



XA04N2201

STATE AND LOCAL SAFETY PROGRAM

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ABSTRACT

This paper will give emphasis to the need for an increasing role of the states, along with the Federal agencies, in the Plowshare Program in order to assure state and local confidence with respect to the safety of their residents as the Federal government seeks new methods to benefit society.

First will be stressed the age-old principle of control at the source.

Other factors to be discussed are monitoring; standards and their use; control action; public relations; predictions and the need to have certain advance knowledge of tests - even if security clearance is necessary for appropriate state representatives; the state and local government responsibility to their citizens; the isolation of national decision making from state and local concern and responsibility; cost assessments and their responsibility; and research as it relates to the ecological system as well as the direct short- or long-term effects of radioactivity on man.

The threat to human health of radioactivity in the environment has received growing attention in the post-war period, and has caused health officials in the United States considerable concern. The almost unlimited possibilities for useful application of radioactivity or operations resulting in radioactivity will attract the intellectual and practical efforts of mankind for centuries to come. How well these applications are thought through in advance will determine whether this new tool will be a blessing or a curse to society.

Much evidence has been accumulated to date to show the feasibility of controlling radioactivity at levels which will not result in unacceptable hazards. At the same time we must not forget that radioactive fallout in the 1950's from weapons testing was of such a degree and composition of long-term half-life nuclides that it may be many years before we actually are certain about any resulting hazard. Thus, past experience and the vast

complications of the subject argue against any complacency about our present level of knowledge. We simply cannot take it for granted at this juncture that our past control of radioactive exposure has been adequate nor that it will continue to be adequate without greatly increased attention to the entire subject and greater planning effort directed toward major decisions concerning use of the new tools we have found. This symposium is in itself an indication of this concern and a response for that concern.

Control of environmental pollution at the source has been regarded as the most effective means of removing or forestalling threats to the health of the population. The philosophy is still sound, and must be applied in all cases to the limit of practicality, and especially in the case of radioactivity, since everyone agrees that no unnecessary radioactivity should be imposed on the environment. When the standard practice of treating effluents becomes impractical, as seems evident in the Plowshare Program, the decision as to whether or not to continue promoting the possible benefits of a program to society revolves around questions of how adequate are our predictions and measurements of contamination and what are some long-term effects of pursuing a certain course of action. The subjects thus opened up include monitoring, standards, controls, public relations, methods of prediction, state and local government responsibility, the isolation of national decision making from state and local government concern and responsibility, costs of surveillance and related actions, and planning of research.

Utah's geographical position with respect to the Nevada Test Site has served to emphasize the critical responsibility devolving on state and local health officials in protection of the population against radioactive contamination, especially when source control is not feasible. Several papers earlier in this symposium have identified our downwind location. Other states have been involved in the usual sources of radioactivity, but many of these do not present the problems of extensive monitoring or the critical public relations problems which have been experienced in connection with tests in Nevada.

As a result of the 1962 contamination experience, which involved Utah milk supplies to a high degree, Utah was obliged to move into an extensive monitoring and laboratory program which it could not have supported without substantial financial help from the Public Health Service. The 1962 event has been reported before and will not be elaborated here except to say that it has sensitized people in Utah to the potential hazard which exists at the Nevada Test Site.

As indicated by SLIDE 1, at the present time Utah has eighteen air monitoring stations which operate twenty-four hours a day throughout the year. Operators are instructed to call the State Health Division personnel involved, night or day, when readings of atmospheric radioactivity exceed a certain pre-determined figure. This is calculated to give early warning for the purpose of intensifying the regular milk monitoring procedures. Bi-weekly samples from milk tankers (routes shown on the slide) covering all major grazing areas in the state are analyzed for Iodine-131, strontium-89 and -90, cesium-137, and barium-lanthanum-40. The existence of this monitoring

network in 1962 would have better prepared Utah for that event. The Utah network has gradually evolved since that time.

