

**INDIVIDUAL PROTECTION AGAINST RESPIRATORY AILMENTS:**

ITS FUTURE IN SPAIN

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## INTRODUCTION

When the first serious study was carried out in Spain of available techniques of individual protection against respiratory ailments, it was discovered that these techniques were frankly deficient but, at the same time, that they were a highly effective means of combating the occupational diseases that occur with greater frequency than elsewhere in underdeveloped and developing countries. For the reasons stated above, the Administration concentrated its efforts in this area of prevention, with special emphasis on the following points:

Bringing the equipment and facilities up to date.

Developing a plan, based on theoretical and experimental studies, to set general operative standards.

Promoting appropriate legislation to support these standards and give them the legal framework to insure quality in the national markets and require standardized equipment on the job.

In spite of these first necessary steps, which were not taken in vain, we are aware of the fact that much remains to be done. Moreover, we know that not everything done in this area by those involved has had clearly positive effects or has benefited **workers'** health and wellbeing.

At first, when I was invited to this workshop, I wanted to present a strictly technical paper based on our research at the National Bureau of Standards. I then changed my mind, however, and decided it was more important, given my good fortune in being able to address the **world's** foremost authorities in the field--and unfortunately I am no such **authority**--to explain some of the guiding principles applied in my country and the concepts on which we base our plans for the future. In other words: to share our concerns with the institutions and organizations represented here, in whose informed **opinion** I have the highest confidence.

## INDIVIDUAL PROTECTION AGAINST RESPIRATORY AILMENTS IN SPAIN: PLANS FOR THE FUTURE

For the Spanish technicians, planning the future of individual protection in the field of respiratory ailments means thinking in terms of self sustaining equipment, because the results obtained with equipment dependent on outside support are not as satisfactory as one might hope. At the first International Colloquium of Torremolinos, which dealt with protective clothing (in May, 1979), the main aspects of the matters at hand were discussed by European specialists as well as technicians from our Bureau. I **don't** pretend to go back over these discussions, only to recall some of the conclusions reached on that occasion, as my starting point for developing certain ideas.

**There** have been considerable developments in the **field** over the last few years, and **perhaps** the most important, in the opinion of the **members** of CEN, which I share, has been the attempt on the part of all interested countries to reach certain common criteria. Nevertheless, there are certain areas which, in my opinion, have not evolved adequately, perhaps because of vested interests, and in some areas one might say there **has** even been a step backward, if not in the technical development of equipment, certainly in the setting of standards for quality definition and control. Above all, one notices the increasing publicity devoted to promoting specific **products**, rather than to raising the standards of equipment and techniques and insuring their correct usage for the benefit of the working man.

Summing up, one might say that commercial interests are displacing actual needs and that our real purpose, prevention, is not served by these methods.

For the reasons mentioned above, it is felt that the future of individual protection against respiratory ailments in Spain will be based on the following principles:

A greater standardization of **self-sustaining** equipment, in both its technical and practical aspects.

Research devoted to the standardization, so far as it is possible, of equipment dependent on outside support, although use of this equipment would be recommended only in those cases where the use of self-sustaining equipment is impractical.

The development of eventual work programs that would attempt to make individual protection techniques compatible with and complementary to general measures of industrial health.

Research into individual protection against respiratory ailments in the specific area of agriculture.

Research into the **on-site** detection of **contaminants**: an indispensable preliminary to developing effective individual protection equipment.

#### **STANDARDIZATION OF SELF-SUSTAINING EQUIPMENT**

The standardization of self-sustaining and partially self-sustaining equipment is perhaps our most important objective. One which, although partially achieved already, must be further pursued, because our conviction is that, for this equipment to be fully effective, defining and quantifying quality standards is not enough: usage must also be standardized. **Fundamentally**, that means: clearly and stringently defining the workplaces where the equipment can be used; determining the limitations to which the different models are subject, because of the concentration of **contaminants**; determining, also, the salient characteristics of the various positions on the shop floor that might make a particular piece of equipment appropriate in that spot or limit its usefulness; classifying the different work spots on the basis of mobility, permanence, physical effort, surroundings, risks involved in usage, etc.

The above measures would bring order where **currently** there is none and clearly define the advantages **and** risks involved in utilizing any particular piece of equipment.

Furthermore, in order to promote usage of self-sustaining and partially self-sustaining systems, we believe it is important to standardize some of this **equipment** for use in certain very specific and clearly defined activities, without necessarily excluding its use in other activities and in accordance with other norms of usage. It is important to note that certain fixtures needed for some of this individual protection equipment should also be standardized, both at the drawing board stage and for later installation in industrial **plants**.

