

FILE NAME: National Safety Council (NSC)

DATE: 1969

DOC#: NSC496

DOCUMENT DESCRIPTION: NSC Transactions - Volume 2

1969

Volume 2

W3

NA677

57th

v. 2

1969

NATIONAL SAFETY CONGRESS
TRANSACTIONS

AEROSPACE; AIR TRANSPORT INDUSTRIES

NATIONAL SAFETY COUNCIL
425 North Michigan Avenue
Chicago, Illinois 60611



plumbed in electrical and pneumatic supply outlets. There will, however, be high-power socket outlets in the stair-wells to all landing gear pits.

Hangar Doors

The huge void filled by these doors, of which there are six, measures some 450 feet by 75 feet. Each door is about 75 feet square, and weighs some 57 tons. The doors run on three parallel tracks at hangar floor level and slide behind one another when being opened. Drive is by means of hydraulic motors in the door wheels. Maximum traversing speed has been restricted to 76 feet per minute and a stopping distance of 1¼ feet from full speed has been achieved. Even so, these doors could present considerable dangers at relevant trapping points and the following safety precautions have been built in:—

1. It is only possible to traverse a door from a control point at the leading edge which presents the danger (inching in reverse for correct positioning is, however, possible).

2. Control is by means of a quadrant dead man's lever whose progressive movement in the direction of traverse increases door speed to its prescribed maximum.

3. Before the door can be moved, it is necessary to depress a button on the quadrant lever. The quadrant lever cannot be moved for a time delay of 10 seconds (during which hydraulic pressure is built up). During this 10 second delay, an audible warning sounds.

4. If a door is to be moved, then the small fire exit wicket door within it must be shut before movement of the main door can be effected.

5. To avoid the unlikely danger of personnel attempting to use a wicket door just as the leading edge of an adjacent door is passing it, red warning signs will flash in relevant wicket doors when a main door is moving.

6. The recess in which the door control quadrant is placed has its trailing edge tapered to avoid trapping the hand of an unwary and incompetent operator.

7. Door opening and closing will be done only by authorized and trained staff.

8. In the event of mechanical failure, the doors may be towed open by means of a tractor, after brake release by means of an accessible lever has been achieved.

Heating, Ventilation and Lighting, Noise

The system uses forced hot or cooled air as appropriate, directed downwards from high level, plus floor heating by buried hot water pipes (which helps to dry up water on the hangar floor after the aircraft has de-iced). The system has been designed to restore the inner temperature to not less than 60°F in fifteen minutes after opening the hangar doors with an outside temperature of 28°F. With the hangar doors closed, the air change rate is three quarters of the volumetric space of the main hangar void per hour.

A general illumination level of 500 lux has been aimed at hangar floor level. Both mercury and sodium lighting units are used, to combine efficiency with a light quality which is not too far removed from daylight.

Every effort has been made in the design of this hangar to reduce noise with its attendant fatigue and accident causative effects. Main precautions are:

Isolation of noisy rigs, etc., in sound-absorbing rooms off the hangar floor; use of constructional materials designed to minimize noise reflection and transmission; use of inherently quiet electrical, mechanical, and hydraulic apparatus in the hangar.

Cleaning the Exterior of the Aircraft

The simple principle here has been to avoid the need for personnel walking on any part of the aircraft whose surfaces become slippery during washing. A mobile high access unit with power operated rotary brushing heads and plumbed in detergent supply is likely to be used. Once in the control seat the operator is in a safe and protected position from which he may carry out the majority of the external cleaning function.

Conclusion

This paper does not purport to be comprehensive but simply to set out the main safety principles we have considered in relation to maintenance and overhaul of the Boeing 747. There are other ways of tackling these problems but it is hoped that this brief dissertation may be of some help to ground safety executives faced with the inception of this great aircraft. Time and hard experience alone will tell whether accident frequency rates will increase or, as is fervently hoped, decrease, in the light of this challenging safety design exercise.

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1972 At the '70 Congress you can meet other safety people, with the same problems and responsibilities as yourself. You can exchange views and ideas on accident prevention, health, hygiene, and fire prevention . . . on safety in industry, traffic, school, at home and on the farm.

