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RAILROAD SAFETY

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58th NATIONAL SAFETY CONGRESS

Papers Delivered in the

RAILROAD SESSIONS

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KEYNOTE ADDRESS

By FRED W. OKIE
Pres., Elgin, Joliet. & Eastern Railway, Chicago, Ill.

Basically, the workers of today are no different than the workers of 50 years ago. Each has his own personal peculiarities; his likes and dislikes, feelings, virtues, and shortcomings. However, the worker of today is also quite frank in making his wants known. He is not afraid to speak up, because he knows his job is not in jeopardy if he expresses his beliefs and his innermost feelings. This was not always possible in the past.

The world of the worker is vastly different today. He lives in a dynamic society. Enormous pressures are placed upon the individual. These pressures, in turn, cause a variety of stresses on modern man, a dilemma not experienced by the railroader of yesteryear. We thought Jules Verne's stories about the *Nautilus* and trips to the moon were only figments of man's imagination. During the last decade, however, we have seen this imagination of the 19th Century become a reality. The giant technological strides we have made in our times have also brought as many social and psychological problems. Industrial science has advanced more rapidly than the humanities and has surpassed the humanities in its contribution to society.

We have widened our daily contacts. Our daily range of travel has surpassed the dreams of our forefathers. We have become so mobile in our society and so engrossed in our daily affairs that it takes a death or a wedding to assemble a whole family in one place at one time.

It is rather difficult in this fast-moving world to reach men's minds when you are competing with the various media of communication. From the moment we open our eyes in the morning until we close them at night, we are constantly exposed to persuasion of all kinds. How can you get to sleep at night without "giving up the hot cigarette habit" or "wishing everybody used Dial soap?"

Our involvement in daily living makes it difficult to reach people even with all the various communications media at our disposal. The minds of Americans are crowded with a variety of information and are constantly bombarded with ideas and information with which other people hope to improve the world.

However, with all of this, there is a deplorable decline in the fine art of listening. We don't listen very well. Experts in the field of listening declare that people in general do not know how to listen. Repeated experiments on a scientific basis have shown that an audience forgets one-third or one-half of what it hears, and forgets it within the first eight hours! And two months later, only 25 per cent of what is heard today remains in the memory. It is discouraging that most of what we hear literally goes in one ear and out the other. But it doesn't need to be so.

This is what happens when a fellow goes into the boss's office and tells him about some problem or a serious accident that has occurred. The boss gets so mad upon hearing the first words that he never hears the rest of the story! Perhaps some of you have been the boss in some of these painful situations. Many a subordinate complains, and perhaps with justice, that the boss never really listens to him. One of the responsibilities of being a boss is to listen to what the other man says, even though you think it is not very important.

If people are difficult to reach because of the incredible competition for their attention, and if most people are not listening, what can we do about it?

We can begin by getting their attention! To do this, we must find out what the worker really wants. Man listens and responds when his desires are touched upon. Outside the physiological needs for food, clothing, and shelter, he has several needs to be fulfilled, in the following order:

First, he wants security. These wants are essentially concerned with the employee's present level of well-being. The fact that we live in a fairly stable political and economic society enables each of us to feel more secure. Anyone in business, especially

anyone who has gone through a general business recession or depression, has seen the effect of job instability upon the man and his family.

Second, man has certain social needs. Assuming that an individual is generally secure in his home life and job, he will feel a greater desire to be an accepted member of society, to belong to recognized groups such as the church, clubs, or other organizations.

Third, man has psychological needs. All of us need to have our egos fed. Each of us likes to be recognized as a person and to receive recognition for what we have accomplished, whether it is big or little. This is a universal need among men, and it is playing an increasingly important part in business and industrial life.

Finally, man needs self-fulfillment. The need for self-fulfillment is more self-centered than the others, which are concerned with how we function in our environment and how we relate to others. This need for the opportunity to grow is an individual matter. It is concerned with our desire to achieve excellence. We wish to improve ourselves for this reason alone.

These four attention-getting items are the basics of motivation. What I have suggested is that you, who are concerned with industrial safety, must be certain that the employee is properly motivated in order to have the right attitude toward safety.

How can we determine when an employee is properly motivated toward safety? I am not certain there is any given moment upon which we can put our finger as to when this happens, but I can suggest five criteria for the recognition of this motivation:

1. When it is no longer necessary to keep after a worker to wear his protective equipment.

2. When a worker "gets after" fellow workers when they do not follow safety regulations.

3. When a worker offers suggestions about how to improve safety methods.

4. When a worker enthusiastically accepts an appointment to the safety committee.

5. When a worker carries safety ideas into his personal life; that is, into his house and into his family relationships.

We must sell employees on the idea that safety is their personal responsibility. No one can be safe for them! If an employee is injured, he is the one who goes to the hospital. He is the one who suffers physical pain. If he is killed, he is the one who goes to the grave and his loved ones are those who suffer.

If safety is to be in first place on our railroads, our educational programs must be constant, intensive, interesting, and enthusiastic. Above all, they must be honestly believed in and administered effectively by top management. Lip service has no place in a successful safety program. All of us are too prone to accept the theory that the employee is a full-grown man and that he should know how to take care of himself. This kind of thinking on the part of supervisors must be changed if we are to keep safety in first place. Proper instruction to employees in both work and safety habits must be paramount.

I know that it is not easy to win the attention of the worker, but it is possible. Your success as safety men is determined by your ability to have your work force, management and labor alike, think safety and practice safety.