In short, it can be said that self-sustaining and partially self-sustaining equipment will receive first priority in the hope of broadening its applications and thus influencing manufacturers, and no doubt we can expect important innovations in this area.

#### STANDARDIZATION OF EQUIPMENT DEPENDENT ON OUTSIDE SUPPORT

The complete standardization of this equipment is a distant objective. In our opinion, there have been few recent advances in this direction; furthermore, there is no clearly defined sense of the **effectiveness** of this equipment, and it is indispensable that its real limitations be fully established. We can foresee that if this equipment is not perfected in the future and if controlled tests do not support its **effectiveness**, it will lose its current near-total domination of the market.

Dependent equipment was discussed at length during the work sessions of the First International Colloquium of Torremolinos. I simply want to list the conclusions we reached, based on ample evidence.

First and foremost, it should be stressed that the equipment for filtering carbon monoxide is not, so far, subject to clear standards of quality control. The result has been below-standard equipment on the market.

Although by certain criteria, which we respect, these filters should be prohibited altogether, we feel that it would be best to permit the use of those of sufficient quality to guarantee complete protection. This protection would have to be assured by stringent norms of quality control.

In regard to the equipment for filtering NH<sub>3</sub>, I repeat my opinion: its quality is excellent and the only problem in relation to this equipment is its lack of a clear set of accompanying instructions to guarantee effective use.

As for equipment for filtering acid gases, the current picture is not so clear, and it is worth mentioning that in this area there has been a blurring of norms and concepts. Proof of this is the fact that formerly manufacturers made filters against specific acid gases, whereas more recently, perhaps for commercial reasons, all these filters have been equated under the single heading, already mentioned, of acid gas filters, and standards have declined accordingly.

In Spain standardization began with an attempt to **single** out specific contaminants on which to **base** general **norms** where **possible**, taking into account the local environmental **factors** affecting the **equipment**, including such **variables** as permissible mean **concentrations**, actual concentration and average exposure. All of **which**, of course, does not exclude the possibility of having versatile filter that provide protection against all acid gases, although the effectiveness of these filters in relation to each gas remains to be seen.

For the reasons stated above, we wholeheartedly approve the decision reached by **CEN-79** to study the possibility of singling out the filters against **SO<sub>2</sub>**, distinguishing them from those used against other acid gases.

Another factor worth pointing out in the matter of chemical **filters** against acid gases is the formation of other contaminants in the process of adsorption: a reaction not taken into account in the guidelines and badly in need of clarification.

In regard to the filters against organic vapors, the problems are so numerous and the solutions so difficult that it would be risky to venture generally applicable criteria. Nevertheless it should be noted, on the negative side, that outdated norms have been in use for many years, disregarding the findings of such important researchers as Jarg **O.**, Nelson, Harder and many others, which have not yet had the influence one might expect. In Spain we are working on this, but at the moment we have no single set of guidelines, though market studies have been conducted to publicize the relative quality of various filters, determined according to the traditional **cl<sub>4</sub>c** test which, of course, is known to be insufficient.

#### ALTERNATIVE PROGRAMS

The opposing criteria brought to bear on the matter of individual protection by industrial hygienists on the one hand and government specialists on the other is a common factor and one that in most cases does not contribute to finding real solutions to the problems, but quite the contrary. A common practice still very much in effect, at least in my country, is to give individual protection the lowest priority on the scale of prevention; a practice we consider quite out of date and, of course, totally unsound. If the purpose of prevention is to protect workers from occupational hazards, all means at our disposal must be fully utilized. This does not mean we should ever resort to individual protection as the only solution, but unfortunately in many cases there is no alternative. **What** to do in emergencies? How to protect workers engaged in maintenance work? How to eliminate health risks in the production of contaminants? How to protect a worker who has to enter a **contaminated** area in the event of an accident?

The situations are too numerous to detail. But above all we must realize that the very nature of health hazards, as well as our current limited ability to measure contaminants and their effects on the human organism, **demand** a more concerted and effective use of techniques of **individual** protection, as part of an overall effort at improving prevention.

**We conclude**, from all that **has** been said **above**, that programs of prevention must be developed in which individual protection is coordinated with other measures that promote industrial health and collective safety at **work**. The following are the most interesting cases:

**Environments** with high concentrations of contaminants where collective measures can provide **some** protection (primarily by **eliminating** the risk of **fire** or explosion) but where reducing concentrations below permissible levels is either technically impossible or economically forbidding.