SLIDE II indicates air monitoring results collected in Salt Lake City, and shows examples of types of results obtained with this monitoring network. The first peak resulted from the cratering shot of 1962; the second, in the same year, is from an unscheduled venting at the test site; the next three peaks are those resulting from Chinese testing; and the final one is from the scheduled venting at the Nevada Test Site in December 1968.

In the middle and late 1950's the Salt Lake air monitoring station, the only station in continuous operation, identified atmospheric fallout from the Nevada Test Site at levels 5 to 7 fold greater than the 1962 Salt Lake City peak shown in Slide I.

The pattern of deposition of fallout over the state from this "Schooner" shot is indicated by SLIDE III which shows the air results of each of the Utah stations. Charts for each of the Chinese shots show a similar pattern for both air and milk.

In addition, a statewide monitoring system for detection of tritium in water is now getting underway. These activities, related almost entirely to earlier testing programs, will become more important as the testing activities increase, whether due to weapons testing or Plowshare projects.

Not only is the Utah monitoring system presently considered to be an absolute minimum commensurate with the possible hazards involved, but it is furthermore our opinion that the system must be expanded in the future if the proposed Plowshare Program continues. One of the reasons for this is the past history of prediction failures which were related initially to weapons testing programs. There is ample evidence in Utah to show that the most careful meteorological predictions of fallout paths do not materialize in every case, and that without an extensive monitoring system there is no way of detecting the possible exposure of the population resulting from certain atmospheric testing activities. And, for that matter, there is no way to assure the population that fallout did not occur..

Needless to say, the State or local health official is not discharging his responsibilities in any adequate degree if he is not prepared to answer with reasonable precision the questions "Was there any environmental contamination in Utah as a result of the last test, where did it occur and at what levels?"

Constant updating of laboratory capability is also a necessity, resulting in added expenses far beyond those originally contemplated. For example, at considerable extra cost, we have recently acquired a liquid scintillation counter to handle our tritium samples. We are now faced with the acquisition of an additional chemist because our original staff is far overloaded in view of the increasing amount of environmental monitoring found necessary. This will be intensified, of course, as activities involving nuclear fission increase in the area.

Assuming that monitoring capabilities are adequate, the question of standards is the next important consideration. Much work has been done in this area both nationally and internationally, and there exists an abundance of highly technical reports related to the subject. What is sometimes lacking is interpretation in a way which will make application of the standards practical as well as sound in the sense of protecting public health. This problem is being attacked from many angles and hopefully will yield to an adequate solution; however, it must be recognized that new scientific information is being accumulated at such a rapid rate that we will never have a set of standards which are not subject to revision as new evidence comes in.

Differences of opinion with regard to standards are inevitable. This has been so throughout the history of environmental controls, and radioactivity could not be expected to constitute an exception. State and local health departments must rely heavily on the resources of the Federal Government and others in developing standards, but in the final analysis they must assume full responsibility for the precise levels of protection which are applicable to a given segment of local populations. Therefore, they cannot blindly accept standards which are handed down from some other agency, but must evaluate them thoroughly with whatever resources they can develop. One such resource in Utah is the Radiological Health Advisory Committee. This committee was appointed in Utah after the 1962 incident, and is composed of well-known and highly respected experts in their fields. The committee's recommendations are respected and provide the Health Division with a factual and effective base for action. The committee acts as a clearing house for technical radiological health information and is responsible for recommendations to the State Board of Health on various points, including standards, operating surveillance and control programs.

A foreseeable complication in the area of standards development is in the increasing number of ways by which human beings can be exposed to radioactivity. This grows out of the great usefulness of radioactivity both to science and industry, as previously mentioned, and the guarantee that under these circumstances inventive minds will be devising new applications continuously. Standards are often based on exposure from a single source, and shielding and other requirements are based on the single-source, multiple-exposure concept. Not only are some states potentially exposed to nuclear testing as an important source of irradiation, but they must be continually concerned with multiple exposures in numerous radioactive devices which may come to be in almost constant use. This seems to suggest a need for rather comprehensive planning in the standards-setting process.