COMMODITY SAFETY SYSTEM

By GRANT C. VIETSCH, THEODORE S. LEVITON, and LOWELL H. GOMES
Railway Systems & Management Association, Chicago, Ill.

This presentation describes a comprehensive program designed to mitigate against accidents involving the transportation of hazardous materials, especially chemicals.

The problem of transportation safety has been brought to the attention of the American public so repetitiously during the past several years that they seem almost to have lost the ability to respond to the stimulus. In fact, the economy and the public which it represents is in the position of the little boy who asked Santa Claus for a volcano—and got it! The volcano in this case is the millions of tons of hazardous materials moving daily throughout the entire transportation matrix. Since it is patently impossible to remove these materials from the transportation system without making a shambles of our economy—and our standard of living—the alternative is to find a new formula for relating man to this environment.

To focus, say, upon preventive measures, fosters a dangerous sort of tunnel vision. Appeals to conscience have very little prospect of success. Legislation, unless accompanied by an inordinate amount of manpower—which in itself would create a tremendous information problem—would be less than effective.

Deeply serious problems confront people handling an accident. Not only must the safety of on-site workers be assured, but concerns include public safety, environmental protection, and loss prevention. The only hopeful prospect is to create a framework of information which would encompass the entire transportation safety environment. This would define and control the community of interests, and relate them to national goals.

Psychologists tell us that people fear the unknown, that lack of knowledge and fear can lead to panic. So when mishaps involve chemicals—a relatively unknown area to people in general—problems for all parties can become particularly acute. Misinformation, which can be reported by the news media, tends to complicate official emergency activities.

Since we are dealing essentially with a problem in communications, the thrust of the Commodity Safety System is in this direction. In designing this system we were extremely careful in the selection of our information base. We did not invent any information. On the contrary, only recognized and authoritative sources, such as the MCA, NFPA, AMA, and DOT, plus individual manufacturers' product information, are embodied in the system. Our intent throughout is not to surpass the safety man, but rather to improve the environment within which he must labor. To do this, we have developed a system which provides maximum, usable information to the man at the scene of an accident involving hazardous chemicals and more extensive information to those charged with the management of such accidents.

The initial response to this approach to transportation safety has been extremely gratifying. The first element of this system, the safety index is being used by a very large number of railroads, trucking companies, and chemical manufacturers. But really big response—in terms of individual inquiries—has been from fire departments and public safety officers throughout the United States and Canada.

The Commodity Safety System consists of three basic elements:

1. The Chemical Transportation Safety Index, a pocket-size information source.

2. The Handling Guide, which is designed for use in the management of chemical accidents.

3. A computer data bank which can be accessed from any public telephone.

Supplementing these three elements are charts for mounting in engine and truck cabs and for wall display in warehouses, shipping docks, etc.

Safety Index

The Chemical Transportation Safety Index is a pocket-sized slide rule type of device that indexes over 2,500 bits of information in nine different categories. Three categories show the risks involved in the commodity: one category gives the Department of Transportation Hazardous Material classification, if there is one; another gives the degree of relative risk; and the third category spells out precautions to minimize hazards. Two more categories show the hazard to life and give first-aid instructions. Fire danger and methods of fire control are handled in another two categories. And last but not least, two categories provide guidance on area clean-up after an accident, giving data on the reactivity of a material with water and on its toxicity to man.

The format for the Safety Index was predicated by its designed use. It was intended to give quick information on a "first-aid" basis to the man at the scene—the engineer, conductor, or station master. The idea was to provide definitive directions so that safe actions could be taken in the vital first few minutes of an accident, in order to prevent a disaster from developing. The index's size maximizes the probability that it will be with the man at the accident, rather than on a shelf somewhere else. Additionally, the indexing feature allowed a maximum of information, well over 2,800 bits of data, in a minimum of space. The somewhat more than two hundred chemicals listed were chosen on the basis of several factors, chief among them volume transported and severity or peculiarity of hazards. As a matter of fact, we were asked by Hooker Chemical Corporation to add a chemical they shipped in large volume, benzoyl chloride, to the Safety Index, which we did when we revised the index. The revision of the Safety Index just mentioned was done to take advantage of advances made in the manual produced after the Safety Index was first distributed. Incidentally, revised indexes have been shipped to all original holders of the Safety Index, so that they have the latest, best information—and at no additional cost to them, I might add.

The Manual augmented and extended the usefulness of the Safety Index. This was accomplished primarily through the development of two sub-systems, the Numerical Code and the Chemical Synonym Directory. These two sub-systems were developed to handle the problem of multiple names for the same commodity. The chemicals listed on the Safety Index have an average of five or six synonyms apiece. Department of Transportation regulations require that items classified as hazardous be shipped under a specific name. The trouble with this is that not all truly hazardous commodities are recognized officially as such. Furthermore, shippers sometimes place names on their shipments other than the ones spelled out in the regulations. In most cases, we have categorized the commodities under the same names as required in the regulations. There are some exceptions to this; phenol is an example. The name it is supposed to be shipped under is carbolic acid, but it is overwhelmingly referred to as phenol outside of this one special case. Because of this, we have used phenol as the indexing name, and assigned the unique code number 6850 to it and its synonyms. Thus anyone wanting emergency information on carbolic acid would find it cross-referenced to code number 6850; finding 6850 on his Safety Index, he would then quickly get the needed safety information. The code numbers and the primary or indexing name of the commodities appear in both alphabetical and numerical order, which took quite a bit of doing.