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This four-day educational program, planned and presented by the National Safety Council, can be your most thought-provoking, most worthwhile safety experience in 1970.

Make plans early to attend the 1970 Congress and bring the other people in your organization who have safety responsibilities.

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1972	Oct. 30 - Nov. 2
1973	Oct. 29 - Nov. 1

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1972

At the '70 Congress you can meet other safety people, with the same problems and responsibilities as yourself. You can exchange views and ideas on accident prevention, health, hygiene, and fire prevention . . . on safety in industry, traffic, school, at home and on the farm.

1973

You can see the largest of all safety equipment exhibits at the Congress . . . an opportunity for you to make well-informed buying decisions for your company.

This four-day educational program, planned and presented by the National Safety Council, can be your most thought-provoking, most worthwhile safety experience in 1970.

Make plans early to attend the 1970 Congress and bring the other people in your organization who have safety responsibilities.

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CHEMICAL; FERTILIZER INDUSTRIES; RESEARCH and DEVELOPMENT

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NATIONAL SAFETY CONGRESS
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**COAL
MINING**

NATIONAL SAFETY COUNCIL
425 North Michigan Avenue
Chicago, Illinois 60611



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1972 At the '70 Congress you can meet other safety people, with the same problems and responsibilities as yourself. You can exchange views and ideas on accident prevention, health, hygiene, and fire prevention . . . on safety in industry, traffic, school, at home and on the farm.

1973 You can see the largest of all safety equipment exhibits at the Congress . . . an opportunity for you to make well-informed buying decisions for your company.

This four-day educational program, planned and presented by the National Safety Council, can be your most thought-provoking, most worthwhile safety experience in 1970.

Make plans early to attend the 1970 Congress and bring the other people in your organization who have safety responsibilities.

FUTURE CONGRESS DATES

1970	October 26-29
1971	October 25-28
1972	Oct. 30 - Nov. 2
1973	Oct. 29 - Nov. 1

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NATIONAL SAFETY CONGRESS
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1970 NATIONAL SAFETY CONGRESS OCTOBER 26-29, 1970 / CONRAD HILTON HOTEL, CHICAGO

1971 The Congress is always a big week, a worthwhile week for the 14,000 safety people who attend.

1972 At the '70 Congress you can meet other safety people, with the same problems and responsibilities as yourself. You can exchange views and ideas on accident prevention, health, hygiene, and fire prevention . . . on safety in industry, traffic, school, at home and on the farm.

1973 You can see the largest of all safety equipment exhibits at the Congress . . . an opportunity for you to make well-informed buying decisions for your company.

This four-day educational program, planned and presented by the National Safety Council, can be your most thought-provoking, most worthwhile safety experience in 1970.

Make plans early to attend the 1970 Congress and bring the other people in your organization who have safety responsibilities.

FUTURE CONGRESS DATES

1970	October 26-29
1971	October 25-28
1972	Oct. 30 - Nov. 2
1973	Oct. 29 - Nov. 1

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TRANSACTIONS

ELECTRONICS and ELECTRICAL EQUIPMENT

NATIONAL SAFETY COUNCIL
425 North Michigan Avenue
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**FOOD & BEVERAGE;
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NATIONAL SAFETY COUNCIL
425 North Michigan Avenue
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1970 NATIONAL SAFETY CONGRESS

OCTOBER 26-29, 1970 / CONRAD HILTON HOTEL, CHICAGO

1971

The Congress is always a big week, a worthwhile week for the 14,000 safety people who attend.

1972

At the '70 Congress you can meet other safety people, with the same problems and responsibilities as yourself. You can exchange views and ideas on accident prevention, health, hygiene, and fire prevention . . . on safety in industry, traffic, school, at home and on the farm.

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Make plans early to attend the 1970 Congress and bring the other people in your organization who have safety responsibilities.

