

The employer must screen employees for history of certain medical conditions which might place the employee at increased risk from exposure.

1. *Central nervous system dysfunction.* Acute effects of exposure to acrylonitrile generally involve the central nervous system. Symptoms of acrylonitrile exposure include headache, nausea, dizziness, and general weakness. The animal studies cited above suggest possible carcinogenic effects of acrylonitrile on the central nervous system, since rats exposed by either inhalation or ingestion have developed similar CNS tumors.

2. *Respiratory disease.* The duPont data indicate an increased risk of lung cancer among employees exposed to acrylonitrile.

3. *Gastrointestinal disease.* The duPont data indicate an increased risk of cancer of the colon among employees exposed to acrylonitrile. In addition, the animal studies show possible tumorigenic effects on the stomachs of the rats in the ingestion study.

4. *Skin disease.* Acrylonitrile can cause skin burns when prolonged skin contact with the liquid occurs. In addition, repeated skin contact with the liquid can cause dermatitis.

5. *General.* The purpose of the medical procedures outlined in the standard is to es-

tablish a baseline for future health monitoring. Persons unusually susceptible to the effects of anoxia or those with anemia would be expected to be at increased risk. In addition to emphasis on the CNS, respiratory and gastrointestinal systems, the cardiovascular system, liver and kidney function should also be stressed.

APPENDIX REFERENCES

1. Communication from A. C. Clark, Manufacturing Chemists Association (MCA), to Douglas Costle, Environmental Protection Agency, dated April 11, 1977.
2. Norris, J. M., "Status Report on the 2-year Study Incorporating Acrylonitrile in the Drinking Water of Rats" (an MCA-sponsored study done by Dow Chemical), dated Jan. 12, 1977.
3. Quast, J. F., et al., "Toxicity of Drinking Water Containing Acrylonitrile (AN) in Rats: Results After 12 Months" (an MCA-sponsored study done by Dow Chemical), dated March 1977.
4. O'Berg, M. T., "Epidemiologic Study of Workers Exposed to Acrylonitrile: Preliminary Results," duPont Company, May 1977.
5. Kirk-Othmer Encyclopedia of Chemical Technology, 2nd ed. A. Stauden, Executive Editor, p. 319, 1972.

6. American Conference of Governmental Industrial Hygienists "Acrylonitrile," Documentation of the Threshold Limit Values for Substances in Workroom Air (3d Ed., 2d printing), Cincinnati, 1974, p. 6.

7. Manufacturing Chemists Association, Inc., Chemical Safety Data Sheet SD-31, "Acrylonitrile," Washington, D.C., 1974, pp. 16-19.

8. Brieger, H., et al., "Acrylonitrile: Spectrophotometric Determination, Acute Toxicity, and Mechanism of Action," A.M.A. Archives of Industrial Hygiene and Occupational Medicine, 6:128-140, 1952.

9. Wolfst, J. H., "Treatment of Cyanide Poisoning in Industry," A.M.A. Archives of Industrial Hygiene and Occupational Medicine, 4:417-425, 1951.

10. Hygienic Guide Series: "Acrylonitrile," American Industrial Hygiene Association Journal, 18:78-79, 1957.

11. Patty, F. A., "Industrial Hygiene and Toxicology," Volume II: Toxicology (2d Ed., revised), Interscience Publishing Co., New York, 1963, pp. 1992, 2009-2012.

(Secs. 4, 6, 8, 84 Stat. 1593, 1599 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 8-76 (41 FR 25059); 29 CFR Part 1911.)

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DEPARTMENT OF LABOR

Occupational Safety and Health Administration

[29 CFR Part 1910]

[Docket No. H-108]

OCCUPATIONAL EXPOSURE TO
ACRYLONITRILE (VINYL CYANIDE)

Proposed Standard and Notice of Hearing

AGENCY: Occupational Safety and Health Administration (OSHA), Department of Labor

ACTION: Proposed rule and notice of hearing.

SUMMARY: The Occupational Safety and Health Administration (OSHA), in today's issue of the FEDERAL REGISTER at page —, published an Emergency Temporary Standard (ETS) regulating employee exposure to acrylonitrile (AN) (vinyl cyanide). The basis for the ETS was a determination by the Assistant Secretary, based on animal and human epidemiological data, that exposure to acrylonitrile constitutes a cancer hazard. By this notice, OSHA proposes a permanent standard for the regulation of acrylonitrile. The proposal contains three alternative sets of permissible exposure limits which are among those being considered by OSHA for the permanent standard: 2 parts AN per million parts of air (2 ppm) as an eight (8)-hour time-weighted average (TWA), with a 10 ppm ceiling limit over any 15 minute period during the workshift; 1 ppm TWA with a 5 ppm ceiling; and 0.2 ppm TWA with a 1 ppm ceiling. In addition, the proposal would prohibit eye and skin exposure. An "action level" equal to an eight (8)-hour TWA of one-half the permissible exposure limit, is included in the proposal. The proposed standard contains several conditions upon which operations involving the fabrication of products from polyacrylonitrile (PAN) may be exempted from coverage. The proposal requires, among other things, certain methods of compliance, personal protective equipment, measurement of employee exposures, training, work practices, medical surveillance, signs, labels, and recordkeeping. A permanent standard will supersede the existing ETS at the conclusion of the rulemaking.

DATES: Comments concerning the proposed permanent standard must be postmarked on or before February 21, 1978. Notices of intention to appear at the informal rulemaking hearing must be postmarked on or before February 27, 1978. Parties requesting more than 15 minutes for their presentations at the hearing, and parties submitting documentary evidence at the hearing must submit the full text of their testimony and all documentary evidence

no later than March 7, 1978. An informal public rulemaking hearing is scheduled to begin March 21, 1978.

FOR FURTHER INFORMATION
CONTACT:

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SUPPLEMENTARY INFORMATION:

I. BACKGROUND

In today's issue of the FEDERAL REGISTER, OSHA has published an Emergency Temporary Standard (ETS) regulating exposure to acrylonitrile (AN) in the workplace (29 CFR 1910.1045). The ETS, and the preamble explaining the reasons therefor, are incorporated herein in their entirety. Pursuant to sections 6(b), 6(c), and 8(c) of the Occupational Safety and Health Act of 1970 (the Act) (84 Stat. 1593, 1596, 1599; 29 U.S.C. 655, 657), the Secretary of Labor's Order No. 8-76 (41 FR 25059), and 29 CFR Part 1911, it is hereby proposed to amend Part 1910 of 29 CFR by revising 29 CFR 1910.1045 (43 FR —).

This proposed permanent standard applies to all employments in all industries covered by the Act, namely "general industry," construction and maritime.

OSHA seeks public comments, information, and evidence on all issues raised in the ETS and the proposal, including the following:

1. Whether the proposed provisions would provide adequate worker protection from all health hazards associated with AN exposure.

2. Whether .2 ppm TWA and 1 ppm ceiling are sufficiently low to adequately protect employees; whether 1 ppm TWA and 5 ppm ceiling will adequately protect employees; whether 2 ppm TWA and 10 ppm ceiling will adequately protect employees; and whether PEL's other than those expressly proposed would adequately protect employees.

