A total of 157 accidents and 29 deaths on grounded type vs none on double insulation.

Millers Falls in 1960 became the American pioneer in double insulation, and that year manufactured its 1144 nylon drill with a two-prong plug, the first DI tool built in the United States. The Underwriters' Laboratories, with the company's help, wrote a temporary specification and approved this tool, and the double insulation movement was launched. It was understandable, in the light of the long struggle to gain acceptance throughout the United States for three-pronged tools, that there was reluctance on the part of other manufacturers to immediately endorse a change. This reluctance extended to the National Electrical Code, but in 1962 the NEC did act to approve the use of double-insulated tools in residential occupancies. Since that time, over half of the states have amended their codes to permit both residential and industry use, and many manufacturers, other than Miller Falls, have started to manufacture and sell double insulated tools.

The National Code, however, is not easily changed. For a long time it was felt that field tests had not developed sufficiently to justify a change. The controversy centered in Electric Code Making Panel No. 5, a sub-committee concerned with methods and specifications on grounding. Among the strongest proponents for double insulation was the Underwriters' Laboratories.

In the meantime, as state after state approved the industrial use of portable power tools, resistance lessened. Impetus was further given in 1966 when New York State approved the industrial use of such tools. The final change came on December 9, 1966 when the Correlating Committee of National Electrical Code endorsed Panel 5's interim change to the code approving use of approved double-insulated, two-pronged tools in industry. The 1968 Code lists the approval of the use of approved double insulated tools in both residential and industrial applications.

At the present time, Miller Falls has introduced over 100 industrial and consumer DI shock-proof tools; other manufacturers, including Black & Decker, Skil, Rockwell (Porter-Cable), Stanley, Thor, Sears, Montgomery Ward, and others have added double-insulated tools to their line.

Some persons in industry, outside Miller Falls, have predicted that double-insulation will become standard throughout the United States within ten years as more and more tool companies turn to their manufacture.

PRODUCT LIABILITY—PRECAUTIONARY LABELING OF PETROLEUM PRODUCTS

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The safe use of petroleum products has been of prime interest to the oil industry for many years. It can be achiev d only if users know which products are hazardous and what measures should be taken to avoid illness or injury. Industry, including ours, and government have found that one effective aid is the use of precautionary labels for products which may be hazardous, whether they are encountered at work or in the home.

The policy of the American Petroleum Institute with respect to precautionary labeling reads, in part: "The petroleum industry recognizes the value of precautionary labels on containers of commercial products where their normal use and handling may constitute a significant health or accident hazard."

This policy was formally adopted in the mid-1950's. But long before that time the industry was using some precautionary labels. Probably the most familiar one is almost 45 years old. It is the sign on pumps that dispense leaded gasoline. It says in part, "For use as motor fuel only." This was a voluntary move taken after discussion between the manufacturers of anti-knock compounds, oil companies, and the Surgeon General of the Public Health Service. It is one of the best known and oldest examples of voluntary industry action in the field of consumer protection.

In addition to voluntary industry action in precautionary labeling, there are many statutory requirements, Federal, state and municipal, that affect petroleum products. The principal Federal requirements are the Interstate Commerce Commission regulations, the Federal Hazardous Substances Act, and the Federal Insecticide, Fungicide, and Rodenticide Act. All of these require labeling of certain petroleum products. The Los Angeles and New York City Fire Department regulations are the best-known municipal regulations. Many states have laws in this area. Just recently, the six common-market countries in Europe have begun to adopt labeling rules.

Many variations exist in the labeling requirements of the different jurisdictions. This lack of uniformity presents a problem for companies who market nation-wide. It was especially true in the household products field until 1966. An amendment to the Federal Hazardous Substances Act, in that year, preempted this field to the Federal government. Now, any state or local law having requirements affecting household products is void if it differs from the Federal requirements. Industry's goal is complete uniformity. Perhaps some day it will be reached.

Despite the differences, certain common principles exist. (Incidentally, they were first expressed by a trade association — The Manufacturing Chemists' Association — in 1945). These principles, as they apply to petroleum products are:

1. A label should be a true estimate of personal hazard, based on experience, laboratory testing (especially biological testing), and the inherent chemical and physical nature of the product.

2. Labels should not be used for relatively harmless products and should not contain unnecessary warnings because such practices foster disregard of all labels and promote careless and improper handling.

