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**A MANAGEMENT APPROACH
IN
ACCIDENT PREVENTION**

BY

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PREFACE

A MANAGEMENT APPROACH IN ACCIDENT PREVENTION

This report gives a description of a unique loss-control system that greatly improves the overall effect and efficiency of accident prevention activities. The report is presented in a format to facilitate its adoption by any organization.

The technique was created and developed by the author in recognition of accelerated emphasis on economy of operations. It reduces waste and losses by using accidents, unsafe practices, and the existence of hazards as indicators of management failures that are causing unnecessary productive losses.

The benefits of implementation of this system at this Laboratory during the past several years have been twofold: it has been instrumental in further improving a safety program that was already outstanding; and it has helped supervisors and managers recognize and control many costly inefficiencies, errors and oversights. I believe it is a major improvement in the technique of accident prevention, with potential for universal application by safety professionals throughout government and industry.

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A MANAGEMENT APPROACH IN ACCIDENT PREVENTION

INTRODUCTION

GENERAL. During times when economy of operations is in vogue, managements of organizations often endeavor to reduce costs by streamlining productive operations, reducing purchases of new equipment, decreasing numbers of maintenance and overhead employees, and by other such measures that may be objectionable although considered necessary. But now, a unique system in safety programming provides the potential for easily accomplishing considerable monetary savings and productive improvement, as well as eliminating accident causes, without costly expenditures and without cutting down on operations, personnel, or services. Only waste is reduced.

This system is not simply the common approach of safety people who endeavor to justify safety programs by computing and dwelling on the costs of accidents such as medical expenses, compensation paid, property damage, administrative lost time, and various indirect costs. This system is a way to achieve savings.

The technique stems from the simple action of recognizing that all accidents and hazards are indicators of management failures; and that these management failures are causing many productive losses as well as accidents. Investigations quickly show that these failures, which may be simple inefficiencies, errors, or oversights, often exist for years and continually cause huge losses, without anyone knowing about them. But accidents and hazards can be routinely analyzed so as to be a means of detecting them. Once identified, most management failures are easily corrected.

HYPOTHESIS. In the investigation of any accident, there can always be found some degree of management involvement or activity that might in some way have prevented the accident. Therefore, it is arbitrarily assumed that Management will be responsible for the causes of every accident, as well as for the existence of every hazard.

With this hypothesis, the investigation of each accident, and of each hazardous situation noted, will be directed to seek to identify that underlying management involvement.

DEFINITIONS. To assure proper understanding of this process, it is necessary to clarify the meaning and intent of two key words in this system, "Management" and "Failure". Definitions are as follows:

"MANAGEMENT" is defined as including all levels of supervision higher than the immediate supervisor. Also included in Management are all administrative and support agencies such as the Personnel Office, Engineering or Planning Groups, plant maintenance shops, supply agencies, the safety organization, Security, etc. It is emphasized that the immediate supervisor is not included as a part of Management for the purpose of employing this approach. Contrary to common safety philosophy, the "key to accident prevention" will be considered the higher levels of management, not the immediate supervisors.

"FAILURE" is defined as any action or omission which can cause or contribute to an accident, to the existence of a hazard, or to the commission of an unsafe act. It can be called a failure, an error, an oversight, or an inefficiency.

APPLICATION OF SYSTEM

The system is applied by investigating each accident or incident and each hazardous situation that is noted, with general management introspect.

In each case, we must endeavor to get an answer to the question: "WHERE DID MANAGEMENT FAIL?" Determination is made as to whether any element of management took some action which precipitated the unsafe situation, or failed to take some action which could have forestalled it. The management failure may be obvious in one case, or a remote contributing factor in another.

The functioning of the system will be explained and demonstrated by its application to actual cases of hazardous situations that have been noted on safety inspections, or have come to attention due to minor first aid injuries being reported. While examples are based on factual occurrences, places and events have been altered to avoid identification and possible embarrassment of individuals or organizations.

The system is used continuously by safety personnel during their inspectional or investigative procedures. Examples follow.