Handling Guide

These sub-systems and others were used in the Handling Guide, which will be ready for distribution to the various railroads in prospectus form in about a month. We used the same organizational layout as on the Safety Index. Thus, we have information on each Data Form in the Handling Guide arranged in categories 1 through 9, corresponding to the nine categories on the Safety Index is repeated in light face type, and new detailed information appears in bold face type.

The Handling Guide is designed for safety supervisors or the man at the power desk that the fellow at the accident is reporting to and relying on for help. The Handling Guide provides a check on the information that the man at the scene got from the Safety Index and supplies more directions that can be relayed to that man. We feel that it is very important to reinforce the approach already in progress at the accident scene. Indeed, it could be disastrous to invalidate this approach with the sudden imposition of an entirely different approach. Furthermore, as a management tool the Handling Guide facilitates the coordination of the railroad's total effort to return the right-of-way to normal operation with optimum safety consideration.

There are other sub-systems used in the Handling Guide. A tenth category is numbered "0" to conform with the telephone dialing system, which becomes important in the Information Retrieval System. This category gives general properties and uses of the commodity. Another important sub-system is the Priority-Risk Worksheet. This aids in ordering the priority of actions when more than one hazardous chemical is involved. At the upper left-hand corner of each Data Form is a large numerical or alphanumeric symbol, such as 20F for calcium carbide, and 11H for anhydrous ammonia. If you were handling an accident involving these chemicals, you would pull out a copy of the worksheet and see that it is laid out with the twenty-five priority-risk ratings in ascending order of hazard. Next to rating 11H you would write "anhydrous ammonia," and in the "Action" column you would write down key points in handling the chemical; for instance, "Isolate—Spray Leaks—Dike—Use Self-Contained Breathing Apparatus." Similarly, for calcium carbide you would enter the name and actions, such as "Keep Dry—Isolate—Use Dry Powder or Let Burn." The instructions for the worksheet call for checking for inconsistencies in handling the chemicals; in this case, it is readily seen that the fire and hazard control method for anhydrous ammonia, involving water, is inconsistent with the need to keep calcium carbide dry. And of course, the worksheet shows that, generally, calcium carbide is more hazardous and requires more immediate handling. With literally millions of combinations possible, no system can hope to cover all possibilities; this is why we provide in-depth back-up to the worksheet. To use the same two chemicals as examples, the H appended to the 11 rating for anhydrous ammonia indicates that it is a serious threat to Health. The F after the 20 rating for calcium carbide shows that it is a serious Fire threat. The information on the Data Form gives further guidance, all of which gives the man using the Handling Guide maximum flexibility to meet any situation.

The other side of the coin, when we speak of flexibility, is judgment. Each system must take into account the man that is using it. The Safety Index is specific, because we cannot expect the man using it to have sufficient safety knowledge to use a considerable amount of judgment. On the other hand, the Handling Guide is designed for the safety professional at the road who often has been required to use a great deal of judgment without benefit of the Handling Guide. It is a testimony to his ability that he has performed so well.

To further back-up the "man in the system," the Handling Guide has other sections that give medical supportive procedures, to advise local doctors on handling unfamiliar chemical medical emergencies; emergency equipment and manpower resources, which contains data on fire control, personal safety, tools and equipment and communications; public relations, which provides a method for preparing a responsible statement utilizing the data in the Handling Guide; and references, which list other sources of potential aid, such as poison control centers and the National Agricultural Chemicals Association's emergency service for accidents involving pesticides.

In a time where ever-growing amounts of chemically powerful commodities are being transported on our nation's railroads, it is increasingly apparent that responsible safety programs must be more active. The time is past when a road could rely primarily on outside aid; many roads have realized that they have to increase their ability to meet these emergencies in order to protect both life and property. We designed the Commodity Transportation Safety System to aid in this duty, and we believe that the various elements of the system, such as the Safety Index and the Handling Guide, are effective tools for an active safety program.

Information Retrieval System

In the elements of the Commodity Transportation Safety System that we have discussed, you have seen that we have sought to increase the ability of the railroads to handle accident operations more on their

own determinism with less dependence on outside help. While the Information Retrieval System is a logical extension of these elements, and serves as a back-up to the Safety Index and the Handling Guide, it really is a more general system designed to bring this same sort of information to everyone. This is based on the idea that a major source of fear directed at the transport of chemicals is based on the public's sense of helplessness in dealing with these chemicals, and a concomitant lack of understanding of the utility of these chemicals to our life style. These fears, like all others, are based fundamentally on ignorance. This is what the Information Retrieval System attacks in a manner that puts high-powered safety information at the finger tips of virtually everyone.

This system will be computerized to afford rapid access to the exact information needed, and access to the data will be obtained directly by telephone, any telephone in the nation. All a user needs to do is to dial a toll-free area code in the 800 series, such as the nation-wide reservation systems use. Then he dials a certain prefix, just like your local exchanges. Those three numbers will get him access to the computer. The next four numbers that would complete the normal telephone number will be the code number of the chemical in question, such as 7003 for phosgene. After dialing this code number, the person would then get the desired safety information on phosgene. Alternatively, if the individual wanted to get a certain type of information first, he could simply dial in the corresponding category number, such as 5 for first-aid, after he dialed the code number. Then he would get the required first-aid information first, avoiding any crucial delays. This, incidentally, is why the categories on the Handling Guide are numbered 1 through 9 and then 0 for the tenth category—so that it would coordinate with the numbering used on all telephones.

