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EXHIBIT D

"THE TEAM APPROACH TO SAFETY AND HEALTH"

1976 Safety and Health Seminar

PACCAR Inc

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(Excerpt from C. M. Pigott's talk at February, 1976 Senior Management Meeting)

"This increase in cost was attributable to higher benefit schedules, the sharp increase in medical care costs, and new vocational rehabilitation standards. It is anticipated in 1976 that most states and provinces will further increase benefit schedules, reduce waiting periods, and expand rehabilitation programs. In the State of Washington, our workers' compensation rates have already been increased approximately 30%.

Other changes are expected this year. Government occupational safety and health agencies now have more manpower for investigative purposes. More regulations of machine guarding is expected. Hearing conservation and control of chemical hazards not heretofore recognized will be required. The addition of larger numbers of new employees will require training in safe work practices. Employment of handicapped workers will receive greater attention."

4. Response:

   A. Training

      (1) Must do more to train employees how to do jobs safely (job safety analysis for example).

      (2) Supervisory training - new program coming which will get this effort started.

      (3) This seminar and large number of participants evidences managers' recognition of training needs.

   B. New Programs - Increased Services:

      (1) Hearing conservation

      (2) Return to work - rehabilitation

      (3) Safety newsletters

      (4) Survey program extended to warehouse and branch facilities.

5. Purpose of Seminar:

   A. Develop coordination and cooperation between plants and Corporate staff so we can work better together.

   B. Review and discuss common problems:

      (Program designed for benefit and participation of safety and plant engineering professionals - believe that the attendees will benefit from hearing discussions and talking with their counterparts in the Company).

THE IMPACT OF SAFETY ON EMPLOYEE RELATIONS

D. M. Irwin
Vice President-
Employee Relations
PACCAR Inc

1. PACCAR's health and safety policy:

   A. To provide a safe and healthful working environment for employees through recognition and elimination or control of hazards.

   B. To provide leadership and education to employees in performing their work in a safe and healthful manner.

   C. To cooperate with appropriate agencies for compliance with current occupational safety and health regulations.

   (Excerpt from C. M. Pigott's talk at the February, 1976 Senior Management Meeting):

   "All levels of supervision need to be aware of our safety and health objectives and to communicate them to employees. The Company intends to provide employees a safe and healthful working environment. This is accomplished by eliminating recognized safety and health hazards, providing leadership and training in safe work practices, and by complying with occupational safety and health standards. If employees ignore standards that have been established for their safety, then disciplinary action may be necessary."

2. Top management's expectations:

   A. Improved safety results

   B. Challenging objectives

   C. Comparable results to industry leaders

   D. Compliance with PACCAR's health and safety policy

3. Why:

   A. Conservation of human resources

   B. Responsiveness to societal changes (employees want and expect safe and healthful place to work).

   C. To improve and maintain employee and governmental relations (demonstrate concern for workers and good corporate citizenship and image).

   D. Greatly increasing costs and more enforcement of standards, particularly industrial hygiene and machine guarding standards.

AN OVERVIEW OF CATERPILLAR TRACTOR CO.'s SAFETY PROGRAM

R.R. "Poley" Hoffman
Corporate Safety Director
Caterpillar Tractor Co.

Facts on Caterpillar

A multinational company
Twenty-six manufacturing plants
85,000 employees
Annual Sales: Approximately $5,000,000,000
Products: earthmoving and construction machinery
diesel and natural gas engines
lift trucks
Manufacturing processes: vary from simple machine operations to hazardous material processes and highly sophisticated operations such as a foundry where the latest techniques for melting, core making and finishing are employed.

Exposures: Handling of piece parts that weigh from a few ounces to over 4,000 pounds (potential for serious injury is always present).

Safety
Philosophy: "Safety Is Always Our Number One Business."

Comments:

If safety really is number one, what about designing and selling equipment? What about schedules? Where do deliveries fit? Isn't "Safety Is Always Our Number One Business" an overstatement? We don't think so! The slogan does not mean that sales, schedules or deliveries come second or third. The "Business" it refers to is our every day work activity. Whether we supervise others, operate a lathe, package parts, drive a company car or clean the floor, safety is every individual's number one business -- the slogan is purposely provocative to keep it sharp in everyone's mind.

Accident prevention is a job that must be performed as well as we know. It is a primary responsibility of management. The creation of a safe and healthful working environment and a safety-minded, competent organization is our moral, legal and economic duty.

The promotion of safety is one of the greatest contributions a company can make.

We practice management by objectives. Each year, we set new objectives for each phase of our business and determine how we are to meet them. Safety and health goals are an integral part of this process, and we expect those goals to be met.

We practice a multiple approach. Few accidents have a single cause. Therefore, there is no single solution. People achieve satisfactory results only through a multiplicity of actions.

We follow a nine part program.

1. A successful safety and health program depends on the support and leadership of management. Top management must be willing to accept the responsibility for the safety and health of employees as an integral part of their jobs. The basic principles of management (the functions of planning, organizing, directing and controlling) must be applied to safety. A manager must set the facility's safety policy, stimulate safety awareness in others and show his own interest, if others are to cooperate in making conditions safe and healthful. Of course, the key link in the chain is the 1st line supervisor. If he is to fulfill his responsibilities, he must be one of the most highly trained in safety and health.

2. We set standards for safety. We believe standards contribute to the reduction of accidents and injuries by providing uniformity of instructions, rules and procedure implementation at all units.

   For example, one of our procedures provides and requires completion of a safety and health checklist on all new machine tools and process purchases. Also, all new machine tool purchases must meet our "Noise Limit Specification for Machine Tools or Equipment."

   When Quality Assurance makes a check on a machine or process capability prior to its delivery, they also check to see if its noise level meets this standard.

   This Noise Abatement Procedure has been in force for over 10 years:

   A. The entire plant is divided into identifiable areas, and a walk through survey is made -- using the hand-held sound level survey meter. All areas where the sound level exceeds 90dBA is noted in "red". This study is done by a Safety Inspector, and the area Safety Committeeman is advised of the results.

   B. A meeting is held with representatives of the manufacturing, planning, plant engineering, industrial hygiene, and safety departments. Each area or machine where a potential violation exists is discussed. Suggestions are made and departments commit themselves to certain actions.