3. Precautionary wording should be selected by those who not only know the nature of the product but also have a broad acquaintance with its field of use.

4. Precautionary labels are primarily intended for use on containers. In the oil industry they are prepared for use on drums and smaller units. Thus, quantity is important when considering the wording relating to predominant use.

A good precautionary label should satisfy these requirements:

1. Statements should be brief, accurate, and simple to understand.

2. It should call attention not only to hazards due to the inherent nature of the substances, but also to hazards arising out of the reasonably-anticipated conditions of storage, handling, and use.

3. It should represent the best available knowledge of the product and its behavior. If data are not adequate, the label should so state.

These requirements apply equally to industrial and household products. They are the basis for voluntary labeling programs and of requirements imposed by laws.

To repeat, the objective of precautionary labeling is to prevent illness or injury among persons using or exposed to potentially hazardous substances. Industry has accomplished much in protecting workers on the job from hazardous substances. The big problem exists in the home, primarily because of the presence of small children. Annually, an estimated 500,000 children swallow products left within reach. Petroleum products are involved in probably about five per cent of these accidental ingestions. Most of the incidents involve drugs and other medicines.

Fatalities from accidental ingestion also show the magnitude of the household problem. In a 13-year period (1952-1964) deaths from accidental poisoning among children under five years of age averaged 418 annually. Deaths due to swallowing of petroleum products averaged 78 annually, or about 18 per cent of the total. But the deaths from petroleum products dropped from an average of 105 in 1952 and 1953 to 46 in 1963 and 1964. Deaths from all substances in these same years decreased from 444 (in 1952 and 1953) only to 421 (in 1963 and 1964). This favorable experience with petroleum products is not all because of precautionary labeling. A better knowledge by physicians on the proper treatment, we feel, is an important factor. (It is worthy to note here that the API contributed considerable money to support research in the development of proper treatment for accidental ingestion of petroleum products by children.)

It is not the purpose of this paper to teach in detail how to write a precautionary label for a petroleum product. An excellent guide is API Bulletin 2511 on *Precautionary Labeling*. The second edition (1964) is undergoing revision, but the principles will be unchanged in the third edition, which should be available in 1969.

The obvious first step in preparing a label is to determine if the substance is hazardous. A hazardous substance (or mixture of substances) is one which: is toxic; is corrosive to tissue; is an irritant; is a strong sensitizer; is flammable; or generates pressure through decomposition, heat, or other means — if such substance may cause substantial personal injury or illness during, or as a direct result of any customary or reasonably-anticipated handling or use. (The hazards of radioactive substances are a separate matter, outside the scope of this discussion of commercial petroleum products.)

This definition of a hazardous substance necessitates the determination of six different properties:

Toxicity. The inherent capacity of a substance to produce personal injury or illness in man as a result of ingestion, inhalation, or absorption through any body surface.

Corrosiveness. The property of a substance which, in contact with living tissue, causes destruction of the tissue by chemical action. It does not refer to action on inanimate surfaces.

Irritation. The extent to which a substance, as a result of immediate, prolonged, or repeated contact with normal, living tissue, will induce a local inflammatory reaction. Most commonly, the tissues to be considered are the skin, eyes, and surfaces of the respiratory tract.

Sensitization. The property of a substance to produce on normal, living tissue, through an allergic or photodynamic process, a hypersensitivity which becomes evident in reapplication of the same substance.

Flammability. The property of a substance, solid, or liquid, which enables it to burn. For a liquid, the degree of flammability depends on its flash point. Everyone seems to have his own definition of a flammable liquid. The ICC describes a flammable liquid as one with a flash point of 80°F or below. The Federal Hazardous Substances Act uses this same cut-off point, but classes those with flash points of 20°F or below as extremely flammable. The New York City Fire Department uses 100°F as the top limit for flammable liquids.

There is a flash point temperature above which the hazard of flammability is not considered great enough to require a precautionary label. Between this temperature and the temperature presently used to class a substance as flammable, an area of uncertainty exists. This is the area which many sincere authorities feel needs attention: the lowest class of flammability. The API Committee on Precautionary Labeling believes, currently, that petroleum products with flash points above 80°F to 120°F should be classed as "Combustible." This differs from the 150 top figure of the MCA and some other groups. The 80°F and 120°F range includes Stoddard solvent, a widely-used cleaning solvent, and most kerosenes.