3. Whether compliance with a .2 ppm TWA and 1 ppm ceiling is feasible for all affected industries; whether compliance with a 1 ppm TWA and 5 ppm ceiling is feasible for all affected industries; and whether compliance with 2 ppm TWA and 10 ppm ceiling is feasible for all affected industries.

4. Whether eye and skin contact with AN should be prohibited.

5. Whether a weekly survey of operations involving liquid AN to determine points of AN release is appropriate for the standard, and what types of equipment are available for such a survey.

6. Whether the provisions for recordkeeping, methods of compliance, medical surveillance, regulated areas, personal protective equipment, protec-

tive clothing, hygiene facilities and practices are appropriate and feasible.

7. Whether medical removal protection should be provided where, as a result of the medical surveillance program, it is determined that an employee is at an increased risk of material impairment of health from further exposure to AN.

8. Whether the provisions for training, posting and labeling are appropriate and fully apprise employees of the hazards of AN exposure.

9. Whether levels of residual AN can adequately be correlated with employee exposures; and whether quantities of residual AN can feasibly be reduced in acrylonitrile-based polymers and polymer products as a means of controlling employee exposures.

10. Whether the proposed action has any significant adverse environmental impact.

11. What is the economic impact of the proposed actions?

12. What methods are available for monitoring and determining employee exposures to AN, including passive dosimeters, and what are their sensitivities, accuracies, and possible interference?

In the development of this proposal, OSHA has received recommendations and data from the National Institute for Occupational Safety and Health, as well as numerous reference works, studies, case histories, and journal articles, some of which are included in the reference section of the ETS. The discussions in the ETS which conclude that acrylonitrile poses a cancer hazard to humans will not be repeated here.

II. PERTINENT LEGAL AUTHORITY

The primary purpose of the Act is to assure, so far as possible, safe and healthful working conditions for every working man and woman. One means prescribed by Congress to achieve this goal is the authority vested in the Secretary of Labor to set mandatory safety and health standards.

Occupational safety and health standards provide notice of the requisite conduct or exposure level and provide a basis for assuring the existence of safe and healthful workplaces. The act provides that:

The Secretary, in promulgating standards dealing with toxic materials or harmful physical agents under this subsection, shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such a standard for the period of his working life. Development of standards under this subsection shall be based upon research, demonstrations, experiments, and such other information as may be appropriate. In addition to the attainment of the highest degree of health and safety protection for the employee, other considerations

shall be the latest available scientific data in the field, the feasibility of the standards, and experience gained under this and other health and safety laws. (Section 6(b)(5).)

Sections 2(b) (5) and (6), 20, 21, and 24 of the Act reflect Congress' recognition that conclusive medical or scientific evidence, including causative factors, epidemiological studies or dose-response data, may not exist for many toxic materials or harmful physical agents. Nevertheless, standards cannot be postponed because definitive medical or scientific evidence is not currently available. Indeed, standards need only be supported by the best available evidence. The legislative history makes it clear that "it is not intended that the Secretary be paralyzed by debate surrounding diverse medical opinion." House Committee on Education and Labor, Report No. 91-1291, 91st Cong., 2d Session, p. 18 (1970). This Congressional judgment is supported by the courts which have reviewed standards promulgated under the Act. In sustaining the standard for occupational exposure to vinyl chloride (29 CFR 1910.1017), the U.S. Court of Appeals for the Second Circuit stated that "it remains the duty of the Secretary to act to protect the working man, and to act even in circumstances where existing methodology or research is deficient." *Society of the Plastics Industry, Inc. v. Occupational Safety and Health Administration*, 509 F. 2d 1301 (2d Cir., 1975), cert. denied, 421 U.S. 992 (1975).

A similar rationale was applied by the U.S. Court of Appeals for the District of Columbia Circuit in reviewing the standard for occupational exposure to asbestos (29 CFR 1910.1001). The Court stated that:

Some of the questions involved in the promulgation of these standards are on the frontiers of scientific knowledge, and consequently as to them insufficient data is presently available to make a fully informed factual determination. Decision-making must in that circumstance depend to a greater extent upon policy judgments and less upon purely factual judgments.

Industrial Union Department, AFL-CIO v. Hodgson, 499 F. 2d 467, 474 (C.A.D.C. 1974).

In setting standards, the Secretary is expressly required to consider the feasibility of the proposed standards. Senate Committee on Labor and Public Welfare, S. Rept. No. 91-1282, 91st Cong., 2d Sess., p. 58 (1970). Nevertheless, considerations of technological feasibility are not limited to devices already developed and in use. Standards may require improvements in existing technologies or require the development of new technology. *Society of the Plastics Industry, Inc. v. Occupational Safety and Health Administration*, *supra*, at 1309.

Where appropriate, the standards are required to include provisions for labels or other forms of warning to ap-

prise employees of hazards, suitable protective equipment, control procedures, monitoring and measuring of employee exposure, employee access to the results of monitoring, and appropriate medical examinations. Moreover, where a standard prescribes medical examinations or other tests, they must be made available at no cost to the employees (section 6(b)(7)). Standards may also prescribe record-keeping requirements where necessary or appropriate for enforcement of the Act or for developing information regarding occupational accidents and illnesses (Section 8(c)).

III. SUMMARY AND EXPLANATION OF ADDITIONS TO OR MODIFICATIONS OF THE ETS

The requirements imposed by OSHA in the ETS are those requirements which OSHA considers to be essential and feasible to meet immediately, pending the development of a permanent standard. The preamble to the ETS explains the purpose and rationale for the provisions of the ETS. The following sections discuss provisions of the proposal which differ significantly from the ETS and which OSHA believes are more appropriate for a permanent regulation of employee exposure to acrylonitrile.

1. *Paragraph (a).—Scope and application.* The proposal, as does the ETS, includes conditions upon which an employer involved in the processing, use, or handling of materials made from polyacrylonitrile (PAN) can obtain exemption from the provisions of the standard. However, because the proposal contains several alternative sets of permissible exposure limits, as will be discussed below, the conditions for exemption in the proposal must be changed to reflect the various alternatives under consideration. The changes that are made in the exemptions as proposed are intended to assure that employees engaged in processing operations will not be exposed above the action level which applies for each alternative set of permissible exposure limits.

The first condition for exemption under the ETS applies if an employer can provide, and establish that he reasonably relied upon, objective data to demonstrate that the material to be processed is incapable of releasing AN resulting in air concentrations above 1 ppm under the expected conditions of use which will cause the greatest release. In the proposal, the level for exemption is maintained at one-half the permissible TWA exposure limit. Thus, for a permissible exposure limit of 2 ppm, materials which are incapable of releasing AN above 1 ppm would be exempted; for a permissible exposure limit of 1 ppm, the exemption level would be 0.5 ppm; and for a permissible exposure limit of 0.2 ppm, the exemption level would be 0.1 ppm.