   C. Upon completion of the actions agreed, an in-depth sound study is made -- using dosimeters to evaluate noise exposure to individual employees. If a violation is noted, plant engineering, planning, industrial hygiene and safety jointly study the problem to determine steps that can be taken to reduce the noise level.

   D. A discussion-type meeting is held with the Sound Committee (the industrial hygienist, a staff engineer from plant engineering, a staff engineer from planning and the safety manager) outlining the situation to the top plant management.

E. The Union Safety Committee is notified about what has been done to reduce the noise and what we plan to do. Also, they are informed about exact locations where hearing protection will be mandatory.

F. Employees required to wear hearing protection attend a meeting. At that time, they view a film and video tape which explains the need for ear protection; they are offered several different types of protection, and a medical technician helps them select the one they think they can wear. If they select the custom fit plug, they are sent to First Aid for fitting.

G. Wearing of hearing protection doesn't stop actions previously started. In many cases, we find methods that will reduce noise exposure to the point that hearing protection will no longer be required.

3. We educate all employees in the proper way to do a job.

We have training programs for new employees, new supervisors, experienced employees on new jobs and continuing conferences for management people. But, it is not enough to merely show a man where he is to work. He must understand what it is he is to do and, furthermore, he must understand how to do it safely.

We accept the premise that about 85% of all accidents are caused by the unsafe acts of people. Many accidents occur after a given safety rule is repeatedly violated. These two facts helped convince us that supervisory awareness is the key to an effective safety program.

But, before we can hold supervisors accountable for safety results, we must train them properly to do the job. The supervisor tells employees what to do, how to do it, and supervises them on the job. He should know how every job is done properly, efficiently and safely. Recognizing hazards and eliminating or controlling them requires knowledge -- knowledge that he can get through training. Also, each new employee should be thoroughly instructed in general safety policy, rules and procedures before being referred to his supervisor for on-the-job instruction. Safety rules and instructions as to safe job procedures should be provided in written form covering each job in the facility. Older employees transferred to new jobs are given adequate instruction. We don't assume a person is safety conscious. We have a follow-up method of assuring the person has been properly instructed.

4. Each manager is held accountable by his performance (production, scrap, tool breakage, morale and safety are all equal indicators of his or her success).

The plant manager of each facility is held responsible for accomplishment of the Safety Goals he and his people have set. THE TOP MAN HAS TO BE IN CHARGE OF ACCIDENT PREVENTION IF IT IS TO SUCCEED!

He must let each supervisor know that a safe work environment and the prevention of accidents is an activity that is essential for his or her success on the job. Each Management Performance Review (at all levels) includes specific reference to safety results. All management understands that part of their performance evaluation is to be based on these results. Reviews are randomly sampled and checked for safety evaluation.

5. Safety communications are used to develop a good safety attitude and foster greater safety awareness. Posters. slogans, contests, booklets and general letters all have a place in our total safety program. However, face to face communications on specific problems are probably more productive.

   Communication is a two-way process. Suggestions from employees and union representatives can provide added emphasis to make a safety program a success.

6. We have strict enforcement of safety rules. This is a must if unsafe work habits are to be avoided. Supervisors are held directly accountable for the actions of their people. Laxity in this regard is not treated any differently than poor performance (high scrap, etc.). We make the commitment to spend more time and money to educate our employees, and we protect that investment through an effective enforcement system.

7. Special attention is given to off-the-job safety.

   Our program consists of vacation and holiday safety promotions. First Aid Kits, Fire Extinguishers and Home Smoke Detectors sold at cost. Stories in plant papers, posters and handout literature stress off-the-job safety. All employees receive the National Safety Council, "Family Safety", magazine. Defensive drivers course has been made available to employees and their families on their own time.

8. We design and manufacture products that are safe to use and take the initiative to incorporate safety into every aspect of our products. This is often costly -- a fact that the public must realize. But, it must be done. As you know, this has become an increasing concern in the last few years.

9. We involve our employees. Who has a greater right to be heard than employees? Who lives daily with the problems? Who can make more meaningful contributions?

   Two of our more effective employee involvement programs have been the Safety Observers and Unsafe Practice Observation.

   The Safety Oberver Program works as follows:

   A. Each supervisor appoints up to five safety observers from his work group.

   B. One observer is appointed to serve for five months, one to serve four months and one to serve three months, etc. Replacements serve for five-month periods. By rotating appointments, it is hoped that eventually most, if not all, hourly employees will have served as a safety observer for his work group.

   C. Each supervisor must arrange to meet with his safety observers weekly.

   D. Meetings are informal and, for the most part, deal with matters directly connected with the immediate work group, and are held in the supervisor's work area.

E. Meetings are scheduled regularly -- preferrably on a group basis (supervisor and his observers). In areas where a group meeting is not feasible, they are scheduled on an individual basis. Ordinarily a meeting does not exceed 15 minutes and may even require less.

F. Suggested topics can be covered in five or six months. Supervisors can adapt these presentations to meet the needs of his group or develop others that may, in his opinion, be more meaningful.

G. Feed-back is encouraged. Suggestions are generally reduced to practical limits through group discussion. The emphasis is on identifying the problem -- not necessarily upon developing a particular solution.

H. The identified problems that need to be forwarded to another department for correction are recorded and sent to the appropriate general foreman and superintendent. Following review by the superintendent, the report is routed to the appropriate department for correction.

I. Safety observers are encouraged to promote safe practices daily at the "grass roots" level, also, to jointly set goals with the supervisor for safety improvement. As a means of identification, observors may be issued a button which they wear during their term.

The Unsafe Practice Observation Program works as follows:

A. Each month, shop supervisors must submit a form. It contains space for the description of five unsafe practices observed and corrected during the month. The reverse side contains a list of 25 reminders of typical unsafe work practices.

B. By the 25th of the month, supervisors send the completed form to their general supervisors for an audit.

C. The safety director receives the reports next and, upon screening the most significant, unusual or dramatic cases, includes them in the monthly Supervisor's Safety Letter distributed to all management personnel. This letter serves as a means of sharing experiences and results in a broader scope.

D. This technique has been found to be an excellent way to get more people involved in our safety program. They become more aware of their individual responsibility, as well as becoming concerned about the safety of their fellow employees.

Another practical approach to accident prevention, was a "Keyman of the Month" safety promotion. Each supervisor was asked to nominate one of his employees by placing the employee's name on his monthly "Unsafe Practice Observation Report." Qualifications were based on these factors:

(1) Employee wears the item of personal protective equipment required for his job. This would also include safety shoes.