The volatility of materials in this range is such that care is needed in handling these petroleum products. This range does not include domestic heating oil, both in view of its history as an article of commerce and in accordance with the true purpose of all precautionary labeling.

Flammable solids are harder to define. Whatever definition or description is used, it would, at most, affect only a very few petroleum products.

Pressure Generators. Examples are contents of self-pressurized containers, those which can be exploded by an electrical spark or by percussion, and those which erupt from their opened containers at temperatures of 130°F or less after being in the closed container at 130°F for two days.

When information on these six properties has been developed and it indicates that the substance is hazardous, a precautionary label can be prepared. A proper label includes these components arranged in this sequence:

Name of the product. The chemical or commonly recognized generic name of the contents. Usually, a trade name is inadequate. In mixtures, the chemical or generic name of the hazardous components should be given.

Signal word. This word describes the degree of hazard. The words used are "danger!" "warning!" and caution!" in descending order of seriousness of risk. The word "poison" is not a signal word. Its use on a label should be limited to those products which are poisons by a definite toxicity standard or when required by law.

Statement of Hazard. This is a brief, accurate, affirmative statement of the major hazard or hazards.

Precautionary Measures. Action to be followed and to be avoided to prevent the injury or illness stated in the preceding item.

Emergency Action and First Aid. Brief, simple instructions to be followed in the event injury has occurred. If the substance is a poison, the prescribed antidote should be stated here.

Container Storage and Handling. Only when indicated because of the nature of the contents, or when required by law. The statement, "Keep out of reach of children" is required on all household containers of hazardous substances.

Name and Address of the Manufacturer. Good labeling practice and legal requirements dictate that a precautionary label shall be prominent, conspicuous, legible, and in contrast to other printed matter on the container. Type size, color, and location of the label on the container are prescribed in many laws and regulations.

How do commercial petroleum products stand with respect to the six criteria of hazards whether encountered at home or at work? For the purpose of this part of the discussion, commercial petroleum products include fuels, solvents, lubricating oils, greases, and asphaltic materials. Excluded are the many petrochemicals and fertilizers produced by the oil industry, antifreezes, and the great number and variety of automotive specialty products sold in service stations.

The great bulk of these commercial products present no hazard in normal handling, storage, and use. With many, flammability may be the only risk, and the extent to which this hazard is present is roughly indicated by the predominant use.

As regards corrosiveness, I know of no commercial product that causes tissue destruction by chemical action as result of contact. Sensitization to petroleum products is so infrequent that it is not considered a significant hazard. An occasional individual may develop a sensitization to a straight petroleum distillate, but such cases are too few to require their classification as strong sensitizers. However, a few compounded lubricants have caused episodes of skin sensitization because of the presence of a sensitizing additive in the product. One that comes to mind is mercaptobenzothiazole, an antioxidant sometimes used in cutting oils. It has been used for many years in the rubber industry, with an apparently good experience among workers handling it as a solid. But when dissolved in mineral oils, it has caused sensitization. Cases have been reported in Sweden. This is an example of a situation where precautionary labeling will not control the problem. Skin contact with cutting oils can only be minimized; it cannot be completely eliminated. Removal of the offending agent is the solution. There have been some cases of photo-sensitivity from some asphaltic products but again, their number does not appear significant.

As far as pressure generation being a hazard, this problem is minimal except for aerosol and other pressurized containers.

Commercial petroleum products do present a potential irritation problem. The hazard of irritation to the respiratory tract surfaces because of vapor inhalation, in my opinion, is not significant. Eye contact with liquid petroleum products, especially the light ones, may cause some eye irritation. Generally, this is mild and transitory. Flushing with water usually eliminates the discomfort. Permanent eye damage as a result of contact is not expected.

Skin irritation is a hazard of commercial petroleum products, particularly in industry. Petroleum hydrocarbons are good fat solvents. Prolonged or repeated skin contact with petroleum solvents and light oils will defat the skin. It will become dry, fissured, and cracked. Dermatitis may develop. Infection may set in from the bacteria normally present on the skin and in the air. In the home, skin irritation from petroleum products is usually not a problem although dermatitis does occur there. Hobby pursuits may involve skin contact. Some household cleaning agents contain petroleum solvents which may contribute to "housewife hands."

Paint thinners, brush cleaners also may contain these solvents. But the relative infrequency of their use in the home helps the situation.