This should not be confused with the action level concept, which refers to employee exposures rather than to the capability of release above certain levels.

In addition to the two conditions for exemptions contained in the ETS, OSHA is proposing a third condition for exemption from the provisions of the permanent standard, based upon residual AN content of products fabricated from polyacrylonitrile (PAN). Except for latexes and other liquid mixtures, where the material to be processed contains less than a specified amount of residual AN by weight, the processing, handling, and use of that material would be exempted from the standard. At the present time, the proposal does not include a particular level which would qualify for the exemption. The reasons for this action are threefold. First, there is presently no data in the record upon which OSHA can reliably make any definite correlation between residual levels and resulting airborne concentrations of AN during processing. Second, OSHA notes with interest that manufacturers are presently developing more efficient methods for stripping residual monomer from their polymers. The Agency anticipates the receipt of information during the course of this rulemaking as to the techniques employed and the progress being made in improving them. As noted in the ETS, the lower the residual AN levels in PAN the lower the potential for AN exposures to employees working with the PAN in processing operations. Third, the alternative sets of permissible exposure limits in the proposal, together with their respective action levels, provide upper bounds against which any conditions for exemption from the standard must be evaluated. In brief, the lower the exposure limit being considered, the more limited will be the exemption in order to assure that employees who are exempted are not, in fact, being exposed above the action level. Because of the range of exposure limits under consideration, OSHA believes that it is prudent not to propose a specific upper bound for residual AN at this time, but that such a determination should await the submission of comments and data on residual AN levels in various PAN materials, the effectiveness of existing and prospective stripping methods, and correlations between residual AN levels and resulting air concentrations of AN various during processing operations.

The third condition for exemption in the proposal, which concerns PAN materials which are not heated or melted, is unchanged from the ETS. OSHA believes that the processing of PAN (except for latexes and other liquid mixtures) without heating or melting does not present a significant

AN exposure potential to employees.

OSHA welcomes data and information on residual AN levels in AN-based polymers and products, and their relationship to airborne concentrations of AN which may be released during operations where such polymers and products are processed. OSHA also requests data and information on the technology involved in the removal of residual monomer from PAN, and the methods used in determining the amounts of AN remaining in the polymer both before and after stripping.

In exempting operations based upon the residual AN content of materials being processed, OSHA is considering a provision which would lower the maximum allowable residual content by incremental steps during the first year or two years after the final standard becomes effective. As previously noted, the appropriate residual levels have not yet been determined, but will depend upon data and information received in the course of the rulemaking proceedings. Lowering levels of residual AN for the exemption incrementally would allow companies sufficient lead time to develop the methods necessary to reduce the residual monomer content of their products. OSHA invites comments on the steps necessary for reduction of residual AN, the amount of time believed to be necessary to develop the appropriate technology, and the appropriateness of such a phasing-in of a lower residual AN level for the purposes of determining exemptions from the standard.

2. Paragraph (b).—Definitions. The definition of "action level" is revised from the ETS to reflect the proposed changes in the permissible exposure limits. Three alternative action levels are provided in order to correspond to the alternative sets of permissible exposure limits as proposed. The proposed action levels are defined as eight (8)-hour time-weighted average concentrations of one-half of the respective permissible exposure limits. The rationale for the action level, the effects of including it in the standard, and the ways in which it reduces the burden of compliance for many employers are all discussed in the preamble to the ETS.

A definition of the term "emergency" is added to the proposed permanent standard. For the purposes of the standard, emergencies are occurrences such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which are likely to, or do, result in unexpected exposure to acrylonitrile or to AN vapor in excess of the ceiling limit.

3. Paragraph (c).—Permissible exposure limits (PEL). The permissible exposure limits set forth in the proposal are more stringent than those in the ETS. The proposal provides three alternative sets of permissible exposure

limits for consideration; 2 ppm as an eight (8)-hour time-weighted average (TWA), with a ceiling limit of 10 ppm measured over any 15-minute period during the workshift (2/10 proposal); 1 ppm TWA with a 5 ppm ceiling (1/5 proposal); and 0.2 ppm TWA with a 1 ppm ceiling (0.2/1 proposal). The 2/10 proposal is clearly more stringent than the ETS, which also has exposure limits of 2/10, because of the greater flexibility available under the ETS as to methods of compliance, as discussed below.

The 2/10 exposure limits in the ETS are based upon the data currently in the record, which indicate, as noted in the ETS preamble, that these are the lowest levels attainable during the limited timeframe of the emergency standard. For the purposes of the final rule, however, OSHA believes that it is appropriate to look more closely at the development of improved technology. Standards may require improvements in existing technologies or require the development of new technology. *The Society of the Plastics Industry v. OSHA*, supra, at 1309. In the present situation, where efforts are already underway to improve existing methods of controlling employee exposures to AN, the proposal anticipates the continuation of such efforts and their expansion under the permanent standard. It is in this context that OSHA is considering lowering the permissible exposure limits.

By including several sets of alternative permissible exposure limits in the proposal, OSHA acknowledges that there is much data and information yet to be gathered as to what constitutes the lowest feasible level of exposure to AN in the affected industries. It should be noted that although OSHA has expressly proposed three alternative sets of permissible exposure limits, the PEL in the final rule will be the lowest feasible levels, based upon the entire record of the proceeding, and may differ from the proposed levels.

As noted in the proposed OSHA Cancer Policy, exposures to a carcinogen should be reduced to the lowest levels feasible, since there is as yet no satisfactory scientific basis for determining a no-effect or threshold level for a carcinogen for any given population (42 FR 54148, at 54174).

OSHA welcomes any and all data available as to the appropriate permissible exposure limits for AN, the feasibility of the proposed exposure limits and any other exposure limits which should be considered by OSHA, as well as other related issues.

In making a preliminary determination as to the feasibility of the proposed standard for AN, OSHA has taken note of the proven ability of the chemical and plastics industries to develop the necessary controls and other

techniques for compliance with the standard on vinyl chloride (VC) exposure (29 CFR 1910.1017). There are many similarities between VC and AN, ranging from their chemical structure through their methods of processing to the final products fabricated from them. Both are monomers, and as such, they are prized for their abilities to form useful and durable polymers, such as PVC and ABS resins, respectively.

The technology needed for the "stripping" of VC monomer from PVC resins was developed by the VC and PVC manufacturers in response to the requirements in the OSHA standards. It is anticipated that similar technological development will be necessary in some cases to achieve the same degree of reduction of AN monomer levels in AN-based resins, latexes, and other polymers. Similarly, new methods of reduction of airborne VC levels in manufacturing and polymerization operations have been forthcoming in the past several years, as have new and more sophisticated techniques of measuring those levels in the workplace. It may well become necessary for these types of innovations to be developed with regard to AN, as well, in the future.

