rouge on November 10; evacuation was completed 22 hours later. Fear vanished the day the barge was raised with its four chlorine tanks intact. With the exception of two elderly heart patients who died en route and one too sick to be moved, all evacuees were back home by November 14. As for others in the area, schools and businesses were closed in Baton Rouge on barge-raising day,

November 12, and people generally remained in their homes, as urged by authorities, or left the city for the country upwind from the site.

One illustration, among many, of the degree of preparation at Baton Rouge for a disaster which never occurred is provided by the first-aid station custom-built from an obsolete X-ray bus by a Public Health Service officer and Army soldiers. It was equipped especially to care for chlorine gas and burn cases. A filtering device was available to clear chlorine gas out of the station and replace it with pure air. Four pressure inhalators were available for the administration of drugs against lung congestion which is the worst effect of the gas. Drugs and ointment were on hand for the treatment of chlorine burns of the skin and eyes. But there were no chlorine emergencies. There were colds and minor cuts and bruises, fractures of fingers or toes. The most serious injury was a broken leg.

Although the examples provided by the Baton Rouge incident and the Mississippi nuclear Project Dribble are different in many respects, nevertheless they reflect an off-site condition of the kind we can assume might develop as Plowshare projects become more widespread. In each case, large numbers of people were under conditions of possible exposure to agents potentially hazardous to health.

As long as these events are experimental, we are going to have to program safety and health protection for Plowsahre as though we expected the most improbable event to occur. The public must know that safety preparations for possible events have been made or the public will not condone, much less support, efforts to perfect Plowshare technology.

The second part of my presentation concerns the role of the Public Health Service in evaluating each Plowshare project from a public health viewpoint. It is recognized that the conduct of a Plowshare nuclear detonation is an AEC responsibility by statute. The AEC controls the execution of all phases of the operation involving the nuclear device, including site preparation, emplacement, detonation, disposition of radioactive substances, and health and safety. In my judgment, it is the responsibility of the Bureau of Radiological Health, i.e., the PHS, to make a public health evaluation of each Plowshare project. This evaluation should relate to the operational aspects of the actual event, and the production, handling, storage, distribution, and use of the resulting products. The review and evaluation should be initiated as soon as sufficient preliminary information is received and developed. As part of the evaluation, the known as well as the unknown information relating to public health would be delineated. The technical evaluation will encompass the usual operational considerations for the immediate off-site area at the time of detonation, as well as considerations of the long-term and long-distance implications such as the distribution of consumer products resulting from certain nuclear explosive applications.

It is the mutual responsibility of industry of several States and Federal agencies to insure that any resulting radiation exposure from Plowshare projects is kept as low as practicable and within acceptable

limits. At this time it is most appropriate to discuss the applicable guidance for radiation exposure. In my judgment, this symposium contributes to a free exchange of ideas and information that will be helpful as we attempt to resolve problems in this area. Because of the uncertainties in the distribution of radioactivity in the final consumer product, it is extremely important that both Federal and State Health agencies be knowledgeable as to the sources of radioactivity that may result in an exposure to the population. In order to carry out their respective responsibilities, public health officials should be kept currently and fully informed of proposed projects and resulting releases of radioactivity.

The basic guidance for public health consideration of radiation exposure is that promulgated by the Federal Radiation Council (FRC) and directed by the President to be used by Federal agencies. The FRC was established in 1959 by Public Law 86-373 to provide a Federal policy on human radiation exposure. A major function of the Council is to " . . . advise the President with respect to radiation matters, directly or indirectly affecting health, including guidance for all Federal agencies in the formulation of radiation standards and in establishment and execution of programs of cooperation with States . . . ."

The Radiation Protection Guide (RPG), which is defined by the FRC as the radiation dose which should not be exceeded without careful consideration of the reasons for doing so for the general population, is 0.5 rem/yr whole body dose for an individual. This guide is applicable to normal peacetime operations and is not intended to apply to radiation exposure resulting from natural background or the purposeful exposure of patients by practitioners of the healing arts. There can, of course, be quite different numerical values for the RPG, depending upon the circumstances.

As an operational technique, where the individual whole body doses are not known, a suitable sample of the exposed population should be developed whose protection guide for annual whole body dose will not exceed 0.17 rem per capita per year.

The Radioactivity Concentration Guide (RCG) is defined as the concentration of radioactivity in the environment which is determined to result in whole body or organ doses equal to the RPG. The use of RCG's is an operational technique which provides a means to evaluate potential human exposure based on measurement of environmental concentrations of radioactivity. An RCG must be based on an RPG and is applicable only for the circumstances under which the use of the corresponding RPG is appropriate.

Effective radiation control measures for any health hazard will require the establishment of radiological safety procedures and guidance for health agencies to reduce any potential hazard to an individual or the public to as low a degree as practical. Establishment of these control procedures requires value judgments in which the potential risks of the hazard are weighed against the benefits to be derived. Because of this need, the health agency must have sufficient technical information related to the problem to derive workable control procedures. This is needed along

with scientific knowledge concerning the biological effect of the ionizing radiation to adequately evaluate the magnitude of the hazard under the given condition. All agencies involved in the peaceful nuclear explosives program must understand that this guidance is needed to assure protection of the individual and the public and to permit anticipated benefit to the public.

Other groups concerned with population risk should be consulted to assist in the review of all factors which may affect the impact of the guidance on the consumer.

Concentration guides provided by the NCRP and ICRP, supplemented by guidance provided by the FRC, are applicable to total exposure of the public to radiation from all sources (except medical uses and natural background), and do not provide specific guidance for exposures to individual sources. Appropriate guides for a particular application of nuclear energy should be based on the following considerations: (1) Activities resulting in man-made exposure should be authorized only under conditions for which it is determined that the benefits outweigh the risk; (2) Within these conditions, radiation exposures should be limited to such levels that the reduction in risk associated with any further reduction would not justify the total effort.

It is my understanding that radiation limits for Plowshare Projects will be established by the AEC's regulatory group under the procedures set forth in the Code of Federal Regulations. However, the limits for commercial products associated with Plowshare applications may not be developed until the projects change from an experimental to an industrial application phase. Further, it is recognized that the FRC has applied general guidance for these applications. For instance, the present AEC position regarding regulatory limits for natural gas applications limits is as follows:

> " "The AEC has not developed regulatory limits which are directly applicable to the gas storage application and it is expected that the results of the experiment would be used as a partial basis for developing such limits. These limits may be some small fraction of the FRC guides or of the recommendations of the ICRP and NCRP. After satisfying the experimental requirements, any commercial use of storage gas from the chimney containing radioactivity would be subject to appropriate regulatory approval. Such approval would be granted only after a determination has been made that use of the gas would not result in a significant increase in the radiation exposure normally received by the general public."

It seems clear to me also that there can be no planning compatible with a given use of explosives without close cooperation between the developers of the explosive device and public health authorities. No device ought to be brought to a mature state of development by nuclear

specialists working independently. If the public health is to be adequately protected, input from public health specialists must be accepted at an early stage.

Looking back over the Plowshare experience, I believe the capability probably is available to insure that nuclear explosives can be used for peaceful purposes, on a large scale, either without human and environmental exposure or with exposure at acceptable levels. As yet this capability has not been demonstrated. Nor do I think that the American public fully believes the capability exists. I trust, however, that the time may be nearing when we can agree, from the public health standpoint, that Plowshare is ready to move forward as a tool for progress. This, ladies and gentlemen, is the goal we seek.