(2) He maintains good to excellent housekeeping practices in his work area.

(3) He has demonstrated, by his actions and conduct, his interest and concern for not only his own safety and health, but that of his fellow workers.

At the end of each month, one of the names is chosen in a drawing, and the name selected is then the "Key Man" for the month. He is awarded a pair of safety shoes of his choice for this recognition. He gets a large "gold key" to display at his work station.

All of the other names nominated are listed on Shop Bulletin Boards, along with a photo of the winner, indicating their selection as "Key Man" on their lines or sections.

Wallet cards are also presented. At the end of the year, all employees nominated are eligible for the drawing to determine the "Key Man of the Year" Award. A $50 Savings Bond, plus appropriate publicity, is the prize.

By recognizing individuals, we generate continuous interest in safety. We feel that promoting safety is no different than selling a product (you must attract attention, must gain acceptance, and hold interest).

Involvement of all employees to the highest degree possible is a prerequisite for any successful safety program. We make a concerted effort in this respect and, also, continually urge management to use every opportunity to involve their employees in safety activity.

At some plants, we have monthly tours by a Safety Action Committee comprised of four manufacturing department management people and the safety manager. The Union Safety Committeeman working the particular building being inspected accompanies this committee. Items needing correction can be promptly handled as committee members have overall responsibility for some phase of the operations. This also gives the Union a chance to participate in a "high level" type managmeent safety activity.

In addition, most of our plants have regular monthly safety meetings of the Union-Management Safety Committee. This enables the Union to participate in the safety program through the exchange of ideas, suggestions and, occasionally, a gripe or two. We feel fortunate in having truly conscientious Union people serving on the committees, and their safety attitude is indeed an asset to our programs.

Sometimes, we involve management people on task forces to help solve problems. For example, some years ago, we organized a task force with a goal to improve the welder's environment.

We installed low level ventilation in our welding areas to improve the environment. This improved it some, but not enough to attract qualified people to the welding operations.

We studied glasses, helmets, gloves, jackets, heat, arc radiation and welding smoke. We approved a program to develop and implement the installation of a low volume, high velocity welding smoke extraction system, specifically to remove smoke at the source.

A feasibility and development study was successfully completed at Caterpillar, and an agreement was negotiated with the Hobart Bros. Co. to utilize our data to build a commercially available welding smoke extraction gun and system.

This is how we at the Corporate headquarters help our managers make accident prevention programs successful. We provide:

(1) A Safety Policy -- That is the development and propagation of a consistent idea of what we want to do and why we want to do it.

(2) Long Range Planning -- Each facility plans its own safety program, but when the scope of planning goes beyond each facility, someone else has to do it. A good example of this is the five year corporate safety projection for First Aid Frequency, Disabling Injury Frequency and Disabling Injury Severity that established overall improvement guidelines.

Other examples are the development of a procedure which created a safety manual establishing the rules for storing, using and labeling hazardous materials. We also have a corporate Accident Prevention Manual. This is a ready reference and source book for facilities to use in developing individual safety programs.

(3) Consultation -- Publishing a Quarterly Safety Newsletter and statistical reports, maintenance of a film library, and development of safety conferences, safety posters, communicating safety ideas from one facility to another.

Every company requires these programs to get a safety program off the ground. We also employ Safety Audits -- sometimes referred to as review and appraisal. Usually, facilities to be audited are selected on a worst-first basis. But, every facility is audited periodically. An audit consists of a Safety Administration Evaluation, a Factory Inspection, and the development of an action plan to solve specific problems -- this is vital to success.

This is done through personal communication based on an important corporate-wide philosophy which bears heavily on safety . . . that of being severally responsible for performance.

Let me tell you how being "severally responsible for results" operates.

It's really rather simple . . . I'm responsible, along with the operations people at each facility, for their safety results. If their performance is worsening, it's my responsibility to discuss this with them and to find the most appropriate resource within the company to develop plans for improvement. I can't sit in my office and say, "I told them, but they didn't listen." Under this system, we do sometimes have differences of opinion. That's not altogether bad. We don't want blind conformance by our line organization when dealing with employee safety any more than we do in other areas of the business.

While each facility has considerable autonomy in developing and implementing its own safety program, there are uniform Company-wide regulations established for the reporting of injuries consistently and punctually.

Each facility reports its significant safety experiences (occupational injury frequency, disabling injury frequency and disabling injury severity) to my office monthly, and all are compiled into a single report comparing each facility with its objective.

Manufacturing and parts facilities are ranked annually by their safety results -- this information helps me plan my audit schedule.

In conclusion, Caterpillar's approach to safety and health has involved the active support of all management levels and, also, stimulated a higher degree of employee participation. . .most important, it has resulted in improved safety and health.

Abraham Lincoln once said, "Next to creating life, the greatest thing in the world is to save a life."

At Caterpillar, we understand Mr. Lincoln's words, and we manage by the philosophy that "Safety is Always Our Number One Business."

Industrial Health and Hygiene

Peter A. Breysse
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I. History of Industrial Health

A. Industrial diseases have been recognized for centuries.

B. Proper ventilation has been recognized as the major control mechanism since the early 1700's.

C. Charles Thackary, M.D., stated that: (1) he recognized all the industrial disaeases; (2) their causes; (3) the means to control them (17th Century); and (4) the major problem then (as now) was the ignorance of the working man.

D. Some of the industrial diseases recognized early were:

(1) Silicosis in granite workers.

(2) Lung diseases in miners.

(3) Cataracts and blindness in glass blowers.

(4) Phossy jaw among match makers using yellow phosphorous.

E. Occupational health laws were originally developed to protect the women and children laboring in factories during the industrial revolution.

(1) Regulations: Child Labor Laws

(2) Taxation of hazardous chemicals (e.g. phosphorous taxes)

II. The Problems Associated with Controlling Industrial Health Hazards

A. Lack of public awareness. Example: Hydrogen sulfide tank car went off the railroad tracks in downtown Seattle.

(1) Emergency crew was not fully aware of the extent of the hazard (respirators and tanks were worn, but masks were not in place).

(2) Spectators were allowed to gather.

(3) The downtown area was not sealed off.

(4) Why was the tank car being moved through a large metropolitan area? Why was there no labeling on the tank car?