OSHA has noted the capability of the chemical and plastics industries to adapt their operations and make necessary changes to reduce employee exposures to toxic substances and carcinogens. Many of the breakthroughs and improvements brought about in the context of vinyl chloride are relevant to the control of employee exposures to acrylonitrile. Where there are areas in which the control of VC and AN differ, OSHA is confident that the affected companies will continue to demonstrate their innovative abilities to meet the challenge. With regard to vinyl chloride, industry has shown that many problems which were formerly looked upon as unsolvable have now been solved satisfactorily. Although it cannot be said that the control of AN exposures in the workplace will be a simple matter, OSHA is confident that, based upon recent performance by the affected industries, it can be accomplished.

4. Paragraph (e).—Exposure monitoring. Weekly survey of operations involving liquid AN. OSHA recognizes that the use of instruments to detect the presence of AN at levels below the permissible exposure limits can be of great benefit in determining potential sources of employee exposure. In addition, it may also assist in pinpointing trouble spots, such as leaks and defective seals, before they become more serious problems. The data submitted into the record to date indicate that there are several methods available, such as the use of infra-red gas analyzers and multi-point sequential sam-

pling systems, which are capable of detecting AN at levels in the range of 0.2 to 0.4 ppm or below. Although there is clearly a difference between detecting AN and measuring employee exposures to AN, OSHA believes that a system for the early detection of fugitive emissions of AN can be of great value in controlling emissions and limiting potential exposures. Therefore, a weekly survey of operations involving liquid AN has been included in the proposed permanent standard.

OSHA has determined that a weekly survey would be of greatest value in operations where the monomer is produced, used, or processed, since it is in such operations that a leak or spill is most likely to occur and to cause the greatest potential for employee exposure to AN above the permissible exposure limits. The proposal would require the employer to survey, on a weekly basis, using an infra-red detector or similar AN detection system, areas of operations where liquid AN is manufactured, used, or processed.

The weekly survey requirement is flexible as to the type of equipment required for measurement of levels of AN. Employers are permitted to use such methods as detector tubes, Saran bag "grab samples", and portable infra-red gas analyzers. In addition, OSHA has learned that several companies either have installed, or are presently in the process of installing, fixed point area monitoring systems with sequential sampling, similar to those developed for detecting vinyl chloride. Such systems would be ideal for developing the kind of data to be obtained from the weekly survey, and are encouraged, but not specifically required, by the proposal. The reasons for flexibility as to the methods used in the weekly survey are twofold. First, OSHA emphasizes that the personal monitoring required by the proposal is the primary method of determining employee exposures. Detailed requirements are included in the standard as to the required precision and accuracy of the methods for determining employee exposure. The weekly survey, on the other hand, is a means of detecting AN levels before they become significant parts of an employee's exposure.

Second, the weekly survey should not be overly time-consuming. By allowing the employer the widest latitude in selecting a method that is most efficient for his/her operations, the provision most adequately assures that the survey will be carried out as required.

5. *Paragraph (f).—Regulated areas.* Where AN concentrations are in excess of permissible exposure limits, the employer must establish a regulated area. The purpose of establishing regulated areas is to limit AN exposure to as few employees as possible.

The burden on the employer is expected to be minimal, since the provisions of the proposed permanent standard require the employer merely to identify and control access to regulated areas and to notify the applicable OSHA Area Office of their existence and the conditions therein.

6. *Paragraph (g).—Methods of Compliance.* The proposed standard would require the employer to institute engineering and work practice controls to reduce employee exposures to or below the permissible limits. In situations where engineering and work practice controls that can be instituted immediately will not reduce exposures to the permissible exposure limits, these controls must nonetheless be used to reduce exposures to the lowest feasible level and be supplemented by the use of respirators. In addition, a compliance program to reduce exposures to within the permissible exposure limits solely by means of engineering and work practice controls must be developed and implemented. Written plans for this program must be developed and be furnished upon request for examination and copying to representatives of the Assistant Secretary, representatives of the Director, or affected employees. These plans must be reviewed and updated periodically to reflect the current status of the program.

Engineering controls are the preferred means of compliance because they reduce exposure hazards in the workplace environment by removing the airborne contaminant. Engineering controls may include the installation of local exhaust ventilation, modification of a process so as to reduce emission of the contaminant into the workplace, or substitution of another substance for acrylonitrile. Work practices are often necessary for the effective operation of engineering controls, and they are also a preferred means of controlling exposures.

Respirators are the least satisfactory means of control because of certain difficulties inherent in their use. Respirators are capable of providing good protection only if they are properly selected for the concentrations of airborne contaminants present, properly fitted to the employee, properly worn by the employee, and replaced when they have ceased to provide protection. While it is theoretically possible for all of these conditions to be met, it is more often the case that they are not. As a consequence, the protection of employees by respirators is not always effective.

OSHA recognizes that there are certain activities, often involving certain maintenance operations, in which the use of engineering controls to control exposures will not be feasible, regardless of the permissible exposure limits in the standard. Where the employer

can show that the engineering control of such operations is not feasible, respirators shall be permitted as a primary means of control of AN exposures.

7. *Paragraph (h).—Respiratory protection.* The provisions for respirator protection in the proposal differ from those of the ETS in three ways. First, the limits for the appropriate use of the various respirators, as specified in Table I, are adjusted to reflect the alternative permissible exposure limits as provided in the proposal. The conditions of AN exposure and respirator usage are expressed in the proposal as multiples of the permissible exposure limits instead of in terms of ppm of AN, in order to simplify the use of the table for each of the alternative sets of exposure limits. Second, the proposal includes a specific limitation on the use of respirators to comply with the permissible exposure limits. Such a limitation is consistent with the proposed hierarchy of exposure controls provided under paragraph (g) of the proposal. Third, the proposal requires that air-purifying respirators, where permitted by the proposal and the respirator table, be approved by NIOSH for use with AN, rather than generally approved for use with organic vapors, as provided in the ETS. Such specific approval will not be given by NIOSH unless the cartridges or canisters have an end-of-service-life indicator, since AN does not have a low enough odor threshold to permit detection of low level breakthrough by smell. OSHA requests information as to whether there are cartridges or canisters presently available specifically for AN which have such end-of-service-life indicators. In addition, OSHA is considering a provision similar to that in the ETS, permitting the use of cartridges or canisters if replaced before the end of their service life (where indicators exist), or at the beginning of each shift, whichever comes first. OSHA welcomes comments and testimony on the selection of appropriate respiratory protection, the proper limitations for the use of air-purifying respirators with AN, and other factors relevant to an effective respiratory protection program. In addition, OSHA also welcomes comments and testimony as to whether a quantitative fit test should be required wherever canister or cartridge respirators are to be used.

8. *Paragraph (i).—Medical surveillance.* The medical surveillance provisions of the proposed standard are substantially identical with those of the ETS. Both sets of provisions give particular emphasis to the central nervous system, the respiratory system and lower digestive tract. These represent the areas which the relevant animal studies and human epidemiological study indicate to be the major target sites for production of malignancy as a result of AN exposure. The

physical examination required in the proposed standard will be required annually for all AN-exposed employees. OSHA requests additional information on tests and analyses which may be helpful in the early diagnosis of cancer of the aforementioned systems of the body.