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1970 October 26-29
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1973 Oct. 29-Nov. 1

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GLASS and CERAMICS; RUBBER INDUSTRIES



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NATIONAL SAFETY CONGRESS
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**INDUSTRIAL
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We feel that the \$14,000 was a mean income for the members serving on the 02 Committee.

For man-hours tied up in this standard from travel through to the committee sessions themselves, there is a ratio of 7 to 1 in man-hours allocated for the development of standards. For every extra hour devoted to drafting this standard seven hours were allocated. The cost projection of \$60,000 is conservative. However, the longer it takes to write a standard the higher the cost.

Time is of the essence in drafting a safety standard, as it is in any worthwhile chore. Time is a most precious thing. Once gone it cannot be retrieved, once wasted it cannot be salvaged. We are living in a time-compressed age, and time is becoming more valuable each ticking second.

Industry is willing to devote time, effort, and money to assist in drafting appropriate

and quickly developed safety standards. It is the obligation of all organizations in the field of safety activities to design a program which encourages quick responses and expeditious processing of the product—the safety standard.

The 02 Standards Committee believes it developed and drafted a sound, reasonable, and enforceable standard for thousands of sawmills which encompasses the primitive “pecker woods” to the largest older mills and the modern newer ones. We believe the 02 Standard is sound from an engineering viewpoint and provides for safety and hygiene in all facilities. I am convinced that with adequate preplanning, preparation, organization, and scheduling, the time from recognition of the need for a safety standard to the accomplished result could be shortened considerably.

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**LABOR
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lem. The chief informed me that he would have an inspector at the plant tomorrow. The inspector did arrive. A week later I received a response letter indicating that no safety and health violations were found. I subsequently found out that the inspector who visited the plant went to school with the superintendent of the department that I asked to have inspected. So, I went back to the chief of the division and said that I still had the same complaint and wanted it checked out further. He hesitated quite a while and finally agreed to send out another inspector to accompany the previous inspector. The two inspectors telephoned and made an appointment to make an inspection, and subsequently did. Again, I received a letter indicating that there were no violations found. I realized that the problem was still existing, so I went back to Columbus and again talked to the chief of the division. I informed him that I was tired of getting the run around, and that I had proof from past court cases that this type of an operation is hazardous. I asked that he himself come to the plant and meet with us relative to this problem. He finally did call me and set up an appointment for the meeting. This time, management, the chief of the State division, and myself inspected the work areas under question. He went back to

Columbus and wrote me a real nice letter riding the fence and not being committed in any way. I answered his letter by indicating that he must get off the fence and provide a solid, honest opinion because the members of our local really wanted to know. I also informed him that the local union was ready to sue the State of Ohio, based on the results of a past court case pertaining to the same problem. Then the chief of the division suddenly got real co-operative. He responded with a long letter, with the first half of the letter still riding the fence. However, in the second half of the letter he finally agreed with me and the union viewpoint relative to the company's operation and instructed them to correct the condition. This is the way the State of Ohio operates.

GREENE: This is just an example, in my estimation, of why it is so important that all of the employees and the division heads be civil service in state safety inspection departments. When this is the case, the person can conduct his work in a morally responsible manner, rather than worry about political influence and reprimands. This is why it is so important for labor to be active in the various states to insure that this protection is provided to the staff of the safety and health inspection department.

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credible accident area and are in the form of projects being carried on by the Bureau of Mines and the National Academy of Sciences.

The Cargo Size Limitations Panel of the National Academy of Sciences Advisory Committee on Hazardous Materials is approaching the problem by assuming the worst possible accident for a given quantity of cargo and then determining such factors as the downwind hazard of toxic and explosive vapors, the downstream spread of flammable and toxic liquids, and the radius of blast damage. The information they are supplying is a correlation between cargo size and damage areas for a given cargo.

The contract with the Bureau of Mines investigates the behavior of liquefied gases, such as nitrogen, liquefied natural gas, and chlorine, in water. They are investigating sudden, massive releases of these liquids. While their work is still far from complete, it appears that liquefied natural gas forms a lattice with the ice. This ice results from the heat of evaporation absorbed from the surrounding water by the LNG.