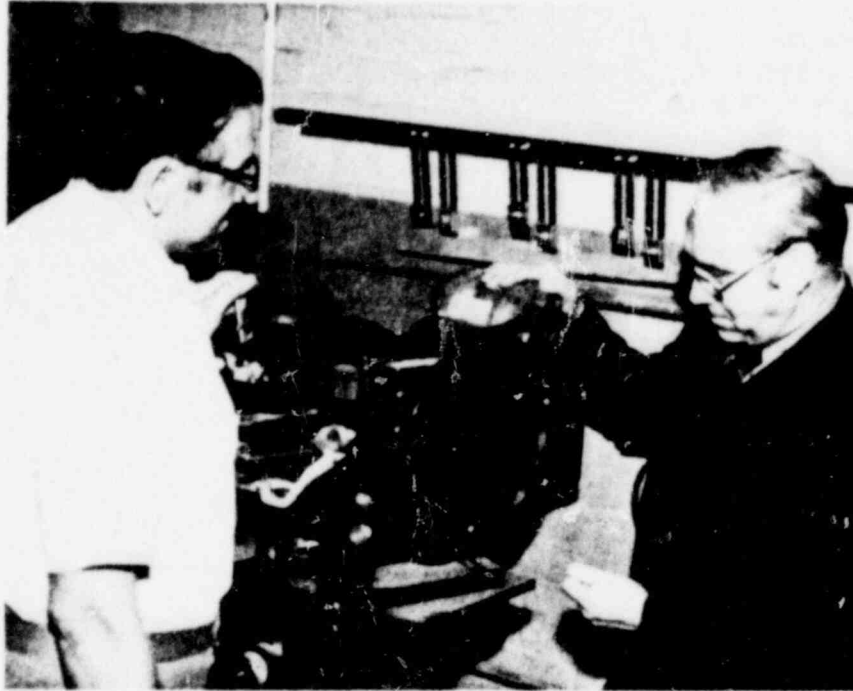


Illustration No. 1

First Situation. Referring to Illustration No. 1, inspectors have noted a machine in use without a belt guard.

This hazard could simply be written up or noted as a violation with advice to have a guard fabricated for the machine, the normal approach in most such cases. But upon inquiry into possible management involvement, the supervisor pointed out that this was a new machine that had been delivered in this condition and he felt that it couldn't be a serious hazard or the manufacturer would have remedied it. Upon further investigation, it was found that safety requirements had not been specified in the purchasing order for the machine. To tie this oversight to some element of management, it was found that the Safety Department had a degree of responsibility for this hazard since it was a policy that Safety would review purchase orders to insure that necessary safety features were always specified. Here, a safety inspection revealed a case of lack of coordination between Safety and Procurement, a management failure.

The next step was to look for possible monetary or productive losses, as well as hazards, due to the effect of this management oversight throughout the plant. A substantial loss was quite obvious. This oversight, the Procurement and Safety Departments not properly coordinating, was putting an unnecessary burden on a number of supervisors, endangering their personnel and adding to their work. For example, it was found that a number of hazardous machines or unsafe equipment had been purchased, such as portable power tools without ground wire systems, because of this error.

Correction of the error was speedily and easily accomplished. Improved coordination between Safety and Procurement forestalled a number of hazards, provided supervisors with safer equipment, tools and materials; and thereby gave supervisors more time for and less diversion from their productive work.

It is significant to note that such plant-wide benefits would not have developed if the violation of the unguarded belt had simply been corrected.



Illustration No. 2

Second situation. Referring to Illustration No. 2, an inspector has noted a hammer which has a cracked handle that has been taped on. Ordinarily, a carpenter or mechanic would be mildly admonished for using or having in his possession a hammer with a cracked handle. This would be considered a minor hazard, perhaps so insignificant that some inspectors would ignore it.

However, this minor hazard is a clue to other hazards, and also to a very costly management failure.

With an investigation into possible management involvement, it was found that the Supply Department stock limits on hammers and on replacement handles had been set too low. This investigation brought to light the fact that the stock was depleted most of the time. Therefore, the users had to make repairs, or improvise

At this point it still may seem like a very minor oversight, until we look at the probable loss. It was found that the stock of hammers and handles had been depleted most of the time, over a period of several years.

Each day an average of four shop employees have had a need for replacement handles, they have taken the time to go to the Supply Store to get them, and have found there were none in stock. They would return to their shops, "gripe and groan" and discuss the inefficient system with others, and eventually decide to do the best they could with what they had.