9. *Medical removal protection.* OSHA is seeking public input regarding the appropriateness of including a provision in the final AN standard which would protect employee participation in the medical surveillance program. This provision would extend economic protection to employees who participate in the medical surveillance program and are removed or transferred from their jobs to protect them from material impairment of health. The purpose of this provision would be to encourage employees to participate in the medical surveillance program, which is an important part of OSHA's multifaceted prophylactic approach to occupational health.

The medical surveillance provision of the proposed standard contemplates that employers will limit the exposure of employees who are at increased risk of material impairment of health. Improved engineering controls, work practices, hygiene practices, and respirators must be utilized to reduce employee exposures so that the employee is no longer at increased risk of material impairment of his or her health.

OSHA's primary goal is to assure that no employee suffers material impairment of health or functional capacity. The Agency does not favor transfer or removal as an alternative to controlling the level of a toxic substance in the workplace environment. Moreover, once full compliance with the permissible exposure limits is achieved by engineering controls and work practices, the need to transfer or remove employees from exposure to AN should arise infrequently.

However, it appears that limitation of exposure by transfer or removal of the employees from occupational exposure may, on occasion, be necessary to effectively protect employees from material impairment of health.

Therefore, OSHA is seeking public input as to whether the medical surveillance provisions of the AN standard should include a requirement for medical removal protection and the nature of such protection. This requirement could maintain the rate of pay, seniority, and other rights of an employee for the time period, or a portion thereof, that the employee is transferred or removed from his or her job as a result of an increased health risk from exposure to AN.

A more complete discussion of the various issues and options available in this proceeding regarding medical removal protection may be found in the

OSHA proposed standard on occupational exposure to lead, published at 42 FR 46547 (September 16, 1977).

10. *Paragraph (g)—Recordkeeping.* The proposed standard requires the employer to keep written records of employee exposure measurements and medical examinations. Symptoms of cancer may not appear for many years after exposure to AN. Thus, records of exposure measurement and medical examinations should be retained for a definite period of years even if the employee ceases to work. For this reason, the recordkeeping provisions of the proposal require the employer to retain these records for at least 40 years, or for the duration of employment plus 20 years, whichever is longer.

V. TECHNOLOGICAL FEASIBILITY ASSESSMENT AND ECONOMIC IMPACT STATEMENT

In accordance with Executive Order 11949 (42 FR 1017), OSHA has contracted for a technological feasibility assessment and economic impact statement from Enviro Control, Inc., (ECI), of Rockville, Md. ECI is presently evaluating the economic impact of the proposed standard, with emphasis on the three alternative sets of permissible exposure limits set forth in paragraph (e) of the proposal.

When the final document has been prepared and reviewed, the Assistant Secretary will certify that the economic impact of the proposed standard on acrylonitrile has been evaluated in accordance with the Executive Order. When the document is available for inspection and copying, a notice of availability will be published in the FEDERAL REGISTER. OSHA invites comments on the technological feasibility and economic impact of the proposed standard.

VI. ENVIRONMENTAL IMPACT ASSESSMENT

The National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 et seq.) requires, among other things, that Federal agencies assess their proposed major actions, including proposed rulemaking, to determine whether a significant impact on the quality of the human environment may result. Further, pursuant to Department of Labor regulations [29 CFR Part 1999.3(a)], whenever OSHA is considering a major Federal action, the Director of the Office of Standards shall determine whether an environmental impact statement is required. If the Director determines that such an impact statement is not required, 29 CFR Part 1999.3(e) states that "he shall set forth in writing the decision and the reasons for it, which shall be available for public inspection." In keeping with these regulations, it has been determined that the proposed standard for occupational

exposure to acrylonitrile (AN) does not require the preparation of an environmental impact statement because available evidence does not indicate that it will have any adverse environmental impact for the reasons set forth below:

1. The proposed standard is designed to control employees' exposures to AN within their work facilities, and it is this population which is expected to experience any health or environmental benefit, as outlined in earlier sections of this proposal.

2. Available evidence does not indicate the potential for significant environmental or health effects outside of the workplace environment resulting from this proposal. According to a source assessment of air emissions from acrylonitrile manufacturing operations, prepared by EPA, [Source Assessment: Acrylonitrile Manufacture (Air Emissions), EPA 800/2-76-032, March 1977], current uncontrolled levels of acrylonitrile emissions from monomer manufacturing plants are less than 0.1 ppm (maximum ground level concentration). No data currently exist which relate AN emissions from these manufacturing operations to health problems external to the workplace.

3. Since it is economically desirable to recycle recoverable AN monomer, there is every reason to believe that emissions will decrease (especially if reductions of employee exposure are achieved through increased monomer stripping), as the employer will be motivated to control and recycle any residuals. Reduction of the emission of any nonnaturally-occurring chemical may be considered a beneficial environmental impact. As discussed in paragraph No. 2 above, however, current emissions of AN are already so low that any further reduction will not result in any incremental benefit to the environment external to the workplace.

4. There is no evidence to indicate that the proposed standard will result in any significant change in water quality, solid waste disposal or land use external to the workplace.

5. Potential energy increases and economic impacts of this proposal will be discussed in the Technological Feasibility and Economic Impact Statement, prepared for OSHA by Enviro Control, Inc.

On the basis of the assessment presented above, and the discussion of the proposal presented earlier in this notice, OSHA has determined that the proposed regulation will not significantly adversely affect the quality of the human environment, and that preparation of an environmental impact statement is not required. If, during the period for public comment on this proposal, however, data are received which indicate that significant and quantifiable environmental impacts are likely to occur as a result of this proposal, OSHA reserves the right to reconsider its decision and to proceed with preparation of an environmental impact statement.

Written comments and information on the projected technological, economic, and environmental impacts of the proposed standard on acrylonitrile are solicited from any interested persons or groups during the period for

written comment submissions listed below in the notice.

VII. PUBLIC PARTICIPATION—NOTICE OF HEARING

Interested persons are invited to submit written data, views, and arguments with respect to the ETS and this proposed permanent standard. These comments must be postmarked on or before February 21, 1978, and submitted in quadruplicate to the Docket Officer, Docket No. H-108, U.S. Department of Labor, 3rd Street and Constitution Avenue NW., Room S6212, Washington, D.C. 20210. Written submissions must clearly identify the provisions of the ETS, the proposal, or both, which are addressed, and the positions taken with respect to each issue.

The data, view, and arguments that are submitted will be available for public inspection and copying at the above address. All timely written submissions received will be made a part of the record of this proceeding.

Pursuant to section 6(b)(3) of the Act, an opportunity to submit oral testimony concerning the issues raised by the ETS and the proposed standard, including the economic and environmental impacts, will be provided at an informal public hearing scheduled to begin at 9:30 a.m. on March 21, 1978, in the Auditorium, New Department of Labor Building, 3rd Street and Constitution Avenue NW., Washington, D.C. 20210.

