Personnel Training for Incinerator Management

L. E. CRANE and M. J. WILCOMB
U.S. Department of Health, Education, and Welfare
Cincinnati, Ohio

ABSTRACT

The place of incineration in solid-waste management seems assured, with technological developments and enthusiasm for new installations steadily increasing. Badly designed, ineptly operated units will not meet the needs of the future. To survive as a process, incineration must work effectively and with minimum insult to the environment. Incinerators will become more expensive and elaborate; hence, the people designing and operating them must be well trained.

A need for training personnel at all levels in the solid-waste field is evident, and incineration is a critical area in this respect. This paper discusses training in the solid-waste field generally and in terms of incineration's needs specifically. Lay public, technical, and laboring groups are identified in terms of training objectives, and examples of effective approaches to training are outlined for each group.

INTRODUCTION

Generally speaking, today's incinerators are not serving their function well. There are exceptions, of course, but the National Solid Wastes Survey of 1968 [1, 2] has documented the overall problem, and a visit to several plants at random will lead the observer to such a discouraging conclusion. Instrumentation is often ignored or broken and useless. Rotting and corroding air-pollution-control equipment is bypassed. Residue quality suffers because the community feels that everything must be delivered to the pit, and the operator is expected to push through the plant everything that is delivered to the pit, regardless of the incinerator's design capacity and capabilities.

In the future, the situation is bound to be worse unless effective steps are taken to design better incinerators and to hire and train better operators. Such a statement may seem exaggerated, but a look at the overall problem should support it.

The nature of the waste received for incineration is changing. This waste is becoming physically and chemically more heterogeneous and can be expected to be increasingly more difficult to handle. Polyvinyl chloride (PVC) is already being used for everything from shoe soles to house siding, and this material is known to have a corrosive effect in the burning process. Other plastics are also being used increasingly and are known to create hot spots in the furnaces and burn out grates are also on the increase.

The very congestion that justifies incinerators as a volume-reduction method makes it imperative that stringent air- and water-pollution controls be imposed on them. It will no longer be acceptable to discharge half-singed residue and to dispose of this smoking heap in the back of a plant.

The increasing difficulty of properly incinerating solid wastes and maintaining proper pollution controls makes us conclude that the incinerators built in the next few years will be more complex and will require much more knowledgeable operating crews than many of those presently employed. Proper operation of these sophisticated incinerators is, therefore, wholly dependent upon our ability to provide a core of trained supervisors and workers for them.
At the professional level, we must develop incinerator-design curricula. At present, the foundation of basic knowledge that leads to innovation is largely lacking, and the sources for such knowledge are so scattered as to make curriculum development difficult. There are no textbooks and few appropriate college courses on the subject.

**TRAINING**

Having established the need for training, we must explore the questions of who is to be trained, how training is to be done, and who will do the training. There are three applicable groups to be reached as recipients of training in the area of incineration. The three groups include (1) the incinerator designers and other professional level personnel in solid waste management; plant managers or supervisors; and the operators or laboring force. Each group has its own particular set of needs and goals to be reached.

**Designers**

The professionals must, to a considerable extent, train themselves. Graduate-level education from universities is available at 11 institutions supported by Solid-Waste Training Grants [3] from the Public Health Service as authorized by PL 89-272. In addition, other universities have been influenced by the current upswing of public interest in our environment to add courses in solid-waste management. At present, there is no graduate curriculum specifically directed to incinerator design. Drexel Institute of Technology at Philadelphia has a solid-waste curriculum that incorporates two courses of particular need to the incinerator design engineer. One deals with combustion theory; the other discusses general incinerator-design considerations.

When developed, an incinerator-design curriculum should be established appropriately in a mechanical-engineering school; in contrast, the present solid-waste programs, which are more concerned with overall solid-waste management aspects, are in civil-engineering schools.

Professional organizations and societies such as The American Society of Mechanical Engineers (ASME) and the American Public Works Association (APWA) offer some limited training opportunities in their conferences and meetings. Additionally, these organizations present unequalled opportunities to meet and exchange ideas and information with other professionals in the field. Short-term specialized courses or seminars in solid-waste management for professional personnel might readily be sponsored from within these organizations.

The Public Health Service, through its various training institutes, offers training that directly or tangentially affects incinerator designers or managers. The Training Program of the National Air Pollution Control Administration, based in Durham, North Carolina, offers a number of short-term technical courses that relate to the air-pollution aspects of incinerator design and operation. The Solid Waste Management Training Branch of the Environmental Control Administration's Training Institute in Cincinnati presents a 1-week course on the principles of incineration, in addition to other courses on other aspects of solid-waste management.

There is a wealth of new information coming out of current research and development, much of it supported by the federal government. Demonstration Grants supported by the Public Health Service are also producing considerable information of value to the field. The material is so voluminous that it may be impossible to review all of it, even if it can be located. The Solid Waste Information Retrieval System of the Bureau of Solid Waste Management in Cincinnati offers a tremendous service in compiling and digesting much of this material [4]. A continuous review of the latest and most pertinent information available is necessary at present to keep current in the solid-waste field.