Another option designed to be used after dialing the code number is intended for physicians. They would be able to dial in an access number made available to them that would give them medical information beyond the first-aid procedures available to all. This would mean that every general practitioner would have the supportive information he would need to coach him in handling a medical emergency involving unfamiliar chemicals.

If you wondered why we developed a four-digit code for identifying the several hundred chemicals covered in the Safety Index or the Handling Guide, it should be apparent now that we were aiming at the requirements of the Information Retrieval System all along. I believe this underscores the value of a systems approach, in that this procedure minimizes the chance that an arbitrary decision early in the program will present you with the problem of either making your early work obsolete, or developing a proliferation of systems to handle the new needs as they arise.

Obviously this is a system that has far-reaching application beyond the limits of railroading. Also, although it will not require an exotic computer, the development and operational costs will be substantial. Thus we feel that the costs should be borne by a more broadly based group than the railroads, such as the government, since it benefits the general welfare. And while this system is being developed for all, the railroads will be able to use the Handling Guide, which not only gives the information of the Information Retrieval System, but additional guidance applicable specifically to the needs of the railroads.

HAZARDOUS CHEMICAL SPILLS IN TRANSIT

By GENE SCHLAF
Supt., Fire Prevention, Illinois Central Railroad, Chicago, Ill.

Scarcely a day goes by that you can't read in a newspaper that a highway collision, a train derailment, a plane crash, a barge accident, or a ruptured pipe line has treatened a community when hazardous commodities have been released or were in danger of being released. How many of these materials were on the market 100 years ago?

Early man first clothed himself in the skins of animals. Later, he learned to weave wool and vegetable fibers into garments. Skins and woven fabrics were also used to provide shelter and to cover dirt floors. Heat for the shelter was supplied by wood. As civilization progressed, he learned to cultivate crops and found that natural fertilizer would increase the yield.

Although animal skins and natural fibers are still used, there is probably no one who doesn't wear materials that were not at one time a flammable liquid or a flammable compressed gas. The chances are that the meal you have just eaten came from food grown from crops that had been fertilized with anhydrous ammonia or ammonium nitrate, both listed in Tariff 23 as hazardous commodities; and the floors in your homes are probably covered with vinyl tile or one of the many synthetic fibers. The water that you drank contains chlorine, a deadly gas that was used in World War I. And, instead of walking, automobiles, propelled by hazardous commodities, provide you with transportation.

The chemical industry has produced a wealth of excellent new materials that enrich our lives in many ways. They are in great demand and must be moved to the market by some means or another. As a matter of fact, any system of moving these raw materials from one place to another has within it certain elements of risk. The nuclear spills by planes over Spain and Greenland are two examples. A ruptured LP-gas pipe line in Missouri several years ago is another. Loaded gasoline transports have taken their toll on our railroad. In 1965, a gasoline truck crossed our tracks, turned around, and then drove directly in front of a slow-moving local train, enveloping the entire train in flames and killing the entire train crew as well as the truck driver. You will recall the sunken barge of chlorine in the Mississippi River a few years ago. The salvage operation was a success, but there was plenty of concern on the part of the community, as well as those in charge of recovery.

The railroads have had their problems too. Dunreith, Indiana; Laurel, Mississippi; Crete, Nebraska; Noel, Missouri; Glendora, Mississippi; and Crescent City, Illinois all come to mind. What caused these accidents? Reports indicate that there is no one single cause, so there is no easy solution to the problem. In the case of Glendora, which occurred on the Illinois Central, the derailment followed the emergency application of brakes necessitated by the presence of a 78-year-old man walking between the rails ahead of the train.

In the case of Laurel, Mississippi, reports indicate the cause to be a defective wheel. The National Transportation Safety Board made certain recommendations following that accident and repeated some of these in their report RAR-70-2 of the Glendora accident, which was released this month. One of them suggested an A.A.R. review of the function of the Bureau of Explosives in protecting the public from danger resulting from railroad accidents involving hazardous materials. In my association with Bureau inspectors at hazardous chemical spills, I have found them to be extremely conscientious in this regard. In the case of Glendora, the inspector was notified of the release of vinyl chloride without ignition. Before departing for the scene, he advised an evacuation of one square mile and the elimination of all ignition sources in the immediate area. While he was enroute, ignition occurred, probably by a friction spark, as the ruptured tank car shifted due to the loss of contents.

What the N.T.S.B. report does not state is that the public had just been subjected to a barrage of news articles about the shipment of phosgene gas from the West to the

South. The National Fire Protection Association, in its Pamphlet 49, "Hazardous Chemicals Data," states that phosgene gas is formed when vinyl chloride burns. The chances are that no over-reaction would have occurred had not the public been pre-conditioned by the previous cross-country movement of phosgene. Under the circumstances, the Bureau inspector could not avert the evacuation of some 20,000 persons, which was under way when he reached the scene.

The N.T.S.B. reports serve an excellent purpose. They try to assimilate all the facts and make recommendations that will minimize the possibility of recurrence of similar accidents. One of their recommendations is to initiate a training program within the railroad organization to develop an effective disaster plan. Although such a plan is already in effect on our railroad, there never was nor ever will be the perfect disaster plan. It needs to be adjusted and improved upon constantly.

When a hazardous chemical is released, what should be done? First, you should have some knowledge of its behavior. If it is a flammable liquid, is it toxic? Non-toxic? Is the liquid lighter or heavier than water? If fire occurs, are the vapors toxic? If it is a flammable liquified gas, is it toxic? Non-toxic? Lighter or heavier than air?