The question of control action more often than not relates to controls over a rather specific use of radioactivity, as radiography, isotope use, laboratory experimental use, etc. In general, it can be said that good progress has been made in this area and controls so far adopted are achieving some success. In Utah, the word "control" conjures up a necessity of taking action with respect to use of foodstuffs, and possibly water, resulting from incidents which occur beyond the State's limits of jurisdiction, such as at the Nevada Test Site. In 1962, Utah found it necessary to actually apply certain controls to the use of milk, but the problems related

to that experience make us sensitive to the need for continual refinement of plans which will be brought into effect in the event of another major contamination incident.

It must be recognized that if our monitoring capabilities are adequate and if the information achieved through monitoring is properly assembled and evaluated, the term "control" might possibly be extended to some efforts at curtailment of Plowshare types of testing. This question was never seriously considered in connection with weapons testing, which have a strong defense connotation. It is obvious that it must be considered in all cases of peaceful application of nuclear energy.

While this paper does not presume to determine the need for nuclear testing, weapons or Plowshare, nor to determine the validity of its purpose, it does presume that once this determination is made to fulfill government policy, all effort must be devoted by the Federal government to protect the health of the public.

Apart from the real dangers to the human population which radioactivity causes, there is another question embodied in the term "public relations" which has great significance, not only in Utah but everywhere else in the country, and possibly in the world. Radioactivity is a glamour subject, and has attracted wide attention, even on the part of the average citizen. Sometimes, besides being fascinating, it is as someone said, a little "scary", and this gives rise to problems which state health departments must face.

A good and effective public relations program in this area is absolutely essential under any circumstances, but it must have equal priority with control action in the case of radioactivity, and particularly the type of radioactivity which originates beyond the State's borders as a result of planned action by man.

The State and local agencies must be prepared to reassure the public that no hazard exists just as often as they must be prepared to take control action. Sometimes the most innocuous release in the press about the existence of radioactivity in any concentration will evoke a strong public reaction which needs to have a counter reaction by responsible officials. At no time should the public be fooled about the true facts, but obviously, when no hazard exists, the State agency should be in a position to state this fact unequivocally and with solid backing from scientific measurements. This is one of the major reasons for the extensive monitoring and laboratory capabilities already mentioned.

This problem also requires some expertise in dealing with the press, which again devolves on the State and local officials. Even the best scientific information can be quoted incorrectly and produce a near public panic as the result of misinterpretation. Obviously, much energy should be directed toward the prevention of such misinterpretation.

One aid in connection with these problems could come from detailed knowledge which might be available with regard to planned tests. In the

past certain tests of necessity were shrouded in secrecy, and release of advance information even to State officials was possible only to a very limited degree. As testing becomes more complicated, it becomes more and more necessary that State officials have complete details of planned tests prior to the event, in order that monitoring and other activities can be geared to meet the needs. If release of such information to these officials requires security clearance, this should be provided automatically, after the necessary checks, of course, to insure adequate security. It seems likely that no one can provide all of the complicated monitoring needed if there is no hint as to the specific isotopes which are likely to be produced. Again, as important as this knowledge is to those conducting the tests, it is equally important to State and local officials who have the responsibility of protecting the citizenry within their jurisdiction, and of avoiding misinterpretations of information which could lead to panic or other undesirable results.

An aspect of the overall problem which needs more emphasis is the isolation of national decision-making from state and local concern and responsibility. It seems unlikely that a Federal Agency making a decision whether or not to conduct a test program can have the same sense of responsibility to a specific population group as a state or local health officer who has to cope with the results of that decision. At the State level, the health agency has almost daily contact with many of the people who may be involved in any adverse developments, he has almost daily contact with industry officials who might be involved, such as the dairy industry, and he is going to be held more directly accountable for any adverse effects of the decision-making process. Involved here, of course, is the public relations problem previously mentioned, but it is not a matter alone of public relations.

