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PLANT MANAGEMENT STRATEGY—RE: OSHA

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I am a member of a general management consultant firm that provides OSHA compliance services as one of its activities. My basic background for most of my career has been as a manufacturing manager.

I am thoroughly convinced that the basic purpose and intent of the OSHA legislation is proper and is a step forward in the field of industrial safety practice. I believe that, in many cases, the changes forced by OSHA compliance can result in, or lead to, significant cost savings which otherwise may well have been overlooked.

I have no doubt that the complexity, the sheer volume and the confusion of the regulations, standards, and interpretations aggravate the hell out of multitudes of establishment managers.

A prerequisite to any sound formulation of strategy is knowing where you stand. To plan OSHA strategy you must have at least these minimal essentials of knowledge:

1. A clear understanding of the federal and state regulations and promulgated standards as applicable to your particular establishment.
2. A good feel for the enforcement practices, techniques, and procedures as used in your area.
3. A solid, detailed knowledge of compliance status in your establishment. This means an organized, item by item list of all possible violations.

There are several ways to acquire this necessary information base:

You can set up your own OSHA staff of one or more people charged with the responsibility for gathering publications, studying them, gaining insight from meetings, seminars, and contact with associates, and preparing for and making a dry-run inspection of the establishment to identify violations.

If you have the right insurance carrier, you can get general aid and counsel from your

insurance representative. He won't do the whole information base job for you, but he can be very helpful to your staff.

You can engage a competent, experienced OSHA consultant to explain and clarify the law, the applicable standards and the local enforcement practices. He can perform an objective, on-site inspection and provide a complete picture of possible violation items with advice and recommendations for compliance action. You will still want some in-house staff for an ongoing compliance program, but such consulting service can get you off to a good start and save time, money, and wasted steps.

With a good knowledge base at hand you are ready to plan your strategy.

The first, and a very basic, decision is to determine, with concurrence from top management, the desired quality level of your compliance effort. Absolute perfection is probably unrealistic. It is something like an A.Q.I. in product quality. A level must be chosen. With OSHA you must determine how comprehensive, how meticulous, and how perfect your plans will be. For instance, planning to satisfy every expectation of the most nit-picking inspection officer is almost impossible. However, planning to ignore serious and obvious violations of standards is asking for trouble.

Make up your mind and then indoctrinate your staff. Review every item of possible violation and establish a first approximation of estimated cost of correction. Classify and group into categories all items of possible violation in terms of the type of corrective action required. This permits you to plan action with the appropriate approach for each category.

A suggested categorization might be as follows:

1. Minor items of lower cost requiring minimal planning for correction.

2. Major items of higher cost whose correction holds promise of productivity increases and cost reduction pay-backs.

3. Major items of higher cost whose correction may lead to reduced insurance premiums.

4. Major items of higher cost whose correction will result in intangible or minimal pay-back.

5. Major items of higher cost where the violation is of questionable interpretation or the specific standard is not yet promulgated.

With the problem thus costed and organized, create a detailed, documented plan of corrective action. This should be time scheduled, evaluated, and should contain provisions for planning time, procurement time, installation time, and impact on the overall business plan.

I recommend doing category 1 first to achieve psychological impact on your staff and your plant employees and to quickly build up a documented record of compliance action.

I recommend doing category 2 second to get the available pay backs started promptly and to give top management the feeling of getting something tangible from the compliance program.

I recommend doing category 3 third to give your finance man a chance to use the documented changes in his next insurance negotiation.

I recommend handling category 4 by equalizing the expense impact over an extended period and plugging in the projects with consideration of the seriousness of violation, the planning and procurement time involved, and the relationship of the action to other planned business moves.

I recommend handling category 5 by carefully tabling all items until each item is clarified and a decision can be made on the basis of positive information.

With a formal strategy plan in hand, approved and well disseminated to all appropriate managers, it is time to turn your attention to tactics. Here are a few suggestions:

Be sure to organize, train, and prepare your staff so that they know what to do and how to act on inspection day. There have been a number of instances where the

inspector's write-up has been colored by his encounters with the injudicious action of floor supervision.

Start immediately to keep competent OSHA records. It's a paper-work oriented game. Play it to your advantage. Impress the inspector with competent and organized records.

