Introduction

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IN THE PETROLEUM INDUSTRY there is a saying that "oil is where one finds it." In similar vein one interested in safety matters might say that "an accident is where one makes it." This is apparent from numerous incidents, such as those described in the following newspaper reports: "A poison with the tongue-twisting name of tetraethylpyrophosphate took the life of a boy six days after some of it spilled on his legs;" or "A workman was rocketed 14 feet into the air by a gasoline explosion touched off by a spark as he was squeezing himself into the top of an empty tank;" or "At least 27 persons were hospitalized after an ammonia compressor exploded;" or the humorous situation wherein "The sign at two holes dug by the gas company read 'Danger Area. No Smoking. No Open Flares, No Matches.' The signs could be read last night because they were lighted by red kerosene lanterns and open-pot flares. A gas company spokesman explained that the flares were to light the holes, not the signs. Workmen had failed to find a reported gas leak, but the signs were left in place because the men who place flares don't handle signs."

Not only because of the wide variety of accidents that have occurred at plants of the oil and fat industry but also because each accident has several facets from which its cost and trouble radiate to those in the industry, this fourth symposium under the general auspices of the members of the Technical Safety Committee of the American Oil Chemists' Society was planned to give broad coverage to the safety problem rather than to highlight certain specific safety matters with which various plants of the industry are concerned. Therefore the reader will find that the following eight papers present the view-points of operating superintendents or managers, insurance representatives, safety directors and safety technologists connected with the various phases of the oil and fat industry. Also, as a related part of the program, there was given at the Technical Safety Committee meeting a lecture-demonstration on the role of static electricity in dust and gas or vapor explosions by S. J. Douglas of the Vincennes, Ind., office of the U. S. Bureau of Mines; this was an extremely interesting and informative lecture, as was proven by the lively attention shown by those fortunate enough to be present, but it is not included with these Safety Symposium articles since its demonstration features are difficult to reduce to print.

Why a Safety Program?

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IT IS NOT because some wanted to promote a popular subject and not that the American Oil Chemists' Society wanted to jump on the band-wagon. The A.O.C.S. is an organization of people in the oil and fat industry devoted to improving their lot through the mutual exchange of talent.

As the solvent-extraction industry grew, accidents likewise grew. It is generally known that the extraction industry grew rapidly; many fields were entered, such as soybeans, cottonseed, flax, corn germ, and meat scraps. Also various solvents as well as a variety of equipment were tried. As would be expected, there were mistakes, costly mistakes. Many were more conscious of the total life and dollar value than I was. Much of this took place during the war years. These are the reasons why we did not get together to swap experiences, to ask questions. But we mighty quickly got curious when the costs for these misfortunes appeared.

We wanted to progress, make money, and stay in business. About this time insurance people looked at us with a jaundiced eye and insurance costs increased. Added to premium cost were penalties for not having this and for not having that kind of protection, such as water hi-tanks, complete sprinkler system, fire-wall building clearance, fenced-in areas, and lightning rods. Then came suggested legislation. With little effort it could be seen that these suggested rules (make no mistake about it, in a short while they would soon have been laws) were not wholly for the best interest of the operators. My memory says a set of mimeographed ideas for extraction-plant regulations for the state of Texas was among the first organized printed forms I saw. I had the immediate thought that they were largely written by someone who directly or indirectly made his living from insurance premiums. I might further say he would have lived well to a ripe old age.

Well back to the subject at hand—we had little meetings in various rooms, we wondered would they try really to pass such laws? If they did, who would enforce them? What background would those people have to assure us just treatment? You all know the answer, we all felt the same way. At one of the A.O.C.S. conferences a formal meeting was set for extraction-plant safety discussion. A safety committee was formed with "Doc" MacGee as chairman. Doc had considerable background for this job. You all know of his many articles on safe handling of flammable liquids. Added to this was Doc's broad acquaintance in the industry, and we were off to a flying start.

One of our first tasks was to prepare a set of Recommended Safe Practices. Doc had quickly sensed the broad expanse of this safety job so he divided the committee into three groups: the extraction plant, the laboratory, and the general which embraces those not specifically covered in the first two groups. We found ourselves quickly at work, greatly aided by a set of Rules published by the National Fire Protection Association, known as N.F.P.A. No. 36T. The T meant it was in Tentative Status. It was their practice to

maintain tentative status for one year, then vote the rules as permanent.