The need for information is clear. Fortunately, there are several sources. There is the Commodity Safety System, described in another presentation. The National Safety Council has a slide rule that contains fewer commodities and sells for less money. The M.C.A. Chem Card Manual is excellent for the eighty-odd chemicals listed. The National Fire Protection Association publishes their "Fire Protection Guide on Hazardous Materials," which sells for $5.50 per copy. I need not tell you of the three Bureau of Explosives publications that deal with this subject; Pamphlet 22, Pamphlet 7, and Pamphlet 7-A contain down-to-earth, easily understood emergency guides.

TROUBLED TIMES WITH HAZARDOUS MATERIALS

By A. F. GRASSMUCK
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Association of American Railroads, Chicago, Ill.

The packaging, carloading, and blocking and bracing of freight to ensure safe and undamaged delivery has always received the highest priority by the railroads, with the A.A.R. being the central agency for development, preparation, and issuance of carloading methods. Our Freight Loading and Container Section publishes and distributes a large number of pamphlets to cover the carloading of a variety of items as shipped in closed cars. Likewise our Mechanical Division publishes some 300 figures or drawings in the *Open Top Loading Rules Manual* for those larger or bulk materials shipped in or on open top cars.

The Rules of Interchange between railroads *makes mandatory* certain rules contained in the *Open Top Manual*, some of which appear in the Closed Car pamphlets and of course apply, in addition to the provisions of the DOT Regulations covering hazardous materials, to loading methods for explosives and ammunition items in either closed cars or in open top cars. The methods for carloading of hazardous materials come within the jurisdiction of the Bureau of Explosives, and in this connection our Bureau publishes several pamphlets: No. 6 for commercial shipments of both explosives and other dangerous articles; No. 6A for the military; and No. 6C covering piggyback shipments.

Rail shipments are subjected to forces in three planes, longitudinal, lateral, and vertical, with those in the longitudinal direction being the most severe. Such longitudinal forces or impacts are encountered in the handling and switching of cars and, to a lesser degree, during actual train movement. To duplicate these forces and thus provide a means of developing or proving a particular blocking or bracing method, the rail impact test was devised many years ago and, with

only slight refinements, it still is being used today. While it has been called unscientific by some, what can be more realistic than a physical test which approaches actual transport conditions? Such tests also provide an unexpected dividend in that container deficiencies, insofar as they effect transportation and were not readily apparent during packaging tests, are often discovered. The first rail impact test to develop methods for transportation of commercial explosives was conducted in the early 1900's in conjunction with the Pennsylvania Railroad at the request of and under the direct supervision of Colonel B. W. Dunn, the first Chief Inspector of the Bureau of Explosives.

Those of you having the opportunity to examine train consists or watch a freight train roll by probably have noted the great number of explosive placarded cars handled almost daily by the railroads since our involvement in the present conflict in Viet Nam; prior to that, the Korean War, and prior to that, World War II. The tremendous tonnage of explosives items transported during these periods and with relatively few major incidents speaks well for the rail industry and, I am sure you will appreciate, has not been by accident. We in the Bureau like to feel that we have contributed in no small manner to this overall safety by our work with the military in connection with impact testing and issuance of covering carloading drawings for ammunition items which goes back some 30 years, with the Army at Savanna Army Depot and with the Navy, originally at Hingham Naval Ammunition Depot but now at the Naval Weapons Handling Laboratory, located at NAD-Earle, N. J. Historically, carloading drawings for the Air Force were prepared by the Army, but are now made by either the Army or Navy, depending on the branch storing or manufacturing the particular Air Force item.

With mostly conventional ammunition items involved prior to and during World War II, it was not too difficult for our Bureau to publish carloading procedures for military ammunition in our Pamphlet 6A. However, with the advent of more sophisticated munitions and particularly missiles, military carloading drawings became so voluminous that our duplication had to be materially reduced. We now indicate our approval of a loading and blocking method in a particular military drawing by signature on the individual procedure involved. Approval by the Bureau is not only referred to in the DOT Regulations, but also contained in military regulations.

Much data and experience has been accumulated over the years, and the results of previous impact tests on items of somewhat similar configuration and weight often can be applied on new items without an actual test. As a successful carloading procedure depends so much on the integrity of a unit load or an individual container, much dependence must be placed on the data developed during packaging tests. This data is reviewed, insofar as it applies to transportation environments, prior to reaching a decision as to whether an impact test will be required. This procedure has been quite successful, and it is estimated that only about 10 per cent of blocking methods for new items are subjected to impact testing. We are by no means infallible, however, and occasionally an untested carloading procedure proves inadequate during actual transportation, and further shipments are discontinued until sufficient containers are secured to conduct an impact test. Fortunately, this condition has been somewhat rare.

A typical test, standard procedure, issued by the A.A.R., concurred in by the military and accepted by DOT, is to allow the car containing the test load to roll freely at four, six, and eight mph into a buffer string of five empty standing cars. The empty weight of the buffer string which, incidentally, have air brakes set, will approach 300,000 lbs. After the three forward impacts are completed, and provided that all has gone well, a reverse impact at eight mph is then made to complete the test. While quite severe, the tests do have the advantage of providing a built in safety factor and, everything being equal, good assurance that an item may be shipped in safety.