**Supervisors**

The plant manager or supervisor, representing the second group to be considered in training, has an educational requirement that in time may equal the educational preparation of the plant designer. His training needs will differ from the designer's to some degree, though, because his function is to operate and maintain one or more installations properly. He must also be able to direct operator-level training, which will be largely on-the-job training.

The superintendent is most fortunate in that his group has, of the three, the best opportunities at present to receive training, although even these opportunities are not too well developed. Short courses in general incineration practice, as discussed previously, are offered by the Public Health Service. In addition, professional organizations such as ASME and APWA offer information at conferences and national meetings. Consulting-engineering design firms provide information on the particular plant installation for which they and the superintendent are responsible.
An unusual program, which might be considered at the level of supervisor training, is the 1-year technical program offered by Charles County Community College, La Plata, Maryland. In addition to basic information concerning solid-waste management and environmental health, the student receives a three-credit-hour course in fundamentals of incineration. The students will have an opportunity to make site visits and exchange ideas with personnel operating solid-waste-disposal facilities in the metropolitan Washington area.

One important training activity of the future should be the instruction and guidance of incinerator superintendents in proper plant operation by the consulting engineering firm responsible for the plant design. It is commonplace today for a purchaser of a computer or elaborate piece of laboratory equipment to expect the manufacturer to provide detailed instruction in its use and, in fact, continuing service for the instruction of any replacement personnel. Certainly it seems reasonable that for an incinerator, costing millions of dollars, the designer should also provide proper instruction in its operation as a part of the "service package." He, after all, should be the person best qualified to do this. The designer should provide continuing evaluation of the plant operation, training of any succeeding supervisors, and materials necessary for the supervisor to train his operating crews. The designer should be paid for all these services under a continuing-service contract, since he is in actuality an agent for the owner-operator of the plant.

**Foreman and Operators**

The third group, the foreman and operators are quite important to train and perhaps the most difficult to train because they frequently cannot leave their work to attend courses or seminars. If they do, they cannot travel far or stay long. Relatively rapid employee turnover is another difficulty, and, since each employee has his own specialized duties, a great deal of individual instruction is necessary, although some elements such as safety practices and general rules of conduct may be common to all job functions.

Basically this is on-the-job training, and logically the plant superintendent should develop and direct a training program for his particular operation. He does have some resources to turn to for support. The plant designer, construction contractor, and individual equipment manufacturers should provide assistance on a long-term continuing basis. Normally this would be done under some mutually agreeable contract basis. At present, this is normally provided at the plant startup but does not include training new plant personnel. Professional organizations such as ASME and APWA, in addition to appropriate governmental agencies, can assist in organizing and conducting training sessions. The governmental agencies include state solid-waste management and air- and water-pollution control agencies and the appropriate federal agencies.

In assuming this responsibility, the supervisor may feel somewhat hesitant in tackling the job of "trainer" in addition to his other activities as plant manager. He may, in fact, by the nature of his background be more comfortable in the ways of machinery than of human relationships and training. Certainly some people are more gifted and experienced in presenting this type of material than others are, but the business of training is not the exclusive prerogative of those who have a formal background in "teaching methodology." To the contrary, we feel that the most important part of on-the-job teaching, assuming the desire to instruct, is for the trainer to know his subject material. With this in hand, his effectiveness as a trainer will then depend upon his success in organizing the material and presenting it in such a manner that it is understood by his staff, while emphasizing each topic in proportion to its relative importance.

A particular capacity for "public speaking" is not required. In fact, as stated by Broadwell [5], it is not even particularly related to a supervisor's responsibility for in-service training. Explanations should be simple and clear. Visual aids, if these are used, should be truly visible and appropriate and should support rather than hinder the presentation.

The supervisor should constantly check to see that he is getting his message across [6]. His "student" staff should feel free to ask for further information when his explanation is not clear. He should properly plan not only for the individual session but also for a continuing program of instruction, so that there will be a well-developed training activity throughout the year that meets the needs of his particular installation.

It is not unreasonable to expect that the incinerator installation of tomorrow will incorporate a meeting place for employees that will be comfortable and quiet and will have the necessary facilities for inhouse presentations. Many installations have these rooms now, but all too often they are found to be serving largely as storage areas or lunchrooms. Thus, one could conclude from this that, although someone
considered employee development to be important and made a physical provision for it, someone else with a "practical" mind later felt it was not that important. Let's come to grips with the fact of the need for an appropriate and adequate training program. Training is important.

CONCLUSIONS

A continuing program of appropriate training for incinerator employees should be as much a part of incinerators as of the fire box. The need for training extends beyond this to the plant supervisor, upon whose shoulders the responsibility for employee training rests, and to the incinerator designers themselves. Clearly, present inadequate incinerators must give way to truly engineered installations if they are to help us simultaneously resolve our solid-waste problems and maintain the quality of the environment. Just as clearly, we are going to have to know more about how to build them well and run them properly.

REFERENCES