The day-to-day decisions of the State health officer are put to test in a practical sense and reacted to more promptly and directly than can ever be the case for a similar official at Federal level. Even if the State official desires to hide behind the curtain of Federal standards and responsibility, he cannot long exist in this position. Sooner or later, he will have to face up to his responsibilities or turn his task over to someone who will. The point is that the State health officer or his authorized representative must be directly informed of all pertinent data of any testing program which may distribute radioactivity over the State area.

This, of course, raises the question of who shall bear the costs of added surveillance and control procedures. Some basic monitoring costs are the proper responsibility of state programs, but it seems logical that the Plowshare program, being essentially a research and development nature, should absorb most of the cost imposed on States for radiation monitoring related to this program, and also of the associated control.

As has been mentioned previously, the cost of monitoring can become a major item for a state, and could be completely beyond state capabilities. This will vary with each state. Currently, however, few states, if any, are adequately prepared. Nevertheless, if the hazard is imposed by decisions

to aid society through development of new processes, those responsible for the decision should see to it that states have enough resources to provide the basic essential monitoring, and to expand it as necessary to meet new needs, whether these develop from expanded uses of radioactivity or from advances in knowledge which dictate greater sophistication in monitoring and analysis capabilities. This need will continue to vary with the States. It is most critical for Utah because the State is both relatively small and its location is readily subject to effects from the testing programs.

Other costs, which hopefully can be avoided, but which still must be considered as possibilities, relate to control action found necessary when food or water become contaminated beyond acceptable use levels. Utah's 1962 incident was estimated to result in total cost to industry of about \$80,000 and total cost to government, beyond normal activities, of about \$37,000. Compared to the high cost of testing such an explosive, these costs are small, but for states of small population these are large, and much more so when repeated and when added to other related costs such as monitoring and laboratory services. Deliberate planning to experiment with peacetime uses of atomic energy certainly should include a positive plan to pay such costs, however large they may become. Acceptance of this philosophy might succeed in transferring some of the direct responsibility mentioned previously from local to national level.

Another cost considered to be an essential part of the activities under discussion, although not exclusively attributable to them, is that of research. Not only is basic research involved, but also some applied research as it relates to the eco-system and the long-term results of small deposits of radioactivity in the environment. These small deposits cannot be considered immediate hazards under any circumstances, and yet they might eventually be serious hazards, particularly when they involve isotopes with long half-lives.

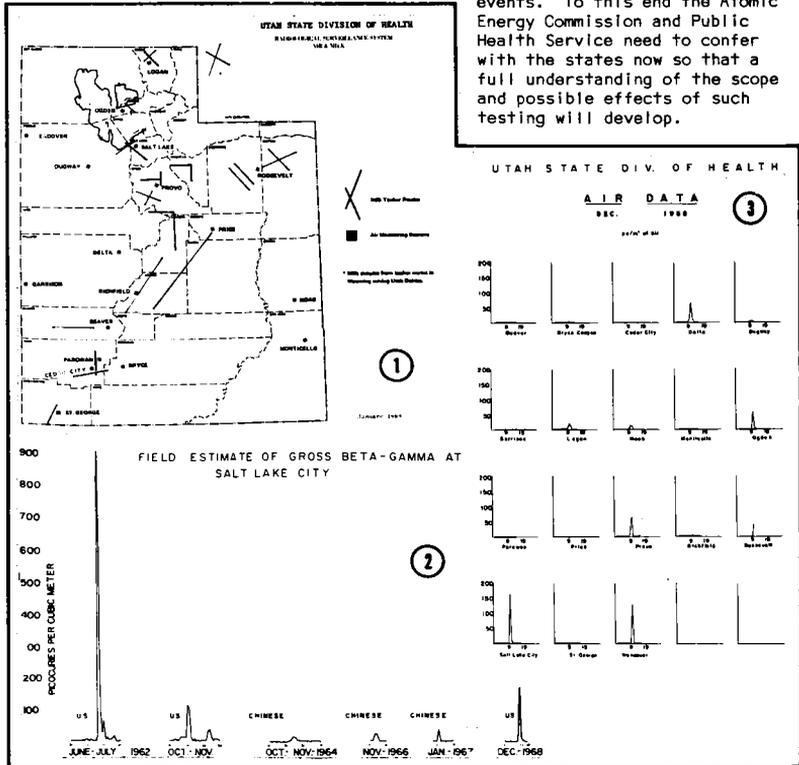
A research program to investigate all aspects of this problem cannot be simple and certainly will be costly. Most of this research is already being done, but again, Utah's peculiar relationship to the testing area seems to argue for an even more complete effort in this particular area, as well as projected research activities for a long time in the future. While we are emphasizing Plowshare activities at this Symposium, it is not too late to also emphasize the need for support of research activities already underway or that should have been undertaken as a part of the weapons testing program. If this is not accepted in advance, it may prove difficult to accomplish afterwards. For example, the Utah-Nevada-Arizona fallout study was initiated after the event of 1962. This year we are finding great difficulty in continued financing for a series of reasons none of which we in Utah are able to accept. Such research should not exclude the development of better methods of monitoring as well as development of control methods which might some day become necessary.