1. Make sure you are keeping all legally required records per instructions.

2. Have your corrective action plan readily available.

3. Document and file all completed corrective actions.

4. Keep your OSHA reference library up to date, organized, and readily available.

Be sure to capitalize on the human relations values of all the time and money expended on OSHA accomplishments.

1. Impress your staff with the impact of the regulations and the sincerity of your intentions.

2. Communicate to your employees so that they realize what you are doing and give you credit for your efforts in behalf of their welfare.

3. Make sure the union is aware of your program, to lessen the temptation for them to use OSHA as a weapon.

4. Toot your horn to the community as is appropriate to the situation.

Make careful provisions to keep up to date on new and changed standards and requirements. The manager in charge of the OSHA reference library should be alert to keep it current. Send your staff to appropriate OSHA seminars, meetings, and classes as available. Keep in touch with acquaintances, association groups, and services such as the National Safety Council.

In closing, let me leave you with two final thoughts:

In planning items of corrective action, plan creatively and thoroughly. Good attention to costs and benefits here can have a great effect on the major cost of OSHA compliance. Many people think of OSHA costs in terms of fines and penalties. This has been relatively minor so far. The prime cost lies in the required compliance action. Thoughtful advance planning can achieve the required results while avoiding the extra cost of crash

programs to meet citation deadlines. You all remember the old Chinese proverb: "When rape is inevitable, relax and enjoy it." The current version is: "OSHA compliance is inevitable—use good management

strategy to achieve safe operation, to avoid penalties, to minimize costs of compliance and to reap all the benefits possible." Enjoy it!

CONTENDING WITH THE OSHA NOISE STANDARDS

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The OSHA Standards Advisory Committee on Noise has prepared a final draft of their proposed OSHA Noise Standard and submitted it to the U.S. Department of Labor for approval. It is doubtful whether any substantial changes will be made before it replaces Section 1910.95 of the present regulations.

The most significant feature of the proposed standard is the retention of the 90 dbA permissible level for eight hour exposures. The proposal calls for a mandatory review of the standard at least every five years, with "changes made commensurate with increasing scientific knowledge relating to effects of occupational noise exposures and aspects of noise measurement and control." Thus, the 90 dbA level may be changed within five years if medical research indicates measurable loss is taking place in the disputed range between 85 and 90 dbA. To assist in the gathering of audiometric data on employees exposed in this range, the proposal calls for "medical surveillance in the form of an audiometric testing program provided annually by the employer when the daily noise dose equals or exceeds .5." This figures out to be 85 dbA for eight hour exposures.

Annual audiometric testing is required "for all employees whose occupational noise exposure is controlled by personal protective equipment. Personal protective equipment shall be permitted for the control of employee's exposure during the period required for the institution of engineering controls or where it can be demonstrated that engineering control is not feasible." Therefore, personal hearing protection is looked upon only as an expedient or as a last resort. The proposal also details the various equipment specifications, technician training requirements, and audiometric test pro-

cedures that must be employed in an audiometric test program that will yield valid audiograms. What will the cost of such a program be? An estimate of the range of costs can be made on the basis of past experience, but company by company variation can be great because of many influencing factors.

One must first differentiate between in-plant audiometric testing and testing done away from the plant or in a mobile van that periodically visits the plant. Cost data that I have compiled on in-plant testing is based on our corporation's experience and on a 1972 study made by the Wisconsin State Board of Health. Here are various components of the cost picture: cost of the audiometric test booth, which ranged from \$1,000 to \$2,000 depending on size, accessories, and who did the installation; cost of the audiometer, which ranged from \$400 for a manual audiometer to \$1,600 for an automatic audiometer; annual cost of calibrating the audiometer, which averaged close to \$100; cost of the technician's or nurse's time to perform each test, which ranged from 75 cents to \$1.25 per test. The largest cost of all was the employee's time away from his job, which ranged from \$3 to a staggering \$12 per test. I have no explanation for the \$12 figure as it was not one of our plants. Our experience has been that even with good scheduling, the employee is going to lose 45 minutes from work. You can plug in your own company's average earned rate to come up with your own cost here. Taking minimum and maximum figures for all these variables and figuring a conservative ten year depreciation on equipment, one arrives at a range of \$240 to \$460 per year for equipment costs and \$3.75 to \$13.25 per employee tested.