The heavier products, greases and heavy industrial oils, can also cause dermatitis. They can cause plugging of the skin pores and result in an accumulation of fat, skin oils, bacteria, and dead cells in the pores. Pimples and local infections can develop. The solution of the problem is good personal cleanliness. Precautionary labeling is not considered necessary to advise people to keep clean. If it were, almost everything would have to be so labeled.

The last hazard to consider is that of toxicity. Earlier, toxicity was defined as the inherent capacity of a substance to produce personal injury or illness in man as a result of ingestion, inhalation, or absorption through any body surface.

Petroleum products, as a class, have low toxicities. Absorption through the skin seldom constitutes a hazard. When skin absorption is a problem it is generally due to the presence of an additive in the product.

Inhalation of vapors of volatile petroleum products may be hazardous under certain conditions. These vapors act as simple anesthetics. When inhaled in sufficient amounts, they can cause symptoms of inebriation, those of the so-called "gasoline jag." Higher concentrations can result in loss of consciousness. "Gasoline sniffers" deliberately inhale the vapors to get a lift. Recovery from gassing caused by such vapors is usually without incident and without aftereffects, with one notable exception. If the product contains benzene in a significant quantity, and the exposure is sufficiently prolonged or repeated, permanent health damage can result. The effect is aplastic anemia due to the action of benzene on the blood-forming organs. Benzene is unique in this respect. No other hydrocarbon is known to cause this effect.

The oral toxicities of petroleum products are low. In industry, systemic poisoning as a result of oral ingestion of petroleum products does not constitute a problem. However, in the home, it is a definite hazard, especially among small children. Even here, it is not because of its oral toxicity. An ounce of kerosene, for example, in a child's stomach, would not be expected to cause a fatality. Deaths following ingestion of the very light petroleum distillates, such as gasoline, naphtha, mineral spirits, Stoddard solvent, kerosene, and mineral seal oil, occur as a result of aspiration of the material into the lungs. The familiar red-colored furniture polishes have caused many deaths of children. These polishes usually consist of mineral seal oil, small amounts of a dye, an odorant, and sometimes a small amount of a wax.

Human experience indicates that petroleum distillates with viscosities above that of mineral seal oil (about 43 SSU at 100°F) do not possess this aspiration hazard to any significant degree. Animal experimentation supports this conclusion.

This hazard of aspiration is the reason for what may appear to be an unusual instruction on certain hazardous household products. Most instructions on emergency treatment after swallowing a hazardous substance read, "Induce vomiting." But with these distillates, the statement is "If swallowed *do not* induce vomiting. Call physician immediately". A small amount of one of these distillates (the quantity usually taken by a small child) will not be harmful if left in the stomach. Most knowledgeable pediatricians say that it may be desirable to give the child a small amount of a salad or vegetable oil.

So far, in this presentation, nothing has been said about the first two words of the title of this paper, "Product Liability." This is a subject that should be discussed by a lawyer, not an industrial hygienist. But a few comments are appropriate.

First is the matter of hazardous substances that are not labeled or are mislabeled. The chances are that such omissions or errors are in violation of a law or regulation. Practically all of these laws prescribe penalties for these violations. For example, the Federal Hazardous Substances Act contains these four provisions.

1. FDA inspectors can inspect plants, warehouses and other establishments. They can (and do) inspect pertinent equipment, materials, labels, and obtain packaged and unpackaged products, subject to the Act.

2. Shipments in violation of the requirements can be seized. The owner or his agent then has three choices: (a) he can deny the violation, and the FDA may then contest the case in a federal court; (b) he can admit the violation and ask the court for permis-

sion to post bond and relabel the product; (c) he can do nothing. Then the product will be condemned by default and destroyed or otherwise disposed of, as determined by the court.

3. Criminal prosecution (whether the product is seized or not) can be instituted in Federal court. A guilty plea or a finding of guilt can result in a fine of not more than $500 or imprisonment for not more than 90 days or both for each separate offense. If there is intent to defraud or mislead, or for second and subsequent offenses, the penalties are more severe — a fine not over $3,000 or no more than one year in jail or both.

4. Injunctions can be sought to restrain a person from the commission of further violations. Failure to comply with the injunction may result in criminal contempt proceedings.