Again, as mentioned previously, the allocation of this type of cost to the Plowshare program should be done with the full realization that it may lead to decisions to curtail the testing program. Certainly this is not too

much to ask in the interests of not only the population in Utah but populations through the country and possibly the world.

It should also be mentioned that there are still wide gaps in our knowledge covering the direct short-term effects of radioactivity on man. This became evident when we were pressed for decisions about how high atmospheric levels could get and for how long before we would declare a crisis and instruct the public on special protective actions. Existing standards relating to this matter simply are inadequate to be of real practical value. At least, in Utah, I believe we would take control action at lower levels of exposure than the current standards seem to suggest. While it may be true that some of the research in this area needs to be financed by other agencies, it again seems logical that the Plowshare program needs to be given rather direct responsibilities of this nature.

While this paper has given emphasis to radiation hazards by fallout, this is because of our past experience. We must now also be concerned with seismic events. To this end the Atomic Energy Commission and Public Health Service need to confer with the states now so that a full understanding of the scope and possible effects of such testing will develop.



QUESTIONS FOR G. D. CARLYLE THOMPSON

1. From Hal Mueller:

Was any Iodine-131 detected in cow's milk by your network as a result of the December 1968 detonation? If yes, how much and where?

ANSWER:

No

2. From Mr. Phelps:

Earlier in the symposium, it was stated that the Director, State Health Department, Utah was informed about the cloud trajectory and radionuclide composition with regard to Plowshare cratering events. Do you inform other groups (i.e., the University of Utah Radioecology Program) of the possibility of fallout and its probable deposition pattern?

ANSWER:

This has been a changing matter because in the beginning the information we received was restricted to our own official use. This was not shared. Later on as we got information that could be shared, we did so. Because again the classification of this information we got was not fully understood. I think the differences that have arisen have resulted in clarification. I understand now that the information that we are going to receive, we will be able to share. I can't say that is going to be the case though, because I haven't received the information yet in regard to some of the future tests. I think there have been some places for misunderstanding in Utah on this very point.

3. From Walt Kozlowski:

You mentioned "unacceptable hazards," would you describe some hazards which would be "acceptable?"

ANSWER:

Well, I think this gets back to the discretion of the designer to learn how much radiation imposed on the population is really necessary. This is the old discussion of what is necessary. From our standpoint, we don't believe that radiation coming to Utah is an area over which we have direct control. If it is determined to be necessary by national policy then we need to have the information available to monitor and to take corrective action should it arise. I presume that if the predictions that we are going to get were indicative of high level fallout, we would protest it. I have a committee, though, which I'm sure would meet to discuss this point. The committee

already has adopted a policy about which I testified before the Joint Committee on Atomic Energy and responded to the fact that we didn't like the new standards and therefore we would use our own judgment in these standards. So I don't believe I can answer that question anymore precisely than to deal with it in the nature of the event, should it occur, and we would probably have to look at it and make our own judgment.