Impact tests were conducted in an attempt to develop a means for open top loading of the 104/E polyethylene container. The flat car tests were a total failure, and the gondola load was determined to be economically unfeasible. It was also found that, when this container was stacked and unitized on three layers, the bottom container buckled from the superimposed weight and the covering DOT special permit was revised to

prohibit shipments over two layers in height.

It should be pointed out that the loading of explosive items on open top cars was unheard of and, in fact, prohibited by the then I.C.C. regulations until missiles were developed and it quickly became apparent that, due to their size and often their weight, they would have to be shipped in other than closed cars. The initial tests for open top loading took place in 1955 at Savanna Army Depot with the original NIKE. With eventual success, such loading became the preferred method for large missile items and the regulations were amended accordingly.

Being able to uncover and correct a packaging deficiency or improve a method of carloading prior to authorizing actual shipments has had much to do with the enviable safety record of rail carriers transporting ammunition items, and we feel this has justified all of the time and effort expended in this continuing program.

BURLINGTON NORTHERN'S DISASTER PLAN

By J. H. BOYD
Asst. to Director, Safety & Rules, St. Paul, Minn.

On merger day for Burlington Northern, a great deal of detailed planning had already been done. Department personnel and their responsibilities had been assigned. Timetables, special instructions, and operating bulletins had been written. Literally thousands of details had been worked out, but one of the many things that still needed to be done was to put together a disaster plan for the merged company.

The major component companies to the merger all had plans for handling hazardous materials involved in derailments, collision, fire, or unforeseen occurrence. There was a mass of technical books, papers, and instructions, all requiring people with expert knowledge and training to use. For example, we had 48 wrecking derrick crews located over 26,000 miles of main track. These crews were not trained and did not have information in a useful form to handle hazardous material occurrences. It was necessary therefore, to write a manual of instruction that could be used by a layman, one not particularly trained in chemicals or other hazardous materials.

The writing of a manual of procedures for handling hazardous materials involved in derailments, collision, fire, or unforeseen occurence, therefore, had a high priority of things to be done first after merger. It was obviously a direct responsibility of the transportation department and the Safety and Rules department.

There are over a thousand articles of commerce officially designated by the DOT as "dangerous articles." Several hundred of these are of a nature to hold serious loss of life, injury, and property damage potential as a result of fire, explosion or the rupture of or the leaking of containers, packages, or tank cars. These materials are of particular concern during transportation when they may become involved in derailments, collisions, fire, or unforeseen occurrence. It was obvious that we had to have a plan to provide an adequate organization of trained personnel, and plans of action, to enable Burlington Northern to respond effectively and in the shortest possible time for handling an emergency where hazardous materials were involved, either in the train or cars on siding or immediately adjacent to tracks. The chief goals of such a plan were obvious: the saving of life, the prevention of injuries, and the limitation of damage or loss of company property and the property of others.

Whenever an accident involving hazardous materials occurs, it must be assumed that it could cause a serious actual or potential hazard for all persons and property involved. A manual of procedures to follow in event of a hazardous material occurrence had to take into account the following facts:

1. The possibility of multiple loss of life, personal injuries, and major property damage.

2. Employees and the public would be involved and not trained to recognize the dangers or how to handle them.

3. The quickest possible action would be required to assess the situation and take action to protect life and property.

To meet these requirements, the manual is written in a step-by-step form, and instructions have been issued to all employees as to what they must do in event of a hazardous material occurrence. The steps to be taken are as follows:

1. Employees at the scene must guard against people entering the area.

2. Check the waybills and consist to determine what, if any, hazardous materials are involved.

3. Notify the dispatcher by any available means of communication of the occurrence and whether or not hazardous materials are involved.

4. Employees at the scene will attempt to rescue injured or trapped personnel, if possible, and move them to a safe area. It also may be necessary for them to call local fire and police departments and ambulance, if needed, to the scene of the accident.

5. Survey the scene and adjacent areas as quickly as possible to determine if explosives or hazardous materials are involved and, if so, the location of such cars in the train, if blocking adjacent tracks, or if cars bearing explosive or dangerous placards are on adjacent tracks. Promptly communicate this information to the train dispatcher using the quickest available means of communication. Employees are authorized to use Bell Telephones from nearest possible source. If a highway is adjacent to the scene, the employee is authorized to use red fusee to stop motorist, identify himself, and ask to be driven to the nearest telephone.

6. Following the first report to train dispatcher, return to the scene of the accident, identify contents of all cars, determine condition of the cars containing explosives or hazardous materials, noting if they are derailed, leaking, fuming, damaged, etc. Determine the position of such cars, whether overturned, on side, or down embankment.

7. If a tank car, it should be determined whether vents in the dome are free to function or whether or not the vents are covered up. Location of tank car in train, as well as in relation to derailed cars. Identify the location of the accident; in other words, whether in the vicinity of a city, town, farm, occupied buildings, open land, etc. Establish weather conditions, rain, wind, approximate temperature.

The things required of the chief dispatcher involved are that he notify the superintendent or his alternate and the division officers nearest the scene and decide on what course of action should be taken. The action would of course encompass derricks or equipment necessary to clear the derailment and material and Maintenance of Way forces required, and local experts in handling of hazardous materials such as the representative of an LP gas concern or a fertilizer company. Notify the civil authorities, fire, police, medical aid, etc. Any news releases would be made locally by the superintendent or his alternate, and any further releases are made through the control center and public relations department. The chief dispatcher would also be required to see that the necessary forms are filed of the occurrence, such as Bureau of Explosives Form 25.