Use of Hazard Evaluation

Hazard evaluation permeates all phases of the Coast Guard's hazardous materials work on both a national and international scale. For instance, the NAS hazard evaluation system has provided basic guidance in the development of major new U.S. regulations for bulk dangerous cargo barges (i.e., "Subchapter O") and in U.S. participation in the development of international standards through IMCO (Intergovernmental Maritime Consultative Organization). Overall ratings for a cargo are used to guide decisions on whether it has unconventional hazards and warrants special precautions in transportation. Selected ratings are used to guide detailed decisions. For instance, if the cargo has high hazard ratings for health as a poison or vapor irritant, closed gaging and venting of tanks is required for liquids. If the cargo has a high hazard rating for water pollution as a human toxicant, a double skin tank is required to minimize accidental release to the waterway.

Another example of using hazard evaluation is the application of the previously dis-

cussed compatibility chart. The hazards associated with compatibility are, in the main, evolution of heat and gas and evolution of dangerous products. Cargoes may have to be separated from each other, or from the water if a reactivity problem is present. Accordingly, a double skin tank is required where the cargo reacts dangerously with the water. A non-reactive cargo, a cofferdam, or void is required around cargoes that react with other cargoes. Separate and independent cargo piping and pressure relieving lines are also required for tanks carrying reactive cargoes. Inert padding is required for cargoes that react with air.

The results of massive cargo spill studies, mentioned earlier, will provide a hazard evaluation technique for guiding decisions on ship and barge design and operation requirements. The studies are already providing a better understanding of transportation hazards; i.e., "hazard evaluation."

Two things should be noted about any hazard evaluation system and ratings mentioned in this paper. First, they are guides to regulatory decision making, and not rigid rules. Second, and as a corollary, other information is used whenever available to supplement or over-ride ratings. Thus, there is a real distinction between classification of hazardous materials and evaluation of their hazards.

Conclusions

Hazard evaluation is an approach to transportation safety rather than a rigid system for correlating commodity properties with compensatory designs and procedures—at least, at this time. Modern bulk hazardous materials present complex hazards to operating personnel and the public in transportation, and with rapidly changing shipping technology and safety standards there are no simple rules to follow. However, the Coast Guard, in its regulatory approach to water transportation, has pioneered in the type of thinking that will provide comprehensiveness and consistency in future regulation of hazardous materials shipments by any mode. Work is still in an early stage but, hopefully, it will provide a framework for advancement of an extremely important cause—transportation safety.

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1970 NATIONAL SAFETY CONGRESS OCTOBER 26-29, 1970 / CONRAD HILTON HOTEL, CHICAGO

1971 The Congress is always a big week, a worthwhile week for the 14,000 safety people who attend.

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suming there is agreement that a special exposure does exist. Management must consider what is at risk. I would consider five major items:

1. The value of the paper and warehouse facility at risk (believe it or not, this may be the least important consideration.)
2. The expenditure for protection should not be based on just what is at risk today, but also what will receive the benefits of protection in the future. If, for example, you have \$300,000 worth of paper at any one time, but your average turnover is four times a year, then actually you are providing protection for \$1,200,000 in stock over the year, and \$6,000,000 in stock over five years.
3. What effect will the loss of paper stock have on the continuation of operations?
4. To what extent is there exposure between the paper storage area and any other facilities or operations?
5. What are the implications to your over-all insurance program?

You will notice that all I've done is pose more questions. But I'll wager that if you seriously attempt to answer these questions, you will find that you can only go so far on fact, and from that point on you will have to rely on judgment, which puts you in a similar position as the fire engineer, but whereas the fire engineer has to contend with the insurance company influence, you will have to contend with a tight budget.

It is my honest opinion, however, that if the management viewpoint is pursued realistically, and sound judgment is applied in a logical manner, the differences between your position and the fire engineer's position will be in a negotiable range, and let's face it, there is always area for negotiation in loss prevention. Whether you agree with the ultimate conclusions or recommendations of the fire engineer or not, he has thought out and reasoned his position. I have never experienced a single instance, when management gave equal thought and equal reasoning, that the matter wasn't worked out. It is only at this point that you or I can arrive at any real answers.