B. Lack of control by unions. The oil, atomic and chemical workers are a progressive union, and they want:

(1) Third party environmental consultants and medical monitoring (not company employed professionals).

(2) Joint labor and management safety committees.

(3) Independent physical exams for the employees at company expense, and the right to review sickness and death records annually.

C. Lack of enforcement personnel at the current rate of inspection, it will be years before every business in the State of Washington is inspected, and NIOSH is overwhelmed with requests for health hazards evaluations.

D. There is a lack of information to evaluate hazards. For example:

(1) Material Safety Data Sheets do not adequately identify the hazardous chemicals contained in a product.

(2) Chemical companies are reluctant to reveal "trade secrets."

E. Union management conflict.

(1) Management wants reduced OSHA regulations (exempt small business, etc.). Pressure is placed on OSHA to reduce enforcement activities.

(2) Unions want stricter enforcement of OSHA standards.

III. Industrial Toxicology: The study of diseases arising out of exposure to chemical substances in course of work.

A. Characteristics:

(1) Mixed Exposures (several different chemicals)

(2) Dose Rate

a. Acute - more likely result of accident

b. Chronic - low conc. over long period of time

(3) Access to Body

a. Respiratory Tract

b. Skin Absorption

c. Ingestion

d. Surface Contact or Skin Absorption

B. Factors Influencing Toxicity

(1) Affinity of substance for human tissue

(2) Rate of absorption

(3) Physical state of contaminant (liquid, solid, gas, etc.)

(4) Soluability in tissue fluids

(5) Concentration

(6) Duration of exposure

a. Effective concentration in the body related to:

1. Rate of absorption
2. Storage
3. Rates of detoxification and excretion

(7) In mixed exposures - there is possible additive - potentiating - or neutralizing effects.

(8) Working environment

a. Temperature

b. Humidity

c. Pressure

d. Physical requirements (heavy exercise can increase the breathing rate by a factor of ten or more).

(9) Reactivity or susceptibility of the human host

a. Age

b. Sex

c. Size and weight

d. Pathological status (pre-existing disease, etc.)

e. Hypersensitivity

f. Tolerance

g. Nutritional status

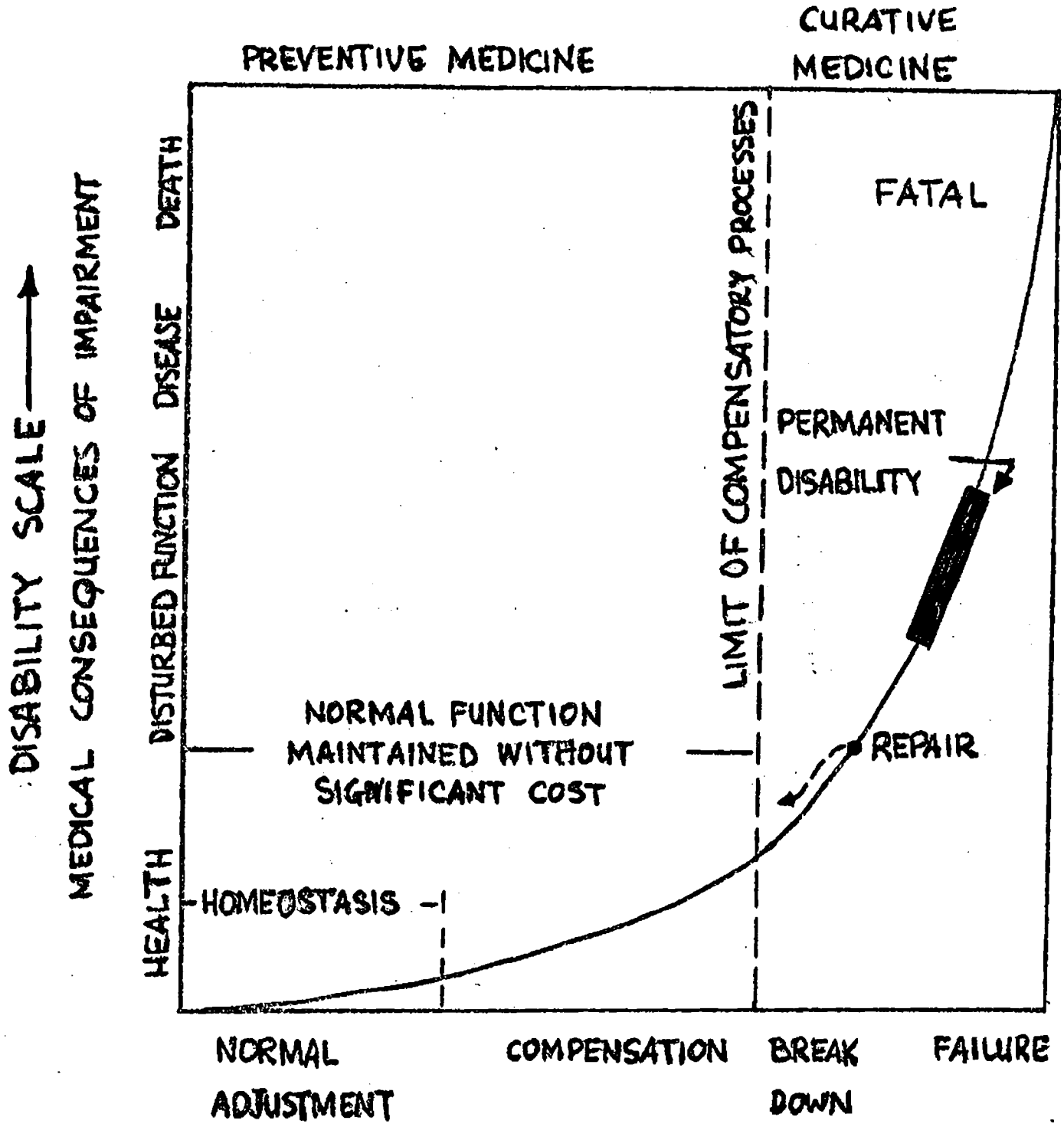
C. Deaths are linked to toxic chemicals

Numbers & Percentages of Deaths in 1967 Linked to Chemicals

Numbers of Deaths Linked to Factors in 1967	Percentage of All Deaths in 1967 Linked to Factor	Factor
300,000	17	Cigarette Smoking
56,000	3	Alcohol Abuse
0 - 400,000	0 - 20	Dietary Composition
60,000 - 150,000	3 - 8	Unknown (cancers)
75,000	4	Medication
100,000	0.6	Narcotic & Addictive Drugs
9,000	0.5	Community Air Pollution
9,000	0.5	Occupational
46,000	0.25	Suicides-Involving chem.
28,000	0.15	Coffee (bladder cancer)
22,000	0.01	Accidents - Chemicals
150	--	Oral Contraceptives