Our experience has been that the cost of each test done away from the plant or by a

mobile van will range from \$4 to \$15, with an average estimated at \$7 per employee tested. This does not include the employee's time away from the job, usually the largest single cost. There are other advantages and disadvantages of in-plant vs. out-plant testing, but cost is often the deciding factor. Our own rough rule of thumb is that in-plant testing becomes practical only when the number of employee audiometric tests per year exceeds two hundred. This last figure is for those in the audience who don't want to run their own cost studies, but remember, it is a very rough rule of thumb.

One last statement on costs. The cost of personal protective equipment for control of employee noise exposure should also be included in your overall hearing conservation program costs. Our costs have averaged very close to \$14 per employee per year.

What is the alternative to these annually recurring, budget draining costs? There is only one answer—total elimination of the problem through noise abatement.

Before proceeding to noise abatement, one must first identify the problem. Let's find out what the proposed standard has to say about identification of noise exposures. "Noise level measurements shall be conducted not less than annually for established equipment, operations, and facilities, and within 30 days of full operation of new equipment, changed process, or other significant work place or work-condition modifications." This means noise surveys in your plant will be a continuing task for someone. Sound measuring equipment varies in price from about \$400 to \$2,000 and up, depending on the amount of information you need to identify and solve your noise problems.

Outside consultants charge from \$20 to \$30 an hour for their services, and they can cover roughly 200,000 square feet of manufacturing space in an eight-hour period. I have no advice to give on which route you should take, but I do believe the techniques of sound measurement are not beyond the capabilities of your engineering staff, given expert short-course training beforehand. Of course, for a fee the outside consultant will couple his survey with concrete recommendations for abating the noise sources he has

uncovered.

Can you solve some of your noise problems without the assistance of outside consultants? Yes, you can—and that point should be emphasized. Much noise abatement work can be done through the use of common sense, adapting the experience and examples of others into simple "cut and try" methods.

The best way to abate noise is to eliminate it through process substitution. Examples are legion: Welding instead of riveting, grinding instead of chipping, mechanical instead of pneumatic punch press ejectors, rubber or other resilient material instead of metal, slow pressure forming instead of high velocity impacts, electric instead of pneumatic tools, selection of slow speed fans instead of high speed fans, belt drives instead of metal gear drives, worm instead of spur gears, visual instead of audible signals, are some illustrations.

We mentioned using resilient material instead of metal to reduce noise. In a Milwaukee foundry the work bench was lined with wood block to achieve noise reduction during cleaning operations. In another example a rubberized belt conveyor replaced a metal conveyor; a 12 db reduction in impact noise was achieved. When a 1/4 inch metal chute was back-lined with metal shot, the noise level was reduced 16 db.

Impact noise reduction is often difficult because the impact—hammering, shearing, tumbling, peening—is often a necessary part of the work. But sometimes the noise radiation into the piece being worked upon can be reduced by reducing the size of the piece or by clamping it. In a milling operation at our Harvey, Illinois plant, an aluminum oil pan is positioned in its fixture to be milled. The two cross pieces are spring loaded tension bars. The fabric is oil resistant rubber pads. Before clamping, 100 dbA readings were obtained. After clamping, the noise level dropped to 84 dbA.

Air turbulence and resulting noise increase rapidly with air velocity. Therefore, reduction of air velocity is an effective noise abatement. A simple dissipative muffler, of which there are many good commercial ones on the market, will reduce noise levels as much as 15 dbA. The simplest way of getting rid of ex-

haust air is to dump it into an area where no one is located. Exhaust air was taken from a squeeze cylinder and carried through a rubber hose to a sand spill tunnel below the floor. Reduction of noise was from 108 dbA to 83 dbA.

On the other hand, air is sometimes used to eject parts on a punch press or to blow away chips on a machine. An air ejector nozzle whose design was given to us by Liberty Mutual Insurance Company is about 10 decibels quieter than a straight piece of 1/4 inch copper tubing that develops an equivalent thrust.

The use of enclosures to achieve noise abatement should be mentioned, since it is often a costly method that is often incorrectly applied.