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1972 At the '70 Congress you can meet other safety people, with the same problems and responsibilities as yourself. You can exchange views and ideas on accident prevention, health, hygiene, and fire prevention . . . on safety in industry, traffic, school, at home and on the farm.

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1972	Oct. 30 - Nov. 2
1973	Oct. 29 - Nov. 1

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NATIONAL SAFETY CONGRESS
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**RAILROAD
SAFETY**

NATIONAL SAFETY COUNCIL
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NATIONAL SAFETY CONGRESS
TRANSACTIONS

SCHOOL and COLLEGE SAFETY

NATIONAL SAFETY COUNCIL
425 North Michigan Avenue
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able to convince you that stamina is a fantastically important factor in safety.

Sense

Take the S in sense. Much of what I've said previously is tied in with sense. How many situations can you think of where the use of a little "common sense" would have helped? How about the time you carried two suitcases and a garment bag out to the car and tripped on the stairs? Or the time you carried the big box that blocked your vision? Oh, maybe you got by with it last time—but don't push your luck! And what about the party you went to on New Year's Eve knowing darn well that you had to drive home! How ready were you to drive when it came time to drive? If you really look back on some other situations you'll see what a fool you were. "Common sense." The really tragic part about the sense in safety is that in almost every accident we realize—afterwards—that we knew better. Yet we took the gamble. Sometimes we won, but most times we lose. Generally speaking, when you lose—you lose big. Sense in safety!

Sex

On to the big word—SEX in safety. To those of you who are beginning to worry about what I'm going to say—relax. I take a neutral position on the male versus the female driving ability. I will neither condone nor condemn the mini-skirt as a probable cause of rear end auto collisions. I refuse to argue the value of the bucket seats over the bench type. I'm still not sure if it's more of a hazard having the girl directly next to you or to have her so far away that you have to look over to make sure she is still with you.

As a man who is really concerned with safe driving, I pay very little attention to the female driver—unless (1) she gets in front of me and slows traffic; (2) she cuts me off and gets the last space in the super market parking lot; (3) she stalls her engine and then looks at me as if I can get it going again; (4) she gives me the impression that she is a better driver than me—and then proves it; (5) she bangs into the front of my car while attempting to back into parallel parking space; (6) she asks for a little shove because she is stuck in the snow and

then spins the wheels at about 30 mph, splattering me with snow and slush; (7) she offers to do something for me someday if I'll just change that little old flat tire of hers; (8) she utters some unkind words about my driving—especially after I've commented on her ability; and (9) she asks for directions, then stops at the next gas station to see if I really knew what I was talking about.

Conclusion

Let's go back to our first S—satisfaction. This summer my family and I drove from Las Vegas around the Grand Canyon, north to south rim. On the return to Las Vegas, we stopped at a motel between Pica and Peach Springs, Arizona. After a little swim and cooling off period, we decided to look for a little curio shop to spend some money. Since we were near an Indian Reservation, we took off towards that. Before very long I noticed a side road and a sign that said Nelson—four miles. Over the objections of my family I turned onto the road and said I'd like to see a small Arizona town. Well, let me tell you we saw a small Arizona town. In fact, the town is so small that the population is not even listed in the Rand-McNally Road Atlas.

The town consisted of four very rundown shacks and one rather well kept home. There were at least ten times as many children as adults. There were more horses in the corral than adults. This town had a population of about 30 people at the most. However, it had a mining operation right opposite the main (and only) road. Our car, which was stared at by all 30 residents and horses, was obviously an oddity in town. I somehow had the feeling that very, very few people come to Nelson.

It was obvious that the five homes were for the mine workers and their families. Let me tell you what I mean about satisfaction in safety. A sign at the entrance indicated the mine had operated 3,123 days without a lost time accident. Other than the 30 residents of Nelson, Arizona and my family of four, very few people ever saw that sign. Yet the company saw fit to show 30 people that there is indeed personal "satisfaction in safety." Maybe this is the most important S in Safety.

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