Some would continue to use their defective hammers, some would tape them up, and others would improvise or substitute for a hammer by using a heavy wrench or some other tool, and thereby damaging the other tool and the work. In every case, they undoubtedly did a less efficient job than they would have done with proper tools.

A conservative estimate of the amount of time lost each time an employee sought a new hammer or hammer handle, is one half hour.

If this situation occurred four times every day for years, and that is a good presumption, we must certainly have incurred many thousands of dollars in costs due to the management oversight that caused this small hazard.

Investigation of the inadequate stock limits on hammer handles brought to attention inadequate limits on a number of other items also, all causing similar losses, and all due to a little unnoticed inefficiency by one stock clerk.

Improved supervision in the stockroom eliminated the inefficiency and therefore a number of continually recurring hazards, as well as many losses.

It is emphasized that these benefits were obtained because the minor violation of the taped up hammer handle was not simply noted and corrected, but the case was investigated to determine higher level management involvement.



Illustration No. 3

For the third situation, see Illustration No. 3, we have an improvised scaffold constructed of stepladders, planks and beams, and fastened with ropes. There is no question that it is unsafe, with potential for a serious injury or fatality. Rather than simply correcting this situation, it was investigated to determine if there were some underlying management errors. Results of the investigation were quite surprising.

It was found that - a properly manufactured scaffold was not available for the crew using this scaffold because someone in a higher management position was endeavoring to operate at the lowest possible costs, avoiding purchases of new equipment.

It was also found that this scaffold had been assembled and disassembled, in order to be relocated or when a job was finished or started, at least once per week throughout the previous year, and probably for a longer time.

Each time the scaffold was removed or erected it required three to four men working about three hours. While it was in use, it required frequent inspection and tightening up; and the men working on it were never at ease.

These factors are to be compared to the situation if a new scaffold were obtained: two men could erect a proper scaffold this size, in one half hour. By some simple arithmetic it was shown that an investment of \$1,000 for a new scaffold could save \$10,000 to \$15,000 annually, and incidentally greatly improve the safety status and efficiency of several men.

This amount of saving would result from improving this one case of scaffolding. But this case brought to the notice of the Department's Top Management the policy in effect of a number of its middle managers being "penny wise and pound foolish" - saving a few cents but incurring tremendous hidden costs. Changing this policy throughout the department brought about a tremendous saving, and incidentally, eliminated many hazards.

Again, it must be noted that the benefits occurred because the situation was investigated specifically for management involvement rather than with the objective of simply eliminating the obvious hazards.

For the next situation, three men are shown in Illustration No. 4 lifting an overloaded cart up a curb.



Illustration No. 4

The employee delivering material with the cart had asked two other men to aid him at this point.

This case came to the attention of the Safety Department when the employee who normally uses the cart reported to the Dispensary for first aid treatment because he had incurred a slight back strain.

The routine safety solution to this unsafe situation would be to advise the supervisor to give instructions to reduce the load, or not to try to go up the curb - stay in the road. The case could have easily been disposed of as one of those "unpredictable or unavoidable minor injuries".

But the in-depth investigation revealed almost a constant use of this hand cart over rough terrain. There was no doubt that the cart was unsuitable for its type of use; the wheels were too small for rough terrain.

However, the department managers did not desire to invest in a more suitable vehicle - one with larger wheels and removable side racks, the cost of which would have been about \$200.00. "Too much money", said someone up the line. "You've got a cart. Use it." This operation was evidently considered minor and not important enough to rate new equipment.

However, a survey showed that the one man assigned to the use of this cart had to find someone to help him as shown in the illustration, an average of three times per day. Figuring the time lost by the cart man plus one or two helpers three times per day, the cost or loss is easily computed to 2 to 3 thousands of dollars annually - to avoid spending \$200.00, another clear example of misdirected effort at economizing.

The result of this investigation was that the very small investment for a new cart greatly reduced the possibility of further back strains, greatly improved an employee's morale, undoubtedly expedited deliveries of material, and created considerable monetary savings.

By publicizing this case, other supervisors and managers were persuaded to observe their operations and facilities more closely with a view to making similar improvements. There are many improved labor saving devices and equipment on the market that will reduce hazards and at the same time greatly increase production. But, sometimes we shy away from such investments.

This case is not remote or uncommon. Similar situations can be found in practically all organizations.