Through quick, skillful, and persistent effort a thorough study of those rules by the experienced A.O.C.S. group revealed many to be unacceptable. These findings were passed on by the A.O.C.S. to N.F.P.A. with the suggestion that the rules be held tentative for at least another year to permit further study. The suggestion was accepted, the rules were revised, and a re-study by the A.O.C.S. was made. To my knowledge N.F.P.A. 36 is still tentative but is immeasurably improved. I am sure that each society realizes that a distinct benefit has resulted.

THERE ARE numerous jobs to do. Here are a few illustrations. All doubt should be eliminated about flashlights. Should we pay extra money to have them underwriter-approved? Considerable study has been given to nonsparking tools. Should we spend extra money for them? Are they beneficial? How many air changes should be provided in the extraction area? What is the definition of the term "Safe Distance?" How do individuals effectively and confidently apply it? Could the Safety Committee clarify this? I am sure it could.

Getting into the laboratory phase for just one illustration, how do you measure solvent in extracted meal? Most of you know there have been numerous accidents from solvent in meal. Our good friend Ed Gastrock has set as one of his goals the development of a test for solvent in meal so that buyers, sellers, or handlers of meal will have confidence in its safety. Many of you have seen the recent summation of the Laboratory questionnaire by R. M. Starr, and you could not help but be impressed by the work involved as well as the interest shown. Earlier questionnaires which resulted in equal enthusiasm were conducted by Norm Witte and Walt Bolens. Requests by individuals for further studies covering more than a dozen subjects are on record.

And there have been many others. I hesitate to mention individuals for fear of offending some through omission. I have not seen a questionnaire that did not get a remarkably high percentage of participation.

Certainly those of us who have been in close association with this program see a great change in the freedom with which information is given. There is a big desire to be helpful, a feeling that "by relating our experience maybe we can help others avoid a misfortune." This help is now volunteered where in former years we had to prod for it. I cannot think of a better atmosphere for success. Considerable progress is being made about "what to do and be safe when straightening up after a misfortune." Again the freedom with which experiences are being discussed is an immeasurable help. So far I know of no set rule as to how to proceed. However, after such and such happens, I now proceed with much greater confidence if I have heard some one relate a similar experience. It is as simple as this: we have all been taught how to use a fire extinguisher, therefore we use it with confidence.

Now where are we going? You people will decide. Have the results been worth the effort? It seems that participation through questionnaires, the consistent increase in attendance, and the fact that your companies are allowing added travel for such participation are strong evidence that this activity is worthwhile. This accomplishment is greatly enhanced through the freedom exercised in giving information about experiences. Reflect for a moment or two how many man-years of experience are present at these meetings, experience which reaches all phases of the extraction industry. Surely this A.O.C.S. safety program will continue to grow and perform a useful and valuable service to the entire industry.

Solvent-Extraction Plant Protection

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DEVELOPMENT of solvent extraction for recovering vegetable oils from various grains and other materials has supplemented mechanical removal to obtain a more uniform and higher quality of product and a more economical process. The transition from mechanical expelling to solvent extraction introduced the hazard of large quantities of solvents in addition to the normal handling of grains and high-flash-point oils. The relatively nonhazardous chlorinated hydrocarbon solvents have not proved satisfactory, in general, for several reasons. Practically all extraction now is accomplished with low-flash-flammable solvents which, with the grain handling and oil storage, pose major fire-protection problems.

Basically the modern solvent-extraction plant for obtaining vegetable oils from grains involves a grain-preparation process, a solvent-extraction unit, and finished oil-storage facilities. The grain preparation introduces a potent dust-explosion hazard while the solvent-extraction unit presents a severe flammable vapor hazard. These features point to the need for locating the entire operation on an adequate plot of ground well distant from other properties both to minimize damage from the operations and exposure to the operations from other activities. The latter is of particular concern since ordinary residential, commercial, and manufacturing activities do not contemplate safeguards against the hazard of flammable solvents or the vapors which could be discharged from the extraction unit. Location of plant should also give due consideration to topography of the ground, prevailing winds, and possible high water, flood conditions, or earthquake. Further, the entire extraction plant also should be well fenced to prohibit access by unauthorized persons who are not familiar with grain dust and flammable liquid hazards.

When feasible, the extraction plant should be located where good public fire department protection is available and the city fire department should be made cognizant of the operation and hazards involved to permit intelligent fire fighting if necessary.

Segregation of major components within the extraction plant proper is necessary to reduce hazards and minimize interruption to operations. Grain-storage facilities and preparation buildings should be detached from each other and from the extraction unit. Boiler house and maintenance shop buildings, containing open fires which provide a potent source of