TOTAL DEATHS FROM ALL CAUSES = 1,850,000

D. Varying degrees of disability were linked to occupational exposure to chemicals.



IMPAIRMENT INCREASES : • WITH AGING

• AS RESIDUAL OF ILLNESS

• FROM EXCESSIVE ENVIRONMENTAL STRESS

E. Threshold Limit Values (TLV)

(1) Definition: Atmospheric concentration of contaminants that a worker can be exposed to for an 8-hour work day - 40 hour work week without resulting in appreciable adverse effects.

(2) Wide Variation in Individual Susceptibility

a. Small percentage of workers may experience some discomfort from some substances at concentrations at or below the TLV.

b. Smaller percentage may be affected more seriously by aggravation of a pre-existing condition or by development of an occupational illness.

(3) Values accepted as best available guides for providing healthful occupational environments.

(4) Classification of TLV's according to major effect at TLV.

a. Irritants

b. Asphyxiants

1. Simple - displace oxygen from the air

2. Chemical - react chemically with blood or at cellular level to prevent normal body respiration (e.g., carbon monoxide or cyanide gases)

c. Anesthetics and narcotics (ether, chloroform, etc.)

d. Systemic poisons (pesticides, etc.)

e. Particulates and liquid droplets other than systemic poisons

f. Carcinogens

(5) T.L.V.'s change from year to year, but in general, the trend is towards lower, more stringent T.L.V.'s.

CHANGES IN THRESHOLD LIMIT VALUES

COMPOUND	1943		1956		1962		1971	
	PPM	Mg/M³	PPM	Mg/M³	PPM	Mg/M³	PPM	Mg/M³
AMMONIA	100		100		100		25	
BENZENE	100		35		25		C-25-SKIN	
HYDROGEN SULFIDE	20		20		20		10	
LEAD		0.15		0.15		0.2		0.15
CARBON MONOXIDE	100		100		100		50	

COMPOUND	1943		1956		1962		1971	
	PPM	mg/m³	PPM	mg/m³	PPM	mg/m³	PPM	mg/m³
CHLOROFORM	100		100		50		25	
MERCURY		0.1		0.1		0.1		0.05
PHOSGENE	1.0		1.0		1.0		0.1	
NAPHTHA (COAL TAR)	1000		500		500		100	

(6) Very small quantities of toxic chemicals in liquid form will exceed TLV's when they vaporize in a small room (10' x 10' x 10').

Quantity of Liquid Chemical Necessary to Reach TLV in 1000 ft^3

	TLV	C.C.
Acetone	1000	83
Carbon Tetrachloride	10	1
Chloroform	50	4.75
Nitric Acid	10	0.47
TDI	0.02	0.09

IV. The development of stringent OSHA standards for occupation health hazards, using asbestos as an example.

A. Asbestos is the generic term for a variety of hydrated silicate material - one common attribute: can be seperated into relatively soft silky fibers.

(1) Two main classes - based on crystal structure - serpentine and amphiboles.

a. I Serpentine - (chrysotile)

b. II Amphibole - (crocidolite) - (amosite) - (anthophyllite) (tremolite) - (actinolite)

(2) Most common type - chrysotile - accounts for more than 95% of asbestos fibers produced today.

a. Both serpentine and amphibole have been synthesized.

b. Asbestos may be found as an impurity in non-metallic minerals such as talc and mica.

B. Epidemiological studies revealed the hazard for insulation workers: Mortality statistics from 1943 - 1971

(1) Exposure to insulation dust usually does not produce disease until 20, 30, or more years after beginning work.

(2) Expected and observed deaths among 625 members of Locals #12 and #32. Many more deaths than were expected, occurred:

	Expected Deaths	Observed Deaths
Total Deaths	288.5	423
Cancer Deaths	52.2	189
Lung Cancer	11.4	84
Pleural Mesothelioma	*	8
Peritoneal Mesothelioma	*	24
Stomach - Colon - Rectum	12.5	41
All Other Cancers	28.3	32
Asbestosis	*	33
All Other Causes	236.3	234

NOTE: *U.S. death rates not available - rare causes of death in general population.

(3) The longer exposure times resulted in ever higher death rates among insulation workers: Mortality statistics from 1967 - 1971:

Expected and observed deaths among 17,800 members of international locals of U.S. and Canada.

	12,681 Members Before 20 Yrs.		5,119 Members After 20 Yrs.	
	Exp.	Obs.	Exp.	Obs.
Total Deaths	178.94	211	626.69	881
Cancer Deaths	26.31	51	117.78	408
Lung Cancer	7.03	22	37.39	191
Pleural Mesothelioma	*	2	*	24
Peritoneal Mesothelioma	*	3	*	48
Stomach	.97	1	5.65	15
Colon - Rectum	2.51	3	15.00	23
Esophagus	.44	1	2.77	12
All Others	15.36	19	56.97	96
Asbestosis	*	3	*	73
All Other Causes	152.63	157	509.91	400

(4) Asbestos and cigarette smoking studies showed that smokers were much more likely to develop disease than non-smokers.

a. Locals #12 and #32 - On January 1, 1963, there were 370 members who had entered union prior to 1943.

Mortality Statistics	Never Smoked Cigs. (87 Workers)	Smoked Cigs (283 Workers)
Total Deaths - Dec. 31, 1971	35	133
Expected Lung Cancer Deaths*	1.26	3.31
Deaths of Lung Cancer Jan. 1, 1963 - Dec. 31, 1971	1	41

b. All U.S. and Canada locals - 17,800 men in the international on January 1, 1976 - 11,656 completed smoking history questionnaire.

Mortality Statistics	Never Smoked Cigs. (2,066 Workers)	Smoked Cigs (9,590 Workers)
Total Deaths - Dec. 31, 1971	73	596
Expected Lung Cancer Deaths*	5.98	25.09
Deaths of Lung Cancer Jan. 1, 1967 - Dec. 31, 1971	2	134

*NOTE: Based on U.S. death rates (U.S. Office of Vital Statistics.