For the next example we will consider the ramifications of an in-depth investigation of a poor housekeeping situation.

This condition was noticed during a routine safety inspection.
See illustration No. 5.

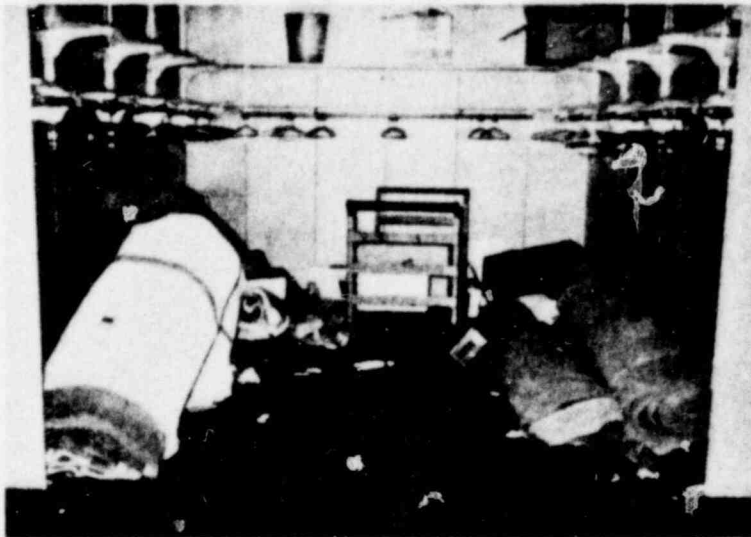


Illustration No. 5

Any safety inspector would get this fire hazard eliminated immediately. That would be quite easy to accomplish, because the hazard is indisputable. However, since it occurred this time, it is possible and quite likely that a similar situation would reoccur perhaps in the same place, or elsewhere, unless the underlying cause, or the management failure that allowed it to develop were identified and eliminated.

An in-depth investigation to seek management involvement revealed that the old rugs were being carried on stock records for no good reason that anyone could state, except that it was the policy of the accountable office to hold such used material for a number of months, even years, before disposing of it.

This case of the rugs turned out to be something like the "tip of an iceberg" which forecasted vast waste of valuable productive space due to unnecessary storage of replaced equipment, machines and material which had no real expectation of use. Such storage created hazards as well as handicaps and delays to productive operations.

Changing the policy and disposing of surplus material with less delay brought about many benefits such as : improvements in safety conditions by eliminating fire hazards, congestions and poor housekeeping; and making more space available to properly plan and layout productive operations.

The key point for emphasis is that an obvious hazard as illustrated here should not simply be removed. That, as a medical doctor would say, would be "treating the symptom, not the cause." We must determine the management oversight that allowed the hazard to develop, and endeavor to establish management policy that will prevent such hazards and productive losses and waste from forming.

The next example pertains to repair work on a large generator in a machine shop. Due to limited working space, the mechanic doing the repair work had to work in an awkward position. As he exerted pressure on a wrench, he bumped his head on a projection on the side of the generator and received a laceration.

The routine approach and corrective action would be cautioning of the employee, with advice to move materials to give himself more working area.

But the "Management involvement investigation" revealed that the generator was old and decrepit, and should have been overhauled or replaced some years ago. Such action had been avoided or postponed by department management for reasons unknown.

It was found that the generator had been repaired at least once per week for at least the past year, with repair time averaging three hours each time.

The generator was used to supply power for the operation of 5 other machines. When the generator was down, two or three machinists or operators had to wait, or find other odd jobs while the generator was being repaired. Thus there was a cost or loss of at least three employees, the repairman and two or three others, for three hours, once per week.

Arithmetically, the loss is computed to be 450 man hours or \$9,000.00 per year due to management's failure to replace the machine when it became uneconomical to continue in use.

In addition, a further investigation revealed that the generator could be eliminated by providing an alternate source of power from two other nearby generators, at a cost of approximately \$200.00 for electrical wiring and materials.

Let us summarize the benefits that resulted from the investigation of management involvement of this first aid injury. Most important, a source of potential injuries was eliminated, the repetitive repair work in a congested area. Secondly, this accident preventive action brought about a monetary saving of approximately \$9,000 per year, for a cost of \$200.00.