Notices of Intention to Appear. All persons desiring to participate at the hearing must file, in quadruplicate, a notice of intention to appear, postmarked on or before February 27, 1978 with the OSHA Division of Consumer Affairs, Docket No. H-108, U.S. Department of Labor, 3rd Street and Constitution Avenue NW., Room N-3633, Washington, D.C. 20210, telephone 202-523-8024. The notices of intention to appear, which will be available for inspection and copying at the OSHA Technical Data Center—Docket Office (Room S6212), telephone 202-523-7894, must contain the following information:

1. The name, address, and telephone number of each person to appear;
2. The capacity in which the person will appear;
3. The approximate amount of time requested for the presentation;
4. The specific issues that will be addressed;
5. A detailed statement of the position that will be taken with respect to each issue addressed; and
6. Whether the party intends to submit documentary evidence, and if so, a brief summary of that evidence.

Filing of Testimony and Evidence Before Hearing. Any party requesting more than 15 minutes for a presentation at the hearing, or who will submit

documentary evidence, must provide in quadruplicate the complete text of testimony, including any documentary evidence to be presented at the hearing, to the OSHA Division of Consumer Affairs. This material must be received by March 7, 1978, and will be available for inspection and copying at the Technical Data Center—Docket Office. Each such submission will be reviewed in light of the amount of time requested in the notice of intention to appear. In those instances where the information contained in the submission does not justify the amount of time requested, a more appropriate amount of time will be allocated and the participant will be notified of that fact.

Any party who has not substantially complied with the requirement to provide the complete text of testimony and documentary evidence may be limited to a 15 minute presentation, and may be requested to return for questioning at a later time.

Conduct of Hearings. The hearing will commence at 9:30 a.m. on Tuesday, March 21, 1978, with resolution of any procedural matters relating to the proceeding. The hearing will be conducted in accordance with 29 CFR Part 1911. In view of the ETS and its emergency nature, the hearing will be conducted in as expedited a manner as possible, consistent with a full development of the record and rights of the parties.

The hearing will be presided over by an Administrative Law Judge who will have all the powers necessary or appropriate to conduct a full and fair informal hearing as provided in 29 CFR Part 1911. Following the close of the hearing or of any post hearing comment period that might be provided, The Administrative Law Judge will certify the record to the Assistant Secretary of Labor for Occupational Safety and Health. The proposal will be reviewed in light of all oral and written submissions received as part of the record, and a standard will be issued based on the entire record in this proceeding.

VIII. AUTHORITY

This document was prepared under the direction of Eula Bingham, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, Third Street and Constitution Avenue NW., Washington, D.C. 20210.

Accordingly, pursuant to sections 4(b), 6(b), 6(c) and 8(c) of the Occupational Safety and Health Act of 1970 (84 Stat. 1592, 1593, 1596, 1599; 29 U.S.C. 653, 655, 657), the Secretary of Labor's Order No. 8-76 (41FR 25059), and 29 CFR Part 1911, it is hereby proposed to amend Part 1910 of Title 29 of the Code of Federal Regulations by amending section 1910.1045 as set

forth below. In addition, pursuant to section 4(b)(2) of the Act (84 Stat. 1592; 29 U.S.C. 653), OSHA is of the view that the proposed standard is more effective than the corresponding standards now in Subpart B of Part 1910, in Parts 1915, 1916, 1917, 1918 and 1926 of Title 29 of the Code of Federal Regulations. Therefore, these corresponding standards would also be superseded by the new proposed standard.

Signed at Washington, D.C. this 12th day of January, 1978.

EULA BINGHAM,

Assistant Secretary of Labor.

Part 1910 of Title 29 of the Code of Federal Regulations is therefore proposed to be amended by revising § 1910.1045 to read as follows:

§ 1910.1045 Acrylonitrile.

(a) *Scope and application.* (1) This section applies to all occupational exposure to acrylonitrile (AN), Chemical Abstracts Service Registry No. 000107131, except as provided in paragraph (a)(2) of this section.

(2) This section does not apply to the processing, use, and handling of products fabricated from polyacrylonitrile (PAN) where objective data is reasonably relied upon as to one of the following conditions:

(i) That the material to be processed is not capable of releasing AN resulting in airborne concentrations in excess of [1.0 ppm; or 0.5 ppm; or 0.1 ppm], under the expected conditions of processing, use and handling which will cause the greatest possible release; or

(ii) That the material to be processed is not a latex or other liquid mixture and does not contain more than (XX) ppm by weight, residual AN; or

(iii) That the material to be processed is not a latex or other liquid mixture and will not be heated or melted during the fabrication process.

Where the processing, use, and handling of products fabricated from PAN are exempted under this paragraph, the employer shall maintain records of the objective data supporting that exemption, as provided in paragraph (q) of this section.

(b) *Definitions:* "Acrylonitrile" or "AN" means acrylonitrile monomer, chemical formula $\text{CH}_2=\text{CHCN}$.

"Action level" means a concentration of AN of [1 ppm; or 0.5 ppm; or 0.1 ppm] averaged over any eight (8)-hour period.

"Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

"Authorized person" means any person specifically authorized by the employer whose duties require the person to enter a regulated area, or

any person entering such an area as a designated representative of employees for the purpose of exercising the opportunity to observe monitoring procedures under paragraph (r) of this section.

"Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health, Education, and Welfare, or designee.

"Emergency" means any occurrence, such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment, which is likely to, or does, result in unexpected exposure to AN in excess of the ceiling limit.

"OSHA Area Office" means the Area Office of the Occupational Safety and Health Administration having jurisdiction over the geographic area where the affected workplace is located.

"Polyacrylonitrile" or "PAN" means polyacrylonitrile homopolymers or copolymers, except for materials as exempted under paragraph (a)(2) of this section.

(c) *Permissible exposure limits.*—(1) *Inhalation.*—(i) *Time-weighted average limit (TWA).* The employer shall assure that no employee is exposed to an airborne concentration of acrylonitrile in excess of [two (2) parts; or one (1) part; or two-tenths (0.2) part] acrylonitrile per million parts of air [2 ppm; or 1 ppm; or 0.2 ppm], as an eight (8)-hour time-weighted average.

(ii) *Ceiling limit.* The employer shall assure that no employee is exposed to an airborne concentration of acrylonitrile in excess of [10 ppm; or 5 ppm; or 1 ppm] as averaged over any fifteen (15)-minute period during the working day.

(2) *Dermal and eye exposure.* The employer shall assure that no employee is exposed to skin contact or eye contact with liquid AN or PAN.

(d) *Notification of use and emergencies.*—(1) *Use.* Within ten (10) days of the effective date of this standard, or within fifteen (15) days following the introduction of AN into the workplace, every employer shall report, unless he has done so pursuant to the emergency temporary standard, the following information to the OSHA Area Office for each such workplace:

(i) The address and location of each workplace in which AN is present;

(ii) A brief description of each process of operation which may result in employee exposure to AN;

(iii) The number of employees engaged in each process or operation who may be exposed to AN and an estimate of the frequency and degree of exposure that occurs; and

(iv) A brief description of the employer's safety and health program as it relates to limitation of employee exposure to AN. Whenever there has

been a significant change in the information required by this paragraph, the employer shall promptly amend such information previously provided to the OSHA Area Office.