C. Asbestos and Cigarette Smoking (Conclusions)

(1) Calculations indicate - asbestos workers who smoke cigarettes have 8 times the chance of dying of lung cancer compared to cigarette smokers who do not work with asbestos.

(2) Asbestos workers who smoke cigarettes have 92 times the risk of dying of lung cancer compared to men who neither work with asbestos nor smoke cigarettes.

(3) No significant trouble with pipe or cigar smoking.

(4) In asbsence of cigarette smoking - lung cancer is not a serious occupational health problem.

(5) However mesothelioma and other cancers and asbestosis occur even without smoking.

SMOKING CIGARETTES AND ASBESTOS DO NOT MIX

D. An asbestos standard was developed (1910.93a) of OSHA regulations.

(1) Definition of asbestos - Includes - chrysotile - amosite - crocidolite - tremolite - anthophyllite and actinolite.

(2) Permissible exposure - effective July 7, 1972

a. 8 hour (TWA) - 5 fibers/c.c. of air (fiber - longer than 5 microns long)

(3) Permissible exposure - effective July 1, 1976

a. 8 hour (TA) - 2 fibers/c.c. , and

b. (Ceiling - 10 fibers/c.c.

(4) Methods of compliance are outlined as follows:

a. Engineering controls - (1) isolation - enclosure, or (2) exhaust ventilation - dust collection shall be used. - Not limited to

b. Work practices shall be followed - (1) wet methods will be used wherever possible, (2) particular products and operations - shall require control of respiratory protection for example, emptying of container: either control or use respiratory protection, or (3) spraying-demolition - removal shall be supplied respiratory protection and protective clothing.

c. Personnel protective equipment is specified.

Respiratory Protection

(1) Air purifying - reusable - single use.

(2) Powered air purifying.

(3) Type "C" supplied air.

(4) Establishment of respirator program.

No employee shall be asked to wear respirator if physician says that employee will be unable to function normally or that safety and health of employee or other employees will be impaired by his use of respirator.

Such employee shall be rotated to another job or given opportunity to transfer to different position.

Same seniority - status - rate of pay - same geographical area.

(5) Special clothing.

(6) Change rooms.

d. Monitoring is required.

(1) Within 6 mos. of standard publication - every place of employment where asbestos fibers are released - must monitor.

(2) Personnel monitoring.

(3) Environmental monitoring.

(4) Employee observation of monitoring.

e. Method of measuring is specified - 400-450 magnification with phase contrast - membrane filters.

f. Caution signs and labels must be used with the following specific wording:

CAUTION
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
BREATHING ASBESTOS DUST MAY
CAUSE SERIOUS BODILY HARM

g. Recordkeeping must be maintained.

(1) Exposure records - monitoring records- 3 yrs.

(2) Employees must have access to the records.

(3) Employee notification is required if the exposures exceed an action level.

h. Medical examinations are required as follows:

(1) Preplacement exams

(2) Annual exams

(3) Termination exams

(4) Medical records - retained at least 20 yrs and access must be provided to: OSHA - NIOSH and the authorized physician of employees.

V. Conclusion:

The new generation of OSHA standards will be very complex and specific so it behooves industry to eliminate hazards now before the standards go into effect.

Industrial Hygiene and Compliance With Health Standards

D. A. Bissonnette
PACCAR Inc-Corporate

This book, "Work is Dangerous to Your Health", is a handbook written by Jeanne M. Stellman, Ph.D. and Susan M. Daum, M.D. Hazardous chemicals and processes are indexed in the back for easy reference, there is good bibliography in the back also, and there is a general index on health problems and environmental conditions! Although there are some factual discrepancies in this book, I would still recommend it highly to anyone involved in administrating safety and health programs. The test is fairly simple, straight foreard and easy to read.

There are three basic industrial hygiene principals: 1) To recognize environmental hazards; 2) To evaluate enviornmental hazards; and 3) Tc control environmental hazards.

In order to recognize environmental hazards, industrial hygienists must have information as to what hazards may exist in a given working environment. With that knowledge, industrial hygienists can then prepare to evaluate the working environment for those particular hazards. Evaluation may take the form of a walk through inspection, or it may require extended sampling of the working environment in order to determine the exact extent of the hazard. If the hazard does not exceed standards which are set by governmental or professional agencies, then control may or may not be necessary depending upon the employee relations factors. If, however, standards are exceeded, it becomes necessary for responsible management to take corrective action to control the hazard or to eliminate the hazard. Threshold Limit Values (TLV's) and Time-Weighted Averages (T.W.A.'s) are terms for the standards set to protect workers from hazardous air contaminants. These air contaminants are measured by various units: 1) Milligrams per cubic meter (mg/M^3); 2) Grains per standard cubic foot (gr/S.C.F.); 4) Micrograms per cubic meter ($\mu g/M^3$); 5) Volumes per million volumes of air (ppm); 6) Fibers per cubic centimeter (fibers/cc); and 7) Millions of particles for standard cubic foot (M.P.P.S.C.F.).

The conceptualize these units, in a room the size of this meeting room (approximately 40' by 50' by 10' high), one milligram per cubic meter could be represented by the amount of water held in 2½ cups, and one part per million of a contaminant gas, such as carbon monoxide, could be represented by the amount of air contained in an empty coffee cup, but distributed evenly throughout the room.

We often see the caution on the side of a can, or bottle, "Use Adequate Ventilation", or "Use Only with Adequate Ventilation", but what is adequate ventilation? Perhaps adequate ventilation is best described as that ventilation which is adequate to control the hazard to within the threshold limit value.

Let's discuss some of the operations which we perform at PACCAR locations and the hazards that exist (see Figure 5).

The industrial hygienist's role under the proposed occupational safety and health standards (see Figure 7) will be to make an initial determination or identification of a contaminant and determine or evaluate the exposure level of workers handling or exposed to that particular chemical. The new standards specify an action level which is usually 50% of the threshold limit value or the time-weighted average. If the employee's exposure does not exceed the action level, then we are in compliance with the occupational safety and health regulations. If, however, the action level is exceeded, management will be required to perform a number of activities which include: 1) Measuring or monitoring the hazards; 2) Initiating controls or plans for control; 3) Training employees; 4) Medical surveillance or examinations; and 5) Detailed recordkeeping of all of the above activities. The left hand branch of this compliance tree, illustrated in Figure 7, will be even more difficult to comply with than the right hand branch of this compliance tree; therefore, it is extremely important that the total safety and health team cooperate to assure that exposures of our employees are below the action levels for any air contaminants in the future.