It is again emphasized that these benefits would not have resulted from a cursory investigation or a "brush-off" as is often given to first aid injuries.

Materials handling operations are prevalent sources of accidents, injuries, and inefficiencies.



Illustration No. 6



Illustration No. 7

In the next example, (see Illustrations No. 6 and No. 7), two men are transporting a barrel of material from a mechanical material lift which brought it up to this level from the floor below. The barrel weighs 80 pounds. The two employees now have to carry the barrel by hand up the stairs to the next floor where it will be used. This materials handling operation is performed an average of five times per day.

This operation was noticed when one of the employees reported a slightly strained back. A few inquiries turned up the information that a mechanical lift to take the material up to the next floor had been suggested and considered in the past. It had not been installed because the estimated cost of \$2000.00 was considered excessive.

Considering the situation from the safety viewpoint, it is a very hazardous operation. A slip could cause a man to fall down the stairs with material falling on top of him. A mechanical lift would be an excellent safety improvement. The question is asked:

Did Management Fail? If so, where?

It was found that each trip carrying the material by hand as illustrated required ten minutes, while a direct mechanical lift would do it in two minutes. Thus, the mechanical lift would save 8 minutes per trip. Eliminating five such trips a day for two men would save 80 minutes per day, or 400 man hours per year or \$8,000.00 per year.

At this rate, the mechanical lift would be paid for in two months, and from then on - there would be a good profit on the investment.

It must be emphasized at this point that safety investigations should not be motivated principally for profit and efficiency, except when such factors can be tied into elimination of hazardous situations in order to get management support. The above case illustrates how a management type investigation of a first aid injury provided ample justification for valuable safety engineering action that eliminated a very hazardous operation, action that would not have otherwise been taken.

We could go on with many more examples. Similar management failures can be noticed every day in every organization, if we seek management involvement in the causes of accidents and hazards. Management errors, or oversights, will be revealed in just about every first aid injury and every hazardous situation noted during an inspection.

Each individual case must be brought to the attention of the Management level or the agency concerned or involved in the situation as soon as possible. The case should be taken directly to the person who is in the position to take the necessary corrective action. Taking a case to higher levels than necessary should usually or normally be avoided to avoid embarrassment of the managers who were involved in failures. This procedure of individual action is the first half of the system.

GENERAL PREVENTIVE ACTION

Can general preventive action be instituted collectively, to eliminate the repetitions of management failures that are noted? This can be accomplished very effectively.

We are enabled to see the BIG PICTURE, that is, where various types of errors are occurring repeatedly, by placing all the possible errors, oversights, or inefficiencies into general categories and "charting" them as they occur.

SUMMARY CHART OF MANAGEMENT FAILURES THAT CAUSE ACCIDENTS

		1974				
	INADEQUATE	JULY	AUG	SEP	OCT	NOV
1.	PLANNING, LAYOUT, DESIGN	///	//	/	//	
2.	SAFETY RULES, MEASURES, EQUIPMENT	/	///	/	//	/
3.	ENFORCEMENT OF SAFETY RULES, MEASURES	//	/		/	
4.	OPERATIONAL PROCEDURES	++++ ////	++++ ////	++++ ////	++++ ////	++++ ////
5.	ENFORCEMENT OF PROPER PROCEDURES	++++ //	///	////	++++ //	//
6.	SUPERVISORY PROFICIENCY		/		/	
7.	SUPERVISORY SAFETY INDOCTRINATION	///	//	////	/	//
8.	EMPLOYEE TRAINING	++++	///	//	////	///
9.	EMPLOYEE SAFETY CONSCIOUSNESS	++++ /	///	++++ //	///	//
10.	EMPLOYEE SELECTION, PLACEMENT	/	//		/	/
11.	EQUIPMENT, MATERIALS, TOOLS	/		/		/
12.	MAINTENANCE, REPAIR OF EQUIPMENT	++++ ////	++++ ///	++++ //	++++ ////	++++ ///

Illustration No. 8

The Management Failures Summary Chart is shown in Illustration No. 8. The left column is made up of a list of general management failures, one or more of which can in some way be responsible for practically every accident, as well as for the existence of every hazard. Each "tickmark" indicates an inadequacy or failure at or by some level of management above the immediate supervisor.