(2) *Emergencies and remedial action.* Emergencies, and the facts obtainable at that time, shall be reported within twenty-four (24) hours of the initial occurrence to the OSHA Area Office. Upon request of the OSHA Area Office, the employer shall submit additional information in writing relevant to the nature and extent of employee exposures and measures taken to prevent future emergencies of a similar nature.

(e) *Exposure monitoring.*—(1) *General.* (i) Determinations of airborne exposure levels shall be made from air samples that are representative of each employee's exposure to AN over an eight (8)-hour period.

(ii) For the purposes of this section, employee exposure is that exposure which would occur if the employee were not using a respirator.

(2) *Initial monitoring.* Each employer who has a place of employment in which AN is present shall monitor each such workplace and work operation to accurately determine the airborne concentrations of AN to which employees may be exposed. Such monitoring may be done on a representative basis, provided that the employer can demonstrate that the determinations are representative of employee exposures.

(3) *Frequency.* (i) If the monitoring required by this section reveals employee exposure to be below the action level, the employer may discontinue monitoring for that employee.

(ii) If the monitoring required by this section reveals employee exposure to be at or above the action level but below the permissible exposure limits, the employer shall repeat such monitoring for each such employee at least quarterly.

(iii) If the monitoring required by this section reveals employee exposure to be in excess of the permissible exposure limits, the employer shall repeat these determinations for each such employee at least monthly. The employer shall continue these monthly measurements until at least two consecutive measurements, taken at least seven (7) days apart, are below the permissible exposure limits, and thereafter the employer shall monitor at least quarterly.

(4) *Additional monitoring.* Whenever there has been a production, process, control or personnel change which may result in new or additional exposures to AN, or whenever the employer has any other reason to suspect a change which may result in new or additional exposures to AN, additional monitoring which complies with this paragraph shall be conducted.

(5) *Employee notification.* (1) Within five (5) working days after the receipt of monitoring results, the employer shall notify each employee in writing of the results which represent that employee's exposure.

(ii) Whenever the results indicate that the representative employee exposure exceeds the permissible exposure limits, the employer shall include in the written notice a statement that the permissible exposure limits were exceeded and a description of the corrective action being taken to reduce exposure to or below the permissible exposure limits.

(6) *Accuracy of measurement.* The method of measurement of employee exposures shall be accurate, to a confidence level of 95 percent, to within plus or minus 25 percent for concentrations of AN at or above the permissible exposure limits, and plus or minus 35 percent for concentrations of AN between the action level and the permissible exposure limits.

(7) *Weekly survey of operations involving liquid AN.* In addition to monitoring of employee exposures to AN as otherwise required by this paragraph, the employer shall survey areas of operations involving liquid AN at least weekly to detect points where AN liquid or vapor are being released into the workplace. The survey shall employ an infra-red gas analyzer calibrated for AN, a multipoint gas chromatographic monitor, or comparable system for detection of AN. A listing of levels detected and areas of AN release, as determined from the survey, shall be posted prominently in the workplace, and shall remain posted until the next survey is completed.

(f) *Regulated areas.* (1) The employer shall establish regulated areas where AN concentrations are in excess of the permissible exposure limits.

(2) Regulated areas shall be demarcated and segregated from the rest of the workplace, in any manner that minimizes the number of persons who will be exposed to AN.

(3) Access to regulated areas shall be limited to authorized persons or to persons otherwise authorized by the Act or regulations issued pursuant thereto.

(4) The employer shall assure that in the regulated area, food or beverages are not present or consumed, smoking products are not present or used, and cosmetics are not applied, (except that these activities may be conducted in the lunchrooms, change rooms and showers required under paragraphs (m)(1)-(m)(3) of this section).

(g) *Methods of compliance.*—(1) *Engineering and work practice controls.* (i) The employer shall institute engineering or work practice controls to reduce and maintain employee exposures to AN, to or below the permissi-

ble exposure limits, except to the extent that the employer establishes that such controls are not feasible.

(ii) Wherever the engineering and work practice controls which can be instituted are not sufficient to reduce employee exposures to or below the permissible exposure limits, the employer shall nonetheless use them to reduce exposures to the lowest levels achievable by these controls and shall supplement them by the use of respiratory protection which complies with the requirements of paragraph (h) of this section.

(2) **Compliance program.** (i) The employer shall establish and implement a written program to reduce employee exposures to or below the permissible exposure limits solely by means of engineering and work practice controls, as required by paragraph (g)(1) of this section.

(ii) Written plans for these compliance programs shall include at least the following:

(A) A description of each operation or process resulting in employee exposure to AN above the permissible exposure limits;

(B) Engineering plans and other studies used to determine the controls for each process;

(C) A report of the technology considered in meeting the permissible exposure limits;

(D) A detailed schedule for the implementation of engineering or work practice controls; and

(E) Other relevant information.

(iii) Written plans for such a program shall be submitted upon request to the Assistant Secretary and the Director, and shall be available at the worksite for examination and copying by the Assistant Secretary, the Director, or any affected employee or representative.

(iv) The plans required by this paragraph shall be revised and updated at least every (6) six months to reflect the current status of the program.

(h) **Respiratory protection.** (1) **General.** The employer shall assure that respirators are used where required pursuant to this section to reduce employee exposure to within the permissible exposure limits and in emergencies. Compliance with the permissible exposure limits may not be achieved by the use of respirators except:

(i) During the time period necessary to install or implement feasible engineering and work practice controls; or

(ii) In work operations such as maintenance and repair activities in which the employer establishes that engineering and work practice controls are not feasible; or

(iii) In work situations where feasible engineering and work practice controls are not yet sufficient to reduce exposure to or below the permissible exposure limits; or

(iv) In emergencies.

(2) **Respirator selection.** (i) Where respiratory protection is required under this section, the employer shall select and provide at no cost to the employee, the appropriate type of respirator from Table I below and shall assure that the employee wears the respirator provided.

TABLE I.—Respiratory protection for acrylonitrile (AN)

Concentration of AN or condition of use	Respirator type
(a) Less than or equal to 10× permissible exposure limits.	(1) Any chemical cartridge respirator with organic vapor cartridge(s) and half-mask; or (2) Any supplied air respirator with half-mask.
(b) Less than or equal to 50× permissible exposure limits.	(1) Any organic vapor gas mask; or (2) Any supplied air respirator with full facepiece; or (3) Any self-contained breathing apparatus with full facepiece.
(c) Less than or equal to 2,000× permissible exposure limits.	(1) Supplied air respirator in positive pressure mode with full facepiece, helmet, hood, or suit.
(d) Less than or equal to 10,000× permissible exposure limits.	(1) Supplied air respirator and auxiliary self-contained full facepiece in positive pressure mode. (2) Open circuit self-contained breathing apparatus with full facepiece in positive pressure mode.
(e) Emergency entry into unknown concentration of firefighting.	(1) Any self-contained breathing apparatus with full facepiece in positive pressure mode.
(f) Escape.	(1) Any organic vapor gas mask; or (2) Any self-contained breathing apparatus with full facepiece.