The requirements for the Control Center and Transportation at St. Paul, after they have been advised of the occurrence and the nature and extent of it, are that they notify the general officers and director or representative of the Safety and Rules. If the situation is serious, the Bureau of Explosives in Washington and the Department of Transportation are notified. They also must examine the train consist and verify that the necessary actions have been taken at a division level.

In this manual we have sections listing how to handle various hazardous materials commonly moved by rail, which are liquid petroleum gas, anhydrous ammonia, ammonium nitrate, explosives, flammable liquids, poisons, radio active and fissionable materials, infectious materials, and cryogenic liquids, (super cooled liquified gases, such as oxygen, hydrogen, chlorine). For any hazardous materials not covered in these areas, we furnish supporting material to determine what may be required. This consists of a chemical safety slide rule or chemical transportation safety index and a fire protection guide on hazardous materials. The manual also shows under

these headings the people to be called upon for assistance in handling any such hazardous materials, such as American Association of Railroads, Bureau of Explosives personnel, U. S. Army Explosive Ordnance disposal units, and the location and numbers of the poison control centers, and the names and telephone numbers of all shippers of hazardous materials. At a division level we maintain a list of all consignees so that their assistance can be obtained in protecting or clearing such derailments or occurrences.

SAFE AT FIRST OR OUT AT HOME

By THOMAS M. GOODFELLOW
President, Association of American Railroads, Washington, D. C.

Working on the railroad—or just plain living, for that matter—has one important factor in common with baseball. It's the number of times you get home safely that counts. And that's a reasonable description of your job responsibility.

I read recently that middle age is that difficult period—between juvenile delinquency and senior citizenship—when you have to take care of yourself. Actually, as the fight referees like to say, you must protect yourself at all times—not just middle age. There's danger everywhere. One wit describes the situation this way: "Our highways aren't safe, our streets aren't safe, our parks aren't safe—but under our arms we've got complete protection."

There's more to the human body than an armpit. The human body is an incredible machine—more miraculous than any computer or other electronic device you've ever heard about.

I'll give you a few figures—and I'll use myself as the example. In my lifetime I've eaten 1,400 times my body weight. That's more than two box car loads. I'm a little startled to realize I've spent the time equivalent of five full years just putting food in my mouth.

Since this time yesterday, my heart has pumped 98,000 times. In the same period, my blood traveled 168 million miles. I breathed 23,000 times. I moved 750 major muscles. I said 4,800 words. And—whatever your impression may be—I'm constantly exercising *seven million brain cells.*

So, what's the message in these fascinating details about the wonder of the human body? The point is that a single accident can stop this wonderful machine cold—for weeks; for months or forever. And you're in the business of making sure that doesn't happen.

I want to take a phrase I've been hearing for years and interpret that phrase in terms of the railroad situation today. It says: "Safety is Engineered, Legislated, and Motivated."

A year or so ago, I got quite a little news attention by telling a luncheon meeting at The House Office Building in Washington that "safety can't be legislated." I went on to say that "safety is a matter of equipment, attitudes, and behavior." And I added that the "world's best safety device is still the one located just above and behind the eyebrows."

I still believe what I said then. But the widespread application of good safety rules and practices is going to be an exercise in a vacuum unless we can resolve some basic problems in our industry. That's why I want to look at those key words—motivation, engineering, and legislation—from a different angle.

Railroaders have the best possible motivation for solving basic railroad problems. The motivation is survival of the industry and preservation of their livelihood as they now know it.

Forty-one years ago the worst financial crash in U. S. history took place on Wall Street and led to the Great Depression of the 1930's. We're having a Great Depression in the railroad industry right now. One giant road has collapsed financially and is being run by trustees. So are three smaller roads. Several others are on the verge of going over the bankruptcy cliff. A third of all railroads in the country lost money in 1969.

You know these dark things. I don't have to labor our financial troubles with you. You know about our incredibly low rate of return. You know the trouble we're having attracting the money we need to be the dynamic, viable transportation machine we could and should be.

So, we're making a pitch to bring sense *into government transportation policy.* I don't want to be an alarmist but, using baseball lingo again, if we don't make it this time, that's the ball game!

What is the pitch—and what does it have to do with safety work? The pitch, in stark essence, is this: The nation needs railroads. The railroads can do a great job for this country. We need some help on transportation policy and on the use of Federal funds. Legislation can do much to bring us into the sunshine. We've worked out specific, constructive proposals. We're pushing for them. You can help. For your own good, for the good of our industry, and for the good of the nation, we'd better be successful in our efforts.

An insurance executive has predicted that accidents will be the leading cause of death for persons under 65 in three decades. As safety officers, you don't want that prediction to apply to the railroad industry. On the other hand, you don't want our safety record to be perfect simply because we've gone out of business.

Believe me, we're not going out of business. As a matter of fact, our industry could have a wonderful future. All we need is a chance to stand at the plate with our arms free to swing. We can hit the long ball, all right. Don't worry about that part.

One thing that's going to help is recent passage of the so-called Railpax bill authorizing a Federally chartered rail corporation to run intercity passenger trains. The railroad industry is behind the Railpax approach and stands ready to work closely with the new corporation.

This is a solid step forward in bringing fairness and realism to passenger operations. It will make it possible for us to provide help as needed in the massive job of moving people. And it should relieve railroads of their losses on that end of the business.

We're definitely needed to do a freight transportation job. There's no question about that. Given a fair and equal opportunity, we can do that job more efficiently, more economically, and more safely than any other mode of transportation.