Any concentration of minor management errors obviously means that there is a major problem. In the case illustrated, we see two major problem areas; item 4, Inadequate Operational Procedures; and item 12, Inadequate Maintenance of Equipment. The tickmarks represent those errors that have been found and probably corrected. But where similar errors continue to occur, as shown by concentrations, it can be assumed that many more errors or inefficiencies remain to continue to cause accidents and other losses. Thus this chart can be used as an excellent guide as to what areas of preventive action require intensification of effort.

This summary chart can also be compiled for individual departments or subdivisions of a plant, so that the predominant problems of each department can be determined.

Unfortunately, some members of Managements may be primarily interested in productive efficiency, but only mildly interested in safety. With this approach, such managers can still be motivated to eliminate hazards by showing the losses caused by the deficiencies. If they agree to undertake to improve the unsatisfactory situations in order to prevent productive losses, rather than to prevent accidents, safety will still profit even if as a by-product or fringe benefit.

METHOD TO DERIVE OR DETERMINE MANAGEMENT FAILURES

This system differs from conventional accident prevention procedures in that each case of an accident or a hazardous situation noted is "tracked back" to management errors or oversights, starting with the primary unsafe acts or conditions. A logical procedure to do this can be easily followed.

The immediate reasons for the commission of unsafe acts and the existence of unsafe conditions are usually quickly apparent or easily discovered. However, a fair degree of expertise and judgement are required to track these causes back to the management failures that created or contributed to their existence.

Below is given a list of 15 basic accident causes, one or more of which will be responsible, contributory to, or involved in practically all hazardous situations.

1. Poor housekeeping
2. Improper use of tools, equipment, facilities
3. Unsafe or defective equipment, facilities
4. Lack of proper procedures
5. Improvising unsafe procedures
6. Failure to follow prescribed procedures
7. Job not understood
8. Lack of awareness of hazards involved
9. Lack of proper tools, equipment, facilities
10. Lack of guards, safety devices
11. Lack of protective equipment, clothing
12. Exceeding prescribed limits, load, speed, strength, etc.
13. Inattention; neglect of obvious safe practice
14. Fatigue, reduced alertness, hypnosis
15. Misconduct; poor attitude

Consider the first cause listed: poor housekeeping. The objective is to accurately derive general management failures that led to poor housekeeping situations. Examples of poor housekeeping accidents are:

- a. An employee trips and falls over equipment left in an aisle.
- b. Material poorly piled on a high shelf falls off.

The most probable reasons or underlying causes for these accidents are:

- a. The hazards were not recognized. Employees and/or the supervisor did not consider that the equipment in the aisle or piled on the shelf constituted a hazard, and so did not remove it. Or,
- b. Facilities were inadequate. Sufficient space for proper storage was simply not available.

For these reasons or underlying causes, we now seek to determine the most probable management failures.

- a. If the cause was the hazard not being recognized, obviously the management failure was inadequate supervisory and employee training, and inadequate safety indoctrination.
- b. If the cause was inadequate facilities, the management failure would most likely be inadequate planning at some higher level of the management. Thus we have translated the causes into general categories of management failures.

In the same manner as above, any and all basic causes can be tracked back to one or more of the general management failures listed on the Summary Chart (Illustration No. 8). For general guidance in developing management failures for all the listed basic causes, the following tables give a system for derivation of the underlying management failures.

ACCIDENT CAUSES TRACED BACK TO MANAGEMENT RESPONSIBILITIES

<u>IMMEDIATE CAUSE</u>	<u>POSSIBLE UNDERLYING CAUSES</u>	<u>POSSIBLE MANAGEMENT FAILURES</u>
<p>1. Poor housekeeping Examples: *An employee trips and falls over equipment left in an aisle. *Material poorly piled on a high shelf-falls off.</p>	<p>Hazards not recognized</p> <p>Facilities inadequate</p>	<p><u>INADEQUATE:</u></p> <p>Supervisory training Supervisory safety indoctrination</p> <p>Planning, layout</p>
<p>2. Improper use of tools, equipment, facilities Examples: *Using the side of a grinding wheel instead of the face, and the wheel breaks. *Someone using forklift truck to elevate people-man falls off. *Someone using compressed air to clean dust off his clothes - eye injury.</p>	<p>Lack of skill, knowledge Lack of proper procedures Lack of motivation</p>	<p>Employee training</p> <p>Established operational procedures Enforcement of proper procedures Supervisory safety indoctrination Employee training Employee safety</p>
<p>3. Unsafe or defective equipment, facilities Examples: * Portable electric drill without ground wire. *Axe or hammer with loose head. * Car with defective brakes, steering.</p>	<p>Not recognized as unsafe</p> <p>Poor design or selection</p> <p>Poor maintenance</p>	<p>Supervisory safety indoctrination Employee training Employee safety consciousness</p> <p>Planning, layout, design Supervisory safety indoctrination Equipment, material, tools</p> <p>Maintenance, repair system</p>

