

TRAINING AND WORK PRACTICES

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Thank you. I get the chance to talk about my favorite subject; training is one of my favorite things. My subject today is training and work practices, which I think has tended to be overlooked.

Work practices are the keys to an effective safety program and to an effective program for the safe operation of all chemical plants, not just those that happen to be handling hazardous materials. Work practices are not limited to workers; they also involve owner-operators and supervisors. A program of good manufacturing practice should be soundly based on process technology, on the personal commitment of all involved personnel, and on the optimum mix for that particular plant of work practices, engineering controls, and administrative controls.

At Union Carbide Corporation commitment can be summarized in three simple policy statements:

1. UCC expects to provide all necessary technical and financial resources to achieve the objective.
2. UCC expects each supervisor and employee to make a personal commitment to achieve the objective.
3. UCC expects to aid and to cooperate with the various governmental regulatory bodies.

These statements are not in order of priority but must be considered as a whole. Since Union Carbide Corporation must pay its taxes and its stockholders it should be obvious that balances must be struck in terms of cost and benefit, and that full usage of resources must be obtained.

The most expensive, the most flexible, and the most under utilized resource any organization has is its people. The most effective way to fully utilize people is to organize them, i.e., direct their efforts through various programs, through guidelines and through manuals, and to train them in the knowledge and skills that are essential in their jobs.

To introduce the subject of training let's focus on the person to be trained. This is a chemical operator. He has two feet and legs permitting an infinite variety of lateral and vertical movements. He has two hands which can act as sensory organs (touch) and which can turn knobs, turn valve wheels, push buttons, and use a variety of tools such as pencils, wrenches, and the like. He has two eyes, two ears, and a nose which act as sensors to evaluate the environment and to receive a variety of communications. Between the ears and back of the eyes he has a brain which is capable of memory, deductive and inductive reasoning and which controls all his actions. Depending on the time available, the quality of instruction and his desire to learn, the operator

can be programmed to perform as a computer in certain areas and as a reasoning creature in many other areas.

This operator is not cheap. He costs about \$30,000 per year to maintain after a cost of possibly \$10,000 in his training. This man, at some point in his training, is placed in charge of \$5,000,000 worth of equipment to operate in a safe profitable manner.

Personnel training today can no longer consist of brief lectures on company policies, job organization and personal safety, followed by assigning the new hire to old experienced workers for two to four weeks of on-the-job hands on instruction. Process technology is changing rapidly, the cost of doing business requires increased performance, and safety and environmental regulations make little or no allowance for learning errors. Today's training program must be structured and well-based on the following:

1. Job analysis
2. Systematic development of training
3. Competence requirements identified
4. Performance orientation
5. Objective evaluation of progress

As regards the man being trained:

1. Weaknesses must be recognized
2. Improvement must be desired
3. Learning climate is permissive
4. Trainers must be available and knowledgeable
5. Opportunity to practice must be provided

All this is summarized on-the-job trainee needs as follows:

1. A systematic training outline
2. Daily bite-sized assignments
3. Specific tasks assigned
4. Hands-on training
5. Frequent testing to gauge progress

The program for the training of chemical operators within UCC's chemicals and plastics varies from one plant to another depending on the needs and the facilities available for such training. Despite such variation, each training program has much in common with another.

The program consists of two basic parts. Part one consists of general training. Instruction that is generally applicable throughout the plant. These are general safety rules such as no smoking, no horseplay, and the wearing of hard hats and goggles. Safety procedures such as wearing respirators and ladder usage. The longest and most useful portion of this part is the familiarization with plant equipment and its operation.

Part two of the training program is the on-the-site job instruction. The new operator must have knowledge of the properties of the materials he

is to be working with on the job. He is assigned a detailed operating manual for the department. The specific departmental safety rules are reviewed with him. Finally he is assigned to a trained operator-trainer for individualized on-the-job training.

At the South Charleston, West Virginia plant during his first two days work, the new hire receives safety orientation. This consists of a combination of films, lectures, slide presentations and training exercises, including operation of some safety equipment. The first two days instruction is as follows:

1. Introduction-Safety Department organization
2. Basic plant safety rules
3. Safety procedures manual
4. Lifting procedures
5. Personal protective equipment
6. Fire extinguisher training
7. Eye safety
8. Ladder safety
9. Equipment lock-out/tag-out procedures
10. Hazardous work permits
11. Safe handling of chemicals
12. Vapor cloud procedure

The new chemical operator, after his safety orientation, starts one week of classroom work known as Intro I.