The density of the material used in any sound barrier determines its effectiveness. The more dense the material, the less the sound transmission. The less dense the material, the greater the sound transmission. Because materials used in sound absorption, such as spun glass fibers, acoustical board, and the like are not dense, they are ineffective in reducing sound transmission. Therefore, dense material such as metal, wood, brick or concrete must be used. Of course, good sound absorbers such as spun glass fibers may be required to line the inside of an enclosure to reduce the amount of sound reverberation and consequent sound level build-up within the enclosure.

An example of a sound barrier is a wall built around a 6,600 cfm blower which is attached to a 150 horsepower motor. Before the wall was built, 102 dbA was measured at a nearby work station. After the wall was built, the noise level dropped to 83 dbA. High density concrete block eight inches thick was specified.

Our largest crawler tractors are manufactured at our Springfield, Illinois, plant. Each one is checked out on a test stand before shipment. The test operation generated sound levels up to 110 dbA in work areas immediately adjacent to the test stands. After an enclosure was built, the level dropped to 86 dbA, which was the background sound level for the area.

These few examples are only meant to show that a lot can be done in any plant to abate noise without a great deal of acoustical engineering know-how. Most of these examples were designed by plant engineers with no expertise in the acoustical field. What is needed is the determination to tackle noise problems in a systematic manner, with the ultimate goal of total noise elimination from your operations.

A Chinese philosopher once said, "A journey of a thousand miles begins with a single step." I don't know how far you have to go in your noise abatement efforts, but I do know the new OSHA noise standard makes it imperative that we all hit the road very soon.

A PLANT ENGINEER'S VIEW OF OSHA AND ITS CHANGING STANDARDS

By NEIL DE KOKER

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Historically, the plant engineer has been responsible for providing a workplace. The plant engineer is the one who builds the buildings, installs the machinery and equipment, and supervises the maintenance. The plant engineer is the landlord.

Because he is responsible for the installation and maintenance of the facility, we at GM made him also responsible for pollution control. The plant engineer runs the waste water treatment plant, and operates the air pollution control devices. With our recent energy problems, the plant engineer must carefully evaluate his facility's operations to conserve energy and consider the purchase and storage of alternate fuels to keep the plant running in the event of curtailments. With the advent of OSHA, we added one more duty to the plant engineer: make sure equipment is specified, designed, installed and maintained to meet the OSHA standards.

No matter which department purchases process equipment, (master mechanic, industrial engineering, etc.) the plant engineer should be a party to its design and installation from the very early stages, because if it pollutes, or uses excessive energy, or it doesn't meet OSHA standards, the plant engineer gets to rework the equipment, which is usually much more expensive than doing things right the first time around.

Although the coordination of the over-all OSHA and people-oriented safety program in our company is the responsibility of safety professionals, the implementation of the equipment and facility-oriented portion of the OSHA standards rests with the plant engineer. I would like to discuss briefly how to best implement and maintain the facility and equipment portion of an OSHA stan-

dards compliance program.

The plant engineering implementation of OSHA standards of compliance covers basically two distinct areas of concern: (1) the purchase of new machinery and equipment to meet OSHA, and (2) the maintenance and revision of existing machinery and facilities to meet OSHA.

All activity and efforts toward OSHA standards compliance must be constantly evaluated in terms of the basic purpose of the law, which is "to assure so far as possible every working man and woman in the nation safe and healthful working conditions" To meet this purpose, the Act has placed a general duty on all employers to "furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm." From the "general duty" clause, it is clear that OSHA is an employer-employee oriented law: as employers we have responsibilities to our employees.

Since the use of a piece of equipment determines its design requirements, we have objected strongly to some manufacturers who have said, "You must take this; it is required to comply with our interpretation of the law." To avoid this, we have recommended to all GM operating units that blanket purchase order clauses which state that the equipment is to conform to all OSHA requirements should not be used. Let's face it—the vendor, in many cases, cannot make this assurance, especially for complex process equipment, because he does not know how the equipment will be used, nor does he know how or if the equipment will be maintained to assure continued compliance with OSHA. Your best bet to avoid paying for things you

don't need or can't live with is to include the OSHA requirements as you know they will apply to you in the detailed purchase specification for the equipment as you will use it.