4. From Walt Kozlowski:

Who are some of the well know experts on the radiological health advisory committee?

ANSWER:

We have two practicing radiologists, we've had a recent change because of illness, but at all times these men have been highly respected in their field in the state of Utah. We have had some health physicists. We've had some men from Industry. We have the leading physicists from our three large universities. We have nine people - I don't know if I have covered them all or not.

5. From Dr. Pelletier:

How many air sampling stations do you think it is necessary to have in Utah to assure your people that they were not exposed to the cloud of a given event?

ANSWER:

This is a question the legislature asks me every time I go for money. As long as we don't have any event, they think we don't need the stations. We didn't have any trouble this year after the December event. Actually, the stations which we operate are partly owned by us and partly owned by the Public Health Service which we operate, and some of them, of course, are using different types of instrumentation for which we are getting comparative results. But I would think we would need about what we now have and if we maintain this, we would be able to determine the fallout in any movement from outside the state. I don't believe every state would need the coverage we have as they move farther away from the Test Site.

6. From Robert Karsh:

The Dugway CBW Incident last year made it apparent that the state of Utah did not get advance information of what was being tested on March 13. Are you now getting this advance information in the radioactive field? Minnesota is now concerned with the possibility and legality of state rules more stringent than those of the AEC. Does Utah foresee this?

ANSWER:

Just to clarify that first part of the question, I believe we are now involved in being informed from Dugway about all of the events that occur there. Heretofore, we were only involved in the biological events, not the chemical events. We were also involved in the beryllium events at Dugway. But the setup which is now in operation is the same for chemical events as for biological events. With respect to the radiation aspect, we haven't had any event since December, but I have been assured that we will be fully informed of anything that we need and we are having some of our staff visit the Southwestern Radiological Health Laboratory for technical consultation with regard to sharpening our capability on our own instruments with respect to some of the isotopes that have been mentioned here in this conference. We do use the Southwestern Radiological Health Laboratory, of course, for reference for specimens on a number of things and we split specimens with them. I might also say, going back to the former question, that one of the reasons we are able to operate these stations as economically as we are because we locate them in connection with our air pollution program for other air pollutants and so we are able to have a separate device while the man power is common. The daily changing and checking of motors and pads and testing samples is done by the same person in multiple areas. This reduces the cost substantially to what you would have to do if you were just operating a fallout network as we were originally.

(Second part of question.) I think we have already given indication to that answer by indicating how our own rad health advisory committee reacted to the new FRC standards when they were adopted a few years ago and prepared the statement which I used to testify before the Committee. When the chairman of the Committee asked me who was going to apply the standard in Utah, he said, "Aren't you?" and I said, "Yes, we are," and he said, "Well, that's the answer to your question." So I presume we will apply the FRC standards in our own way in Utah; if that's writing a Utah standard why it will have to be a Utah standard I guess. It does pose a problem and that's what I said in my paper: that I think we have to have some full discussion of these standards. As you remember back in those days it was said that you were changing the rules of the ball game just as you are about to score a touchdown and there is some bad reaction to that in several of the states. I wouldn't be surprised if Minnesota is one.

7. From John Martin:

To what extent does your state health safety program on radioactive fallout exposure cooperate or collaborate with local universities and private industry researchers?

ANSWER:

I don't know of any private industry researchers in this area in Utah. There are some in the universities and I'm sure I can say that the communication can be improved in this respect.

SESSION IV - BASIC RADIATION
PROTECTION GUIDANCE

Chairman: Dr. Gordon Dunning
Department of Operational Safety
U. S. Atomic Energy Commission
Germantown