Intro I covers seventeen (17) general safety related subjects. Instruction is carried out via training modules for each subject. The module consists of a formal instruction on the subject by a knowledgeable instructor followed by a general group discussion of the subject and sometimes training exercises. The trainee's understanding of what he has learned is then evaluated by a review questionnaire. On completion of this training module, the class then moves on to the next subject. Subjects covered in this initial formal training class are:

1. Introduction to the training course
2. Plant history and layout
3. Pay practices and timekeeping
4. Operations improvement program
5. Safety rules and regulations
6. Protective clothing and safety equipment
7. Safety-related reporting procedures
8. Emergency procedures and squad organization
9. Master tag/lock-out
10. First minute first aid
11. Self-contained and supplied air breathing respirators
12. Portable fire extinguisher
13. Static electricity
14. Filter-type gas and dust respirators
15. Vessel entry
16. Principles of accident control
17. Safe lifting

There is presently some overlap between the safety orientation and Intro classes. Plans are to reduce this to a minimum but not to completely eliminate repetition of critical subjects. Intro subjects are limited to general use items, i.e., useful in over half the plant's operations. Specialized training is given in the operating units.

On successful completion of Intro I, the new operator is assigned a training project and reports to his assigned manufacturing operation. Here he is assigned to an experienced operator for hands-on training. He is given any OSHA required training such as the acrylonitrile standard. He is introduced to the hazardous and reactive chemicals manuals which he must study and he is given an operating manual for that unit. This introductory period covers one week after which he resumes his classroom work for three more weeks.

The second part of the classroom work, Intro II, is more work-related and consists of the following modules:

1. Introduction to chemical operations
2. Sprinkler system and hydrants
3. Plant hose standards
4. Sampling procedures
5. Cardio-pulmonary resuscitation
6. Job hazard analysis
7. Reactive and hazardous chemicals (Attachment I)
8. OSHA
9. Basic hand safety
10. Plant piping and pipelines
11. Valves
12. Safety valves and vents
13. Steam traps and strainers
14. Pumps
15. Bearings
16. Gaskets, packings, and mechanical seal
17. Steam turbines
18. Reciprocating compressors
19. Lubrication
20. Heat exchangers
21. Steam jets
22. Electric motor operation
23. Condensers
24. Transfer procedures
25. Loss prevention/loss reporting
26. Instruments
27. Distillation

After having successfully completed his classroom training, the new operator is assigned to his operating unit and to his initial job in-company with his operator/trainer.

Under the direction of his foreman who has received trainer-training himself, the new man receives training in specialized operations and equipment for that unit, completes his reactive chemicals training. After demonstra-

ting his knowledge and job proficiency to his foreman in 120 days, he is no longer considered a probationary operator. At this time he receives a raise in pay and begins to handle a single job.

When the new man has gained experience in the job and is performing it well, he will be assigned to a second job again with an operator trainer. Having mastered the second job he will be assigned to a third job. This later job rotation and training is not rigidly specified, but depends to a great extent on the man's proficiency and the availability of training operators. The only limit is that an operator must master at least three separate operating jobs in four years before he is considered for maximum pay as a skilled craftsman.

Training materials can be homemade or obtained from a variety of sources. The American Petroleum Institute has a very good series of training manuals. DuPont also markets training and safety manuals. Training materials can be obtained through the various trade organizations such as the Manufacturing Chemists Association or the National Safety Council. Many companies will make training materials available for very nominal fees. EPA, OSHA, and NIOSH are very good sources of training materials.

Training procedures must be varied depending on the subject, the number of trainees and the facilities available.

Attachment II on vinyl chloride is an example of training material for technical and supervisory employees. Attachment III on acrylonitrile is oriented toward hourly personnel and can be used for training one man or 100 men.

The most difficult part of any training program is maintaining commitment and continuing the training of each man indefinitely through refresher courses and through good supervisors. Technology changes and people tend to forget little used but important parts of their training such as emergency shutdowns. There is also a very human factor to be considered, that is, a worker is constantly testing the limits of acceptable performance. A lack of continuity or a poor supervisor can negate the best initial training program very quickly. Training should not be limited to new men but should be made available on a demonstrated need basis to all.

A safe workplace results from a good training program in rules, procedures and operations. The best and most effective control device for the chemical and plastics industry is a well-trained and motivated work force supplemented by other controls where needed.

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