<u>IMMEDIATE CAUSE</u>	<u>POSSIBLE UNDERLYING CAUSES</u>	<u>POSSIBLE MANAGEMENT FAILURES</u>
<p>4. Lack of proper procedures</p> <p>Examples:</p> <ul style="list-style-type: none"> *No requirement to check for gas fumes before starting engine-explosion *No definite instructions requiring power to be locked out before maintenance is done. 	<p>Omissions</p> <p>Errors by designer</p> <p>Errors by supervisor</p>	<p><u>INADEQUATE:</u></p> <p>Operational procedures</p> <p>Planning, layout, design</p> <p>Supervisory proficiency</p>
<p>5. Improvising unsafe procedures</p> <p>Example:</p> <ul style="list-style-type: none"> * "Rube Goldberg" haphazard temporary expedients, without proper planning. 	<p>Inadequate training</p> <p>Inadequate supervision</p>	<p>Established operational procedures</p> <p>Enforcement of proper procedures</p> <p>Supervisory safety indoctrination</p> <p>Employee training</p> <p>Employee safety consciousness</p> <p>Supervisory safety indoctrination</p> <p>Employee selection, placement</p>
<p>6. Failure to follow prescribed procedures</p> <p>Examples:</p> <ul style="list-style-type: none"> *Shortcuts bypassing safety precautions. *Operation will only be done once; take a chance. 	<p>Need not emphasized</p> <p>Procedures unclear</p>	<p>Enforcement of proper procedures</p> <p>Supervisory safety indoctrination</p> <p>Operational procedures</p>
<p>7. Job not understood</p> <p>Example:</p> <ul style="list-style-type: none"> *Employee uses wrong method, doesn't follow instructions. 	<p>Instructions complex</p> <p>Inadequate comprehension</p>	<p>Operational procedures</p> <p>Planning, layout, design</p> <p>Employee selection, placement</p>

IMMEDIATE CAUSE	POSSIBLE UNDERLYING CAUSES	POSSIBLE MANAGEMENT FAILURES
<p>8. Lack of awareness of hazards involved</p> <p>Examples:</p> <ul style="list-style-type: none"> *Not realizing rotating shaft was dangerous. *Not realizing fumes were hazardous. *Not realizing that hydrogen from battery charging operation could explode 	<p>Inadequate instructions</p> <p>Inadequate warnings</p>	<p><u>INADEQUATE:</u></p> <p>Supervisory safety indoctrination</p> <p>Employee training</p> <p>Employee safety consciousness</p> <p>Planning, layout, design</p> <p>Safety rules, measures, equipment</p> <p>Operational procedures</p>
<p>9. Lack of proper tools, equipment, facilities</p> <p>Examples:</p> <ul style="list-style-type: none"> *Cart too small for hauling large items. *Auto-maintenance done without proper wrenches-cut knuckles 	<p>Need not recognized</p> <p>Inadequate supply</p> <p>Deliberate</p>	<p>Planning, layout, design</p> <p>Supervisory safety indoctrination</p> <p>Equipment, materials, tools</p> <p>Morale, discipline</p>
<p>10. Lack of guards, safety devices</p> <p>Examples:</p> <ul style="list-style-type: none"> *Machine has exposed belt and gear-severe cut *No warning horn on vehicle - pedestrian hit *No guard rail on a scaffold 10 ft. high 	<p>Need not recognized</p> <p>Inadequate availability</p> <p>Deliberate</p>	<p>Planning, layout, design</p> <p>Safety rules, measures, equipment</p> <p>Supervisory safety indoctrination</p> <p>Employee safety consciousness</p> <p>Equipment, materials, tools</p> <p>Operational procedures</p> <p>Morale, discipline, laziness</p>