I have some slides of monitoring equipment which are used to determine exposure levels for various hazards or contaminants, and I have some equipment with me today. If you are interested in any of this equipment or if your are interested in seeing how it works, you can question me after our panel finishes its presentation.

PACCAR Inc

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME	EMERGENCY TELEPHONE NO.
ADDRESS *(Number, Street, City, State, and ZIP Code)*	
CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS
CHEMICAL FAMILY	FORMULA

SECTION II HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)

SECTION III PHYSICAL DATA

BOILING POINT (°F.)		SPECIFIC GRAVITY (H_2O=1)	
VAPOR PRESSURE (mm Hg.)		PERCENT VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR=1)		EVAPORATION RATE (_____=1)	
SOLUBILITY IN WATER			
APPEARANCE AND ODOR			

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	Lel	Uel

EXTINGUISHING MEDIA

SPECIAL FIRE FIGHTING PROCEDURES

UNUSUAL FIRE AND EXPLOSION HAZARDS

FIGURE 5

OPERATION	HAZARDS
PAINT DEPARTMENT	• PAINT PIGMENTS • PAINT SOLVENTS • PAINT PLASTICS • NOISE • SKIN CONTACT
WELDING	• METAL FUMES • TOXIC GASES • RADIATION
GRINDING	• METAL DUSTS • NOISE • VIBRATION
TOOL SHARPENING	• CHROMIUM • NOISE • COBALT DUST • TUNGSTEN CARBIDE
RIVETING	• VIBRATION • NOISE
ASSEMBLY	• NOISE • VIBRATION • ERGONOMICS • STRESS

FIGURE 5
(CON'T)

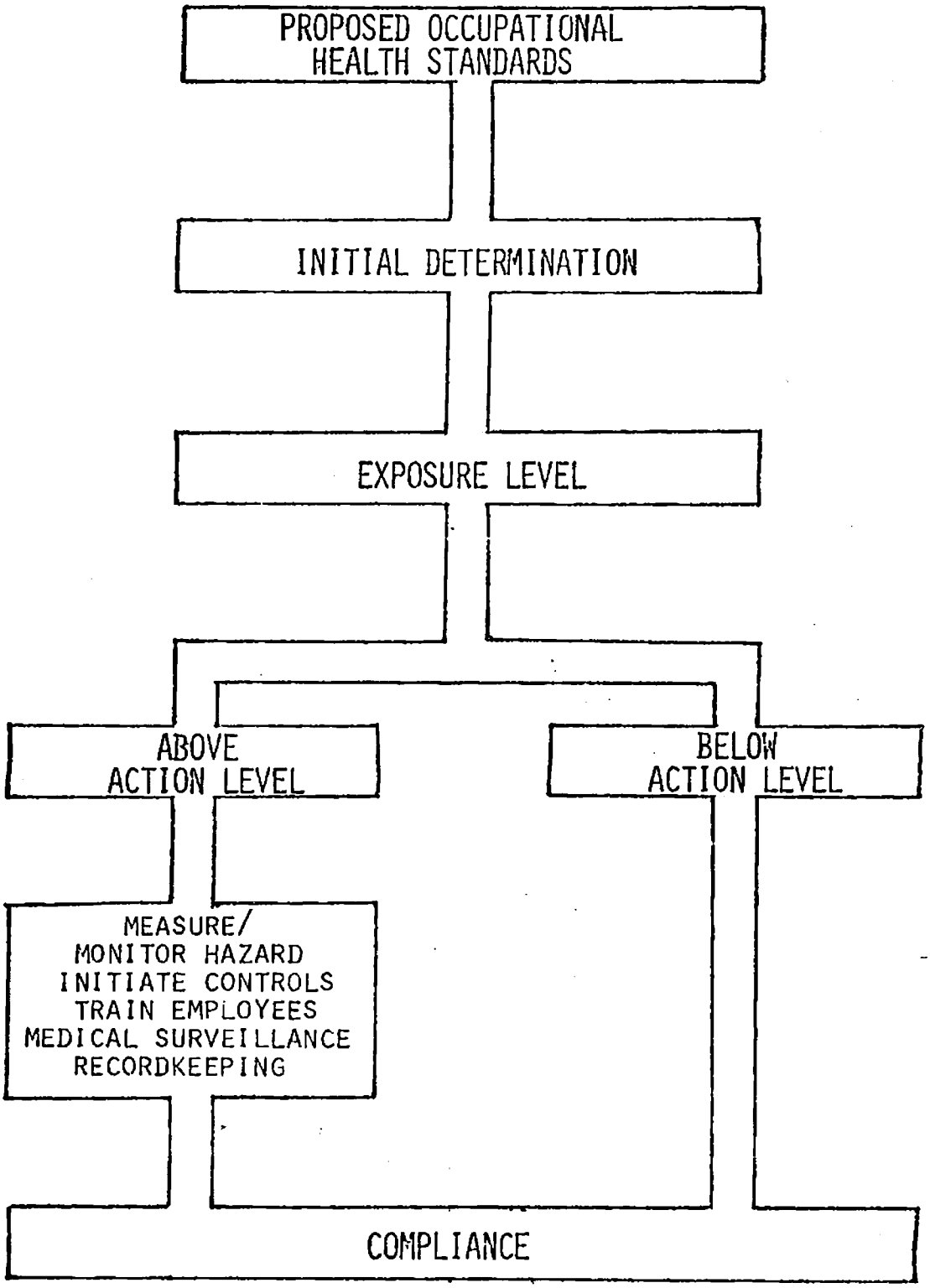
OPERATION	HAZARDS
TEST	• NOISE • OXIDES OF NITROGEN • POLYCYCLIC ORGANIC MATERIAL • ALDEHYDES
FORK TRUCK	• RADIATION • HEAT • COLD • NOISE • VIBRATION • CARBON MONOXIDE • OXIDES OF NITROGEN • PROPANE
PLASMA ARC BURNING	• METAL FUMES • OZONE • RADIATION
SOLDERING AND BRAZING	• HEAT • CADMIUM • COPPER • FLOURIDES • RADIATION
DEGREASING OPERATIONS, PARTS WASHING	• CHLORINATED HYDROCARBONS • CAUSTIC COMPOUNDS • ERGONOMICS • SKIN CONTACT • HYDROCHLORIC ACID