The above approach will avoid payment for such things as the inside of an electrical panel painted orange, very complex interlocked guards on a machine that makes it impossible to operate and must be revised to fit your method of use, and key-lock selector switches to control every mode of operation on a press because the vendor decided they were necessary to meet the "means capable of supervision" requirements in the standards.

Now, let's briefly discuss the best approach to revise your existing facilities and maintenance practices to meet OSHA. It would be easy to say, "just obey the law." As you know, the OSHA standards were largely derived from national consensus standards such as those published by ANSI and NFPA. I can assure you that there are certain requirements in these consensus standards that would not have been there had industry known that they would become enforceable under a law. Many of these standards are updated to include the latest technology and methods, and were meant to apply to new facilities and equipment. To apply these standards to facilities that are 30, 40, or 50 years old has created some serious questions as to the degree of improvement in employee safety and health that would be obtained from the expenditures required to meet the letter of the law in some instances. Many of these types of "problem areas" in the OSHA standards have been eliminated by revisions during the past two years. Many more will be changed in the future, I am sure.

If I were asked to give one major criterion for OSHA compliance, I would say that you should apply common sense in your day-to-day operations. Let me substantiate this by reviewing some typical citations that we have received at General Motors.

1. Floor conditions and normal house-keeping items have been the most frequently cited sections of OSHA. Some typical citations stated: "Two exit doorways had skids obstructing exits; floor was dirty because oil sump was allowed to overflow on surround-

ing floor; boxes in aisles; hydraulic tubing on floor," etc. Needless to say, we don't need a federal law to tell us these conditions are unacceptable, nor should it take a federal inspector to get such items corrected.

2. The second most frequently cited section involves electrical wiring and grounding. Some typical citation statements were: "Terminal box uncovered; unlabeled disconnects; flexible cord run through wall as a substitute for fixed wiring; line tap was made through open door of control box; portable fans had inadequate grounds (3rd prong broken off)," etc. Again, these items are obviously a poor practice and should be corrected in our day-to-day activities.

3. The next area is machinery and fan guards. Citation statements have read: "Failure to provide a guard or enclosure for the bandaw; excessive clearance between grinding wheel and work rest on maintenance grinder; spooket and chain guard out of place, exposing gears; guards in up position, exposing die area," etc. It is our job not only to provide guards but also to see that they are used properly, adjusted when necessary, and replaced when removed for maintenance activities.

4. The use and condition of welding equipment has also been cited. Typical citation statements are: "Work had been finished, but oxygen and acetylene cylinder valves were not shut off; oxygen cylinders stored without protective caps; failure to secure cylinders in upright position; failure to provide suitable screens or shields to protect adjacent workers from arc flashes," etc. Again, these are commonly known safety practices that should be followed on a routine basis.

5. Many simple solutions have been found in the area of noise control by involving all your employees. It is amazing, some of the ideas that the operator at the noise source can come up with that you may have never thought of yourself.

6. The use and condition of personal protective equipment involves a three-fold responsibility; to provide, enforce the use of, and to inspect equipment regularly. We don't need a federal inspector to tell us that an employee performing grinding operations must wear eye protection, or that ear protec-

tion must be worn in high noise areas. And it also makes sense that if you are going to have emergency equipment such as respirators around, they should be checked regularly to be certain of their proper condition at all times.

7. OSHA requires us to maintain our equipment in a safe operating condition. A good preventive maintenance program makes good business sense financially and will also avoid citations such as: "No formal crane hook inspection program; failure to maintain written and signed reports of crane and running rope inspections; failure to maintain inspection records on all power presses," etc.

As you can see from these few typical citation statements, the adherence to day-to-day safety practices that we have all been advocating for years will avoid such citations.

On the other hand, what do you do about OSHA requirements that, in your best judgment, will not improve the safety and health of your employees? My first reply would be to make certain that you are not reading things into the standards that are not there. For example, one GM division was all set to hire a full-time employee to test all ventilation hoods and ducts throughout their plant every 90 days because a statement to that effect is made in 1910.94(d)(8)(i) of the OSHA standards. I immediately pointed out that those requirements applied to exhaust ducts for open surface tanks only. Many similar examples of misinterpretation or misapplication of standards can be cited.