<u>IMMEDIATE CAUSE</u>	<u>POSSIBLE UNDERLYING CAUSES</u>	<u>POSSIBLE MANAGEMENT FAILURES</u>
<p>11. Lack of protective equipment, clothing</p> <p>Examples:</p> <ul style="list-style-type: none"> *Eye protection not used in shop. *Dermatitis because employee didn't use protective lotion or gloves. *Not using respirator when spraying paint. *Long haired man not using hairnet *Materials handler not wearing safety shoes. 	<p>Needs not recognized</p> <p>Inadequate availability</p> <p>Discipline</p>	<p><u>INADEQUATE</u></p> <p>Planning, layout, design</p> <p>Safety rules, measures, equipment</p> <p>Supervisory safety indoctrination</p> <p>Employee safety consciousness</p> <p>Equipment, materials, tools</p> <p>Operational procedures</p> <p>Morale, discipline</p>
<p>12. Exceeding prescribed limits, load, speed, strength, etc.</p> <p>Examples:</p> <ul style="list-style-type: none"> *Driving vehicle too fast - accident *Overtaxing a crane or hoist or elevator-lifting beyond rated capacity load drops 	<p>Warnings inadequate</p> <p>Instructions inadequate</p> <p>Lack of comprehension</p> <p>Deliberate</p>	<p>Safety rules</p> <p>Proper procedures</p> <p>Employee training</p> <p>Employee training</p> <p>Employee selection, placement</p> <p>Enforcement of safety rules</p> <p>Employee safety consciousness</p>
<p>13. Inattention; neglect of obvious safe practice</p> <p>Examples:</p> <ul style="list-style-type: none"> *Welder picking up hot metal in bare hands. *Driving much too fast. *Walking under a suspended load. *Not cleaning up broken glass on floor. 	<p>Lack of motivation</p> <p>Inadequate comprehension</p>	<p>Enforcement of safety rules, measures</p> <p>Enforcement of proper procedures</p> <p>Employee training</p> <p>Employee safety consciousness</p> <p>Employee selection, placement</p>

<u>IMMEDIATE CAUSE</u>	<u>POSSIBLE UNDERLYING CAUSES</u>	<u>POSSIBLE MANAGEMENT FAILURES</u>
14. Fatigue, reduced alertness, hypnosis Examples: *Putting excessive hours on hazardous machine operations. *Repetitive inspection of small parts	Excessive physical or mental requirements	<u>INADEQUATE:</u> Planning, layout, design Employee selection, placement Operational procedures
15. Misconduct; deliberate failure to use protective clothing. *Failure to install safety guards. *Desire to speed (for thrills)	Low morale Poor attitude Malassignment	Supervisory training Employee selection, placement Planning, layout, design Employee selection, placement Employee training

SUMMARY

In summary, the concept for this approach in accident prevention is to not simply detect and remove hazards. We must endeavor to identify and remove the higher-level management failures which permitted the hazards to exist, and probably caused numerous other productive losses.

This system departs from the common principle that "the immediate supervisor is the key man in accident prevention." We contend that the immediate supervisor can do no more than is possible with the resources and authority that has been given to him. Through this approach, the key and the basic responsibility for accident prevention are passed up to higher levels of management where there are power, influence and capability to direct that operations be conducted safely. The buck is not passed down to the overburdened immediate supervisor who is often frustrated in his efforts to get approvals for his recommendations.

This system can easily be implemented by any safety personnel simply by starting to investigate all first aid injuries and hazardous situations with a manager's viewpoint. Investigators must look at the Big Picture in every situation, and concentrate on finding the underlying management errors or oversights that are responsible for many other hazards as well as other types of losses. It is done simply by asking the question, "Where did Management Fail?" whenever an accident occurs or a serious hazardous situation is noticed.

Experience shows that management errors can be found in practically all hazardous situations that are discovered, and substantial monetary savings in manpower and/or materials can be achieved in at least half of these cases by correcting the management errors.

The next step is to consolidate and summarize the minor problems to find major areas needing attention.

Savings as demonstrated in this report can be produced at any organization by the use of this concept and approach, savings that would not otherwise be realized. Further, the approach will induce and promote better working relationships and understandings between safety personnel and line management.