FIGURE 5
(CON'T)

OPERATION	HAZARDS
PLASTICS SHOP	• DUST (FIBERGLASS) • NOISE • STYRENE • ACETONE • METHYL ETHYL KETON PEROXIDE
FOUNDRY	• SILICA • CARBON MONOXIDE • ISOCYANATES • HEAT • RADIATION • NOISE • VIBRATION • METAL FUMES • ERGONOMIC HAZARDS • POLYCYCLIC ORGANIC MATTER
OFFICE WORKERS	• (SEE NEXT TRANSPARENCY) • ORGANIC VAPORS • NOISE • STRESS

FIGURE 7

ROUTE TO OSHA COMPLIANCE



Industrial Health and Hygiene

Dr. Johanson
PACCAR Inc-Corporate

There is an increasing need for improved and increased emphasis on industrial health for a variety of reasons: 1) the Occupational Safety and Health Act has placed the responsibility for workers' health directly on the shoulders of management. Therefore, management must respond by developing health monitoring programs which will assure workers' health is maintained in the working environment; 2) the Federal Government has increased spending on research in environmental health problems which occur in the working environment. The increase in research has revealed a number of industrial diseases which were not previously identified and epidemiological research was shown that there is a much larger occurrence of industrial disease in the working populations than had been previously suspected. Due to literature that is being published from these research projects; 3) workers and their physicians are becoming increasingly aware of the occurrence of disease induced by the industrial environment, and the more alert physicians and workers are now aware of rights for compensation claims; 4) many unions actively support their members in the pursuit of workers' compensation claims or third party suits against product manufacturers; and 5) finally, myself, plant nurses, and the Company are all concerned with each workers' health.

OSHA is undergoing a reorganization and a re-emphasis on health hazards under Dr. Morton Corn (the new head of OSHA). There will be more emphasis placed upon the monitoring and control of health hazards in the working environment. The new philosophy is exemplified by the proposed standards for toxic substances, including alkyl benzenes, cyclohexane, ketones, ozone, toluene, and noise exposure. Although all of these standards place primary emphasis upon engineering control of hazards, they also require that: 1) the environment be monitored; 2) the regular medical monitoring of employees; and 3) the maintenance of employee health records. As you might well expect, this will mean increased costs; therefore, it behooves management to pursue engineering controls to eliminate hazards in the working environment. Until such time as hazards are controlled by engineering, it will be necessary for management to monitor the health of workers. If an OSHA inspector should enter a plant after these standards are finalized and find levels of chemical exposures in excess of published action levels, he would then be able to cite and fine management for failure to control the hazard, for failure to monitor the hazard, for failure to monitor employee health, and for failure to maintain adequate records of employee health.

Biological monitoring is rapidly becoming a necessity for all plants engaged in manufacturing activities which expose workers to chemical solvents, dusts, fumes, mists, hazardous radiation, noise, or any other recognized environmental hazard. Data from biological monitoring will: 1) allow management to transfer employees out of hazardous areas when they begin to show biological indications of potential health problems. The early recognition of potential for disease or disability; 2) allow management to retrain those employees who do not properly use their protective equipment or ventilation systems; and 3) allow management to identify areas where protective equipment is not functioning

properly or where ventilation control systems have failed to control a hazard. Sometimes, the results of biological monitoring or epidemilogical study, may reveal to management that there is a problem in an area of which they had not been previously aware.

In order to facilitate the use of biological monitoring, and in anticipation of future standards, PACCAR has contacted a few companies to perform biological monitoring throughout our corporation at an advantageous cost. Several PACCAR operations are already using Hear, Inc., of Portland, Oregon, to perform the anlaysis and recordkeeping function of their audiometric testing program. These companies will be well ahead of others when the OSHA inspector arrives to monitor employee health records pertaining to hearing conservation programs. Peterbilt/Nashville has been using services of another organization, ICN Medical Laboratories, Inc., to do blood lead levels of their painters and welders. These blood lead measurements allow Peterbilt/Nashville to demonstrate the fact that their overall safety and health program to control the exposure of workers to lead, is functioning properly and that in fact none of their employees do have any excess level of lead in their blood. This type of program provides a rational and logical defense if any compliance officer should ever find airborne levels of lead higher than that allowed by the Occupational Safety and Health regulations.

Biological monitoring of employee health by an independent laboratory provides records to verify the effectiveness of environmental control programs for any hazard. Furthermore, these records can be used as a defense in compensation claims cases, especially when pre-employment examinations have been given to employees shortly before or immediately after they begin working for a PACCAR organization.

Pre-employment examinations identify those employees who have health or disability problems at the time of employment. The identification of health or disability problems will allow management to place a worker in an environment where he will not be a hazard to himself or others working with him. Pre-employment examination can also provide a baseline for the employee's health records. It should include certain important tests in order to be most beneficial. The tests should include: vision and audiometric baseline testing for all new employees; pulmonary function tests for all employees exposed to airborne contaminants (i.e., painters, welders, grinders, plastic and foundry workers); a chest x-ray is also recommended for those individuals working in plastic shops or foundries, and for painters and welders when indicated; back x-rays should be provided to employees when lifting, twisting or turning may strain or injure their backs; for painters, welders, grinders and burners exposed to lead fumes or solvent vapors, there should also be a baseline test at the pre-employment hire for blood lead and/or liver function tests. Because of the possibility of genetic hypersusceptibility traits, it may be necessary in the future to provide tests to detect this condition in new employees so that they will not be placed in work environments where they may have hypersensitive reactions which can result in permanent disability.

As a conclusion to my talk, I would like to show some of the devices utilized for biological testing of employees: pulmonary function testing, vision testing, and audiometric testing; therefore, it behooves management to pursue engineering controls to eliminate hazards in the working environment. Until such time as hazards are controlled by engineering, it will be necessary for management to monitor the health of workers. If an OSHA inspector should enter a plant after these standards are finalized and find levels of chemical exposures in excess of published action levels, he would then be able to cite and fine management for failure to control the hazard, for failure to monitor the hazard, for failure to monitor employee health, and for failure to maintain adequate records of employee health.