Now, assume that you have surveyed your plant and there are a number of conditions that do not meet the letter of the law, but your present methods are as safe as that required by the standards. Examples of this could be:

1. Your catwalk guardrails are 36 inches high instead of the 42 inches specified.

2. Your toeboards are 2 to 3 inches high instead of the 4 inches specified.

3. Your fixed ladder rungs are 1 1/2-inch diameter steel rod in lieu of the 3/4-inch minimum diameter specified.

4. You have a paint spray booth that meets all OSHA requirements except you have potentially spark producing equipment 13 feet

from the booth instead of the 20 feet specified.

5. You have your own color code for designating aisle lines instead of the white and black combinations specified.

6. You have portable welding equipment hung from a support system with multiple hangers and bolted connections such that the failure of any component will not result in a danger of falling instead of the safety chains and clevises specified.

7. Your welder controls are always kept locked but are not locked and interlocked as specified.

8. Your portable fire extinguisher distribution does not meet the exact distribution and minimum walking distances specified, although your entire facilities are equipped with automatic sprinkler systems and stand-pipe and hose systems that do meet OSHA specifications.

9. Your plant is not equipped with emergency lighting facilities and it appears, based on your reading, that this is required in OSHA 1910.36(b)(6).

I'm sure that each of you can cite many similar examples of standards requirements where you are out of compliance but your present method is probably as safe as that specified in OSHA. OSHA is very aware of many of these problem areas and so are the ANSI and NFPA committees who wrote those standards. Many of the standards are presently under revision, and you should attempt to check on such proposed changes prior to taking further action. This could be done through your trade associations or through your local safety council.

For example, the ANSI A12.1 standard on railings, toeboards, floor and wall openings has been revised to allow 36 to 42 inch guardrails and toeboards of less than 4 inches in height. You will not be cited for 36 inch guardrails, but you will be cited where you have no guardrail at all. Similarly, OSHA has indicated that they are not required "to consider conditions of little importance in the workplace" in reply to our request for guidance on fixed ladders with 1 1/2-inch rungs but capable of meeting the performance requirements of the standards. In fact, the entire section of OSHA covering walking-working surfaces,

including ladders, stairs, guardrails, toe-boards, etc., was revised by OSHA and published as a proposed revision in the September 6, 1973, issue of the *Federal Register*. The NPPA-33 committee on spray finishing has revised their standard relating to the 20 foot separation of spark producing equipment from the open face of spray booths to 10 feet (or 5 feet if the spraying equipment is interlocked with the ventilating system).

I believe we are all aware that OSHA is developing a performance standard on color coding and that they will not cite you for use of a wrong color, although you will be cited for lack of color coding of hazards. The ANSI Z49 committee on welding and cutting has revised their standard to allow methods of support system safety other than chains and clevises for supporting portable equipment. They also allow locking or interlocking of welder controls in lieu of locking and interlocking. The NPPA-10 standard on portable fire extinguishers has been revised to allow a 50 per cent reduction in fire extinguisher density providing that a standpipe and hose system and automatic sprinkler system meeting applicable NPPA standards is in the facilities. Upon inquiry, OSHA has replied that they do not address themselves to emergency lighting systems. Reliable light source is defined by both OSHA and the NPPA as a source such as a public power and light company.

OSHA, I'm certain, will adopt many of the consensus standards revisions into the

OSHA standards as long as there is no reduction in safety or health for employees.

In conclusion, you must use common sense in your day-to-day operations. If a repairman removes a guard, make certain that he knows the job is not finished until the guard is replaced. Similarly, the old adage, "Don't put off for tomorrow what you can do today," must be followed in correcting conditions that you know in your own mind are not right from a safety and health standpoint. Delays normally result in a significant collapse in employee motivation toward good housekeeping and safe work practices—not to mention the big work load if you have to clean up your operations on a crash basis as a result of an OSHA compliance officer visit. These two approaches should put you in good condition for an OSHA visit.

Finally, develop a line of communication through subscriptions to OSHA reporting services (such as BNA or CCH) and/or participation in trade associations and safety councils to stay abreast of OSHA standards activity to help you set your priorities toward total OSHA compliance.

If proper safety practices are followed at all times, the types of violations for which GM and many other industries have been cited would perhaps not occur. An earnest all-out effort on the part of all employees will provide a safe workplace regardless of how many times the OSHA standards are revised.

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