The Food and Drug Administration has not been inactive in its enforcement work. During a reporting period from February 1967 to July 1968, judgments were completed in 64 cases involving 84 products. Destruction was ordered for 46 products and 36 were released for relabeling. Disposition of two products was not reported. (The multiple seizures of X-33 water repellant, Cracker Ball Caps, flammable rag dogs, and Magic Rocks — sodium silicate — are not included in these figures). Hazardous petroleum distillates were involved in 22 of the 84 products on which judgments were ordered. During this same reporting period, 43 seizure actions involving 60 substances or products also occurred, final actions on which are still pending.

In the states that require the labeling of hazardous substances used in industry, the Labor Department is generally the enforcing agent. The penalties for non-compliance are, for the most part, the same or similar to those for other violations of the state labor regulations.

The second problem is that of liability because of injury or illness caused by a hazardous substance. Civil suits because of such injuries or illnesses are increasing in number. The dollar amounts of awards are also increasing. If a plaintiff can show that the hazardous substance was not labeled or was improperly labeled, a good case for negligence on the part of the manufacturer can usually be established and without too much difficulty.

An adequate precautionary label on a hazardous substance probably would negate a charge of negligence. It should not be considered as complete protection against damage suits or an award for damages. Witness this example:

A small child swallowed some red furniture polish, aspirated it, and died. The parents filed suit against the manufacturer. The court found that the label wording was adequate although it was printed in red on a brown background in rather small type. The type size was in reasonable proportion to other type on the label. The mother said she knew how to use the polish and and admitted that because of this she did not read all of the precautionary wording. An award of $20,000 was made and affirmed by the appeals court. However, all of the award was given to the father; the court said that the mother should not share in it because she contributed to the death of the child.

INTRINSIC SAFETY IN THE PETROLEUM INDUSTRY

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Intrinsic safety — what is it, where can it be used, and what are the design requirements for intrinsically safe equipment and circuitry? We will attempt to answer these questions without dwelling on the detailed technical aspects mainly because you, as safety directors and safety engineers, are not too involved in the details.

In recent years, refinery people and equipment manufacturers in the United States have been applying the concept of intrinsic safety without having any common ground rules. It appeared everyone had their own standards and was manufacturing and installing equipment as they saw fit. This condition became alarming to both the petroleum and chemical industries, where flammable atmospheres are prevalent. The purpose of this paper is to make you aware of the standards that are being prepared which will be discussed later.

The basic definition of intrinsically safe electrical equipment is: . . . "equipment and wiring which are incapable of releasing sufficient electrical energy under normal or abnormal conditions to cause ignition of a specific hazardous atmospheric mixture." In other words, energy is limited at all times to levels which cannot possibly initiate an explosion. Lighting and power circuits, therefore, cannot adhere to the concept of intrinsic safety. However, instrumentation, remote control, and signal circuits can be well adapted because of the inherently low power.

Approved intrinsically safe systems are recognized in Article 500 of the National Electrical Code and are considered safe for use in the specified hazardous atmospheres without special enclosures or physical protection that would otherwise be needed. This equipment is appropriate for use in Division 1 and Division 2 locations. Division 1 areas are those that have a hazardous atmosphere mixture continuously under normal conditions, while Division 2 areas are those that have the potential of containing explosive atmospheres only under abnormal conditions, such as failure of equipment.

Although the National Electrical Code makes the above recognition, there is lacking, for the designer and for the inspector, a set of standards to provide information for the design and evaluation of equipment. The National Fire Protection Association became aware of this problem, and in 1963 they formed the Sectional Committee on Electrical Equipment in Chemical Atmospheres. One part of the scope of this committee is to make recommendations for the prevention of fires and explosions through the use of intrinsically safe, continuously purged, pressurized, explosion-proof, or dust ignition-proof electrical equipment when installed in chemical atmospheres.

This committee immediately recognized its challenge and prepared NFPA publication No. 469 *Purged Enclosures for Electrical Equipment* which provides information for the design of purged enclosures for the purpose of eliminating or reducing the hazardous location classification. In addition, NFPA No. 493-T, Tentative Standard for Intrinsically Safe Process Control Equipment for Use in Hazardous Locations, was also completed. The object of this standard is to provide information for the design and evaluation of equipment depending for safety on limitation of energy to be used in Class I hazardous locations as defined in Article 500 of the National Electrical Code. It is not an instruction manual for untrained persons, but is intended to promote uniformity of practice among those skilled in the art.