Railroads are essential. We currently carry more than 40 per cent of the freight traffic that moves between our cities. By 1980, we'll be called upon to move about 46 per cent more freight than we now move. And we can do the job at less cost for shippers and for consumers.

Railroads provide more than a half million jobs in direct railroad employment. We contribute additional billions to the economy through taxes and purchases. But, above all, we provide an essential, vital transportation service.

Efficient, economical rail service will deteriorate further and your safety objectives won't be achieved if there isn't an improvement in the distribution of Federal funds for transportation projects and some healthy changes in other aspects of transportation policy.

ASTRO is an acronym for America's Sound Transportation Review Organization, a special study group set up to probe the problems and the prospects of the railroad industry. The ASTRO report made a full set of recommendations. A few that, sooner or later, will have special pertinence for safety directors are:

1. Establish a single transportation fund to be used by all modes in furthering a balanced transportation system.

2. Use road funds already available to eliminate highway-railway grade crossing hazards, especially since this is essentially a highway problem.

3. Guarantee up to $400 million annually in loans for improvements to railroad rights-of-way.

4. Guarantee loans and advance down payments for the purchase of needed locomotives and cars.

Employee safety is a major interest of this group. You know, better than anybody, that good equipment and facilities efficiently used under good practices and proper attitudes is the absolute foundation of a successful safety program.

If you're prepared for emergencies, you can handle them when they arise. But it's better not to let them come up in the first place. We've already got an emergency in the railroad business. The railroad crisis

cries out for legislative relief. And so, legislation is the main thrust of the ASTRO recommendations.

The underlying cause of the railroad crisis is government transportation policy that's been punitive towards railroads and promotional towards our competitors. The ASTRO legislative proposals call for money, for freedom, and for equity.

Some of the legislative needs have been making great progress. I've already mentioned the Railpax bill. Other legislative measures relating to freight car supply, guaranteed loans, transportation research, tax discrimination, regulation, balance in subsidies, etc., are in various stages of progress.

One measure has already gone the full route—the rail safety bill which became law following President Nixon's signing. This law authorizes the Department of Transportation to set and enforce safety standards covering railroad equipment, roadways, bridges, and operations. It also gives special attention to hazardous materials controls.

The safety bill may touch on ASTRO objectives only in part—the grade-crossing section, for example—but the bill is a good example of the kind of cooperative effort we must have to resolve manifold problems in transportation. The safety bill had its roots in the special Task Force on Railroad Safety to which so many of you made a contribution and on which I had the privilege of serving.

Initiative in these matters has not rested exclusively with the other interested parties. Not by a long shot, as you well know. We've done our bit where we could; for example, the set of comprehensive track maintenance standards developed by our Engineering Division. These standards represent the consensus of people in our industry with the greatest knowledge and experience in this field. The standards were approved by the AAR Board of Directors and were transmitted this month not only to executives of all member companies but also to Secretary Volpe and to the Federal Railroad Administration as solid evidence of our concern and our initiative for safety.

As I said early in my remarks, safety comes through engineering, legislation, and motivation. ASTRO-recommended legislation should bring equity in transportation policy. With equal treatment, and help in getting the money we need, we can handle the engineering of safety, especially in roadway and equipment.

We already have the motivation for safe and efficient performance. Our motivation ranges across a wide front of major concerns, including safety of life and limb for employees and others and, certainly, including survival of the industry itself.

The Department of Transportation estimates that by 1980 railroads will be called on to carry one trillion and 100 billion ton miles of freight. Secretary Volpe has been quoted as saying: "If all the railroads stopped tomorrow, all other modes of shipment could absorb no more than 10 per cent of what is now sent by rail."

Put these two statements together and one fact is obvious. This nation can't do without its railroads. So, it's not a question of whether we'll have railroads, but what kind.

As a first step, we've got to get rid of our major problems. You can help. I don't need to tell you what must be done to save the railroads. But you need to help get the message to others who don't know or, who need to be reminded.

You can help fight disaster by acquainting yourself with the recommendations of the ASTRO proposals. I've only touched on a few. Other proposals get into abandonments, mergers, rate freedom, innovation, intermodal transport service, and all the rest needed to give railroads the bright, dynamic, useful future they can and should have.

All of us in railroading should promote the ASTRO goals at every opportunity. That's the primary and paramount objective for the railroad industry in the months immediately ahead. In safety terms, the ASTRO plan is our survival kit.

We're not only geared up, we're already rolling on a real grass-roots campaign to put the ASTRO program over. Although we have only a small nucleus headquarters staff for ASTRO in Washington, a very comprehensive nationwide network has been set up throughout the states to carry the program right down to the grass roots.

Most of the state programs are under way. Many railroad executives have already made ASTRO talks. The AAR has produced a small wagonload of ammunition—press kits, speeches, booklets, tapes, radio and TV commercial messages, and so on. A slide presentation and other aids are being progressed rapidly. And we're wide open for good suggestions.

There's going to be a role in this campaign for everybody. Maybe you've already been asked to help. If you haven't, you will be. But, don't wait for an invitation. Volunteer. Your stake is bigger than you know—and it's later than you think.

Passive approval of ASTRO goals isn't going to get the job done. There comes a time when the buck can no longer be passed. That time is here. We must seek and win the support required to pass the legislation needed to make railroads strong, safe, and successful, as they should be, for your sake, for my sake, and for the immediate and long-range good of the nation.

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