Emergency situations where there is a high risk of contamination in the event of failure of the collective means of protection.

Maintenance situations in which individual protection and collective measures can be **combined** in the face of an almost uncontrollable health **hazard**.

Situations in which the nature of the work itself requires contaminating a particular environment.

#### INDIVIDUAL PROTECTION AGAINST RESPIRATORY AILMENTS IN AGRICULTURE

The agriculture labor force of our country and, I believe, of many others, including the most developed countries, is currently exposed to the constant dangers of pesticides, and unfortunately is provided with no protective clothing against this kind of risk, though it is perhaps the segment of the population most urgently in need of such protection. This once purely hypothetical view was **confirmed** by the results of a poll conducted by the National Bureau of Standards, with alarming statistics:

Of 705 large farm owners or operators questioned, 106 had registered cases of the toxic effects of pesticides **among** their laborers, and 21 of these cases resulted in the death of the **laborer**.

Of 825 agricultural workers questioned, 8.8%, that is, a total of 72 persons, had at **some time** suffered these toxic effects.

On the other hand, only 39% of the 825 persons questioned had been provided with protective clothing against respiratory ailments.

And only 11 of the 705 owners and operators questioned knew what type of protective clothing they were providing for their laborers, and in our opinion none of this clothing was adequate.

**The** above figures speak for **themselves** and sound an alarm, since we can **assume** that the situation is more or less comparable in all countries: an **assumption**, by the way, well worth **investigating**.

Therefore this is an area of high priority for us, especially where pesticides are involved, as we realize how unprovided for the agrarian sector is in **matters** of prevention.

The deficiencies having to **do** specifically with the respiratory system may be due to the fact that only **self-sustaining** equipment can provide safety from the enormous range of toxic elements used in pesticides, but the fact remains, that the most deficient **areas** must be given the highest priority, and therefore we believe that the **manufacturers** of equipment as well as the various administrative organisms involved can and must respond adequately to this urgent and complex combination of circumstances which is threatening the health and welfare of millions of workers throughout the world.

#### CONTAMINANT DETECTORS

In a study of the Spanish market conducted by the National Bureau of Standards, easily readable and instant reacting fixed detectors were identified for over 72 possible chemical contaminants. For some of these contaminants there were several models of detectors that functioned according to the most divers systems. **Paradoxically**, in view of this proliferation of instruments, most of the detectors installed in industrial plants or in work areas where there is a possible health hazard because of the presence of dangerous chemicals have not been previously tested for **effectiveness**, and therefore their standard of performance is unknown.

In our view, this is a grave situation that ought to concern all technical sectors involved in the individual protection of the respiratory system and encourage them to take steps to remedy these **deficiencies**. Of course other technical sectors specializing in related matters ought to be similarly concerned. One thing should be clear, and that is that whether the purpose of the detectors is to warn of the danger caused by the presence of chemical **contaminants**, setting off various preventive measures such as wearing appropriate clothing for protection or **escape**, or whether it is to register degrees of variable or periodic contamination that do not reach emergency levels but create a temporary condition requiring individual protection, as often happens in reality, the correct use of individual protection equipment is closely related to the responsiveness and of course the quality of the detector. Therefore, the Laboratory of Respiratory Protection of the National Bureau of Standards has established the following work plan, divided into three stages. The first stage, which has already been accomplished, and its results made public, was a market study of the detectors available to the **consumer**.

The second stage, now in progress, is a complete bibliographical review of current technical standards and the systems for testing detectors according to their various norms, as well as the literature available on the subject.

Finally, we will try to establish guidelines for classifying these instruments and for quality control.

I have been speaking **for** a small number **of** technicians with scarce and limited material resources, all working for the Spanish Department of Social Services and Public Health and no doubt touched by **some** of the Quixotic spirit of a certain famous knight errant known for fighting windmills. In the space of a few years I daresay we have achieved important advances in all matters relating to individual protection of the respiratory system in our **country**, and our purpose is to continue our effort on behalf of the health of all **workers**.

A few years **ago**, I spent a month studying and learning at this Center; the experience marked a crucial moment in the development of my professional life. Today I am here again and I have the honor of addressing this audience.

My **final** words are to share my hope with you that these days of common effort will contribute to the development of more effective means of individual protection against respiratory ailments.

June 1, 1980.