I will briefly review the six chapters of this publication. Chapter 1, "General Provisions," covers the object and scope of the standard which was mentioned previously and mentions the equipment covered, such as process control equipment, primary elements, converters, transducers, and valve operators, location of equipment, and definitions.

Chapter 2, "Fundamental Considerations," deals with the conditions that must be met to be intrinsically safe. There are two conditions: (a) the energy available in the hazardous area must be low enough under normal conditions so that it is incapable of igniting the specified hazardous atmospheric mixture due to arcing or increased temperature; (b) the energy available in the hazardous area must be low enough under abnormal conditions, i.e., with assumed fault conditions, so that it is incapable of igniting the specified hazardous atmospheric mixture due to arcing or increased temperature.

This chapter goes on to explain that intrinsically safe apparatus must be incapable of causing ignition with certain combinations of conditions, including numerous and varied types of faults. The number and types of faults are detailed.

Chapter 3, "Evaluation," explains the three steps of the evaluation procedure when analyzing a circuit to determine the effect of each possible fault and combination of faults. This evaluation may be done either theoretically or empirically. In the theoretical approach, circuit analysis consists of assuming various fault conditions and calculating resulting voltages and currents. In the empirical approach, faults are actually created and the resulting voltages and currents are measured.

Chapter 4, "Test Apparatus and Procedure," explains that the test consists of simulating the effect of opening, closing, and short circuiting that part of the wiring to be located in the hazardous area. To provide a margin of safety over actual field conditions, specialized apparatus with contacts designed to have maximum effectiveness is used, rather than contacts used in the field. The contacts are operated in a chamber filled with the most readily ignited mixture of a suitable test gas with air. Fault conditions are simulated during the test.

The chapter continues to explain in detail the test apparatus, the test mixture of the gases to be used, and the conditions under which the tests shall be performed.

Chapter 5 is "Comparison Procedure." Simple circuits, having energy levels under normal and abnormal conditions well below the known ignition limits and conforming to fault criteria more stringent than for testing, are considered intrinsically safe without actual ignition test. However, transients in complex circuits are not readily analyzed and therefore must be evaluated by actual test.

Chapter 5 highlights the ignition limits and the maximum voltage and current levels. For resistance-inductance circuits, graphs are included showing combinations of inductance, voltage, and current which will not ignite the gases; for resistance-capacitance circuits the graphs show combinations of capacitance, voltage, and current which will not ignite the gases.

Chapter 6 is on "Construction Details." When evaluating intrinsic safety, it is assumed that any component or structure can and will fail. Safety depends on a multiplicity of elements and the improbability of simultaneous failures, or it depends on such construction of one element that the probability of failure is negligible or that it can fail only in a safe direction.

This chapter discusses the elements assumed not to fail or assumed highly improbable to fail when the fault analysis is made. It also includes the testing required by manufacturers and the markings or labels that are to be installed on equipment and circuits indicating they are intrinsically safe. A conspicuous warning label shall also be included stating that any substitution of components may impair the intrinsic safety feature.

In conclusion, I want to reiterate that this NFPA publication No. 493-T is a much needed tool so the users, manufacturers, and inspectors have a common reference when the subject of intrinsic safety arises. I recommend very strongly that anyone interested in this subject obtain a copy of this standard.

HAZARDS OF ACID AND ALKALI CLEANING

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The February 9, 1968, issue of the Casper, Wyoming, *Star Tribune* carried the story. One employee died and one was given a complete exchange of blood to save his life. The first report was that the dead employee had suffered a fatal heart attack, but later reports indicated that arsine gas was involved. The employee became sick to his stomach, vomited, and then suddenly keeled over dead or died shortly afterward. The report stated that an acid inhibitor accidentally came in contact with galvanized coating on a well pipe on which the men were working. Although nothing further has come to our attention on this case, it is reasonable to assume that the acid inhibitor referred to was an arsenic compound, that there would have been hydrochloric or muriatic acid present, and that the acid in contact with the zinc released hydrogen which in turn reacted with the arsenic in the inhibitor to produce arsine gas. The company involved is widely engaged in the chemical or acid cleaning business and arsenic-type inhibitors are used, essentially in acid cleaning in the oil fields, to prevent the acid from attacking the metal once the rust and sludges have been cleaned away. Zinc or galvanized metal