(ii) The employer shall select respirators from those approved for use with AN by the National Institute for Occupational Safety and Health under the provisions of 30 CFR Part 11.

(3) **Respirator program.** (i) The employer shall institute a respiratory protection program in accordance with 29 CFR 1910.134 (b), (d), (e), and (f).

(ii) Where air-purifying respirators (chemical cartridge or canister-type gas mask) are used, the air-purifying canister or cartridge(s) shall be replaced prior to the expiration of their service life or at the beginning of each shift, whichever occurs first. A label shall be attached to the cartridge or canister to indicate the date and time at which it is first installed on the respirator.

(iii) The employer shall allow each employee who uses a filter respirator (cartridge or canister) to change the filter elements whenever an increase in breathing resistance is detected and shall maintain an adequate supply of

the filter elements necessary for this purpose.

(iv) Employees who wear respirators shall be allowed to wash their faces and respirator facepieces to prevent potential skin irritation associated with respirator use.

(i) **Emergency situations.** (1) **Written plans.** (i) A written plan for emergency situations shall be developed for each workplace where AN is present. Appropriate portions of the plan shall be implemented in the event of an emergency.

(ii) The plan shall specifically provide that employees engaged in correcting emergency conditions shall be equipped as required in paragraph (h) of this section until the emergency is abated.

(2) **Alerting employees.** (i) **Alarms.** Where there is the possibility of employee exposure to AN in excess of the ceiling limit due to the occurrence of an emergency, a general alarm shall be installed and maintained to promptly alert employees of such occurrences.

(ii) **Evacuation.** Employees not engaged in correcting the emergency shall be restricted from the area and shall not be permitted to return until the emergency is abated.

(j) **Protective clothing and equipment.** (1) **Provision and use.** Where eye or skin contact with liquid AN or PAN may occur, the employer shall provide at no cost to the employee, and assure that employees wear, appropriate protective clothing or other equipment in accordance with §§ 1910.132 and 1910.133 to protect any area of the body which may come in contact with liquid AN or PAN.

(2) **Cleaning and replacement.** (i) The employer shall clean, launder, maintain, or replace protective clothing and equipment required by this paragraph, as needed to maintain their effectiveness. In addition, the employer shall provide clean protective clothing and equipment at least weekly to each affected employee.

(ii) The employer shall assure that the employee removes all protective clothing and equipment at the completion of a work shift and that an employee whose protective clothing becomes wet with liquid AN or PAN removes that clothing promptly to avoid skin contact with the liquid AN or PAN. Protective clothing shall be removed only in change rooms as required by paragraph (n)(1) of this section.

(iii) The employer shall assure that AN- or PAN-contaminated protective clothing and equipment is placed and stored in closable containers which prevent dispersion of the AN or PAN outside the container.

(iv) The employer shall assure that no employee removes AN- or PAN-contaminated protective equipment or

clothing from the change room, except for those employees authorized to do so for the purpose of laundering, maintenance, or disposal.

(v) The employer shall inform any person who launders or cleans AN- or PAN-contaminated protective clothing or equipment of the potentially harmful effects of exposure to AN.

(vi) The employer shall assure that containers of contaminated protective clothing and equipment which are to be removed from the workplace for any reason are labeled in accordance with paragraph (p)(3)(ii) of this section, and that such labels remain affixed when such containers leave the employer's workplace.

(k) *Housekeeping*—(1) *Surfaces*. (i) All surfaces shall be maintained free of accumulations of liquid AN and of PAN.

(ii) Dry sweeping and the use of compressed air for the cleaning of floors and other surfaces where liquid AN and PAN are found is prohibited.

(iii) Where vacuuming methods are selected, either portable units or a permanent system may be used.

(A) If a portable unit is selected, the exhaust shall be attached to the general workplace exhaust ventilation system or collected within the vacuum unit, equipped with high efficiency filters or other appropriate means of contaminant removal, so that AN is not reintroduced into the workplace air; and

(B) Portable vacuum units used to collect AN may not be used for other cleaning purposes and shall be labeled as prescribed by paragraph (p)(3)(ii) of this section.

(iv) Cleaning of floors and other contaminated surfaces may not be performed by washing down with a hose, unless a fine spray has first been laid down.

(2) *Liquids*. Where AN is present in a liquid form, or as a resultant vapor, all containers or vessels containing AN shall be enclosed to the maximum extent feasible and tightly covered when not in use, with adequate provision made to avoid any resulting potential explosion hazard.

(l) *Waste disposal*. AN and PAN waste, scrap, debris, bags, containers or equipment, shall be disposed of in sealed bags or other closed containers which prevent dispersion of AN outside the container, and labeled as prescribed in paragraph (p)(3)(ii) of this section.

(m) *Hygiene facilities and practices*. Where employees are exposed to airborne concentrations of AN above the permissible exposure limits, or where employees are required to wear protective clothing or equipment pursuant to paragraph (k) of this section, or where otherwise found to be appropriate, the facilities required by 29 CFR 1910.141 shall be provided by the employer for the use of those employees, and the

employer shall assure that the employees use the facilities provided. In addition, the following facilities or requirements are mandated.

(1) *Change rooms*. The employer shall provide clean change rooms in accordance with 29 CFR 1910.141(e).

(2) *Showers*. (i) The employer shall provide shower facilities in accordance with 29 CFR 1910.141(d)(3).

(ii) In addition, the employer shall also assure that employees exposed to liquid AN and PAN shower at the end of the work shift.

(3) *Lunchrooms*. (i) Whenever food or beverages are consumed in the workplace, the employer shall provide lunchroom facilities which have a temperature controlled, positive pressure, filtered air supply, and which are readily accessible to employees exposed to AN above the permissible exposure limits.

(ii) In addition, the employer shall also assure that employees exposed to AN above the permissible exposure limits wash their hands and face prior to eating.

(n) *Medical Surveillance*—(1) *General*. (i) The employer shall institute a program of medical surveillance for each employee who is or will be exposed to AN above the action level. The employer shall provide each such employee with an opportunity for medical examinations and tests in accordance with this paragraph.

(ii) The employer shall assure that all medical examinations and procedures are performed by or under the supervision of a licensed physician, and shall be provided without cost to the employee.

(2) *Initial examinations*. At the time of initial assignment, or upon institution of the medical surveillance program, the employer shall provide each affected employee an opportunity for a medical examination, including at least the following elements:

(i) A work history and medical, history with special attention to skin, respiratory, and gastrointestinal systems, and those non-specific symptoms, such as headache, nausea, vomiting, dizziness, weakness, or other central nervous system dysfunctions that may be associated with acute or chronic exposure to AN.

(ii) A physical examination giving particular attention to central nervous system, gastrointestinal system, respiratory system, skin and thyroid.

(iii) A 14" x 17" posteroanterior chest x-ray.

(iv) Further tests of the intestinal tract, including fecal occult blood and proctosigmoidoscopy, on all workers 40 years of age or older, and to any other affected employees for whom, in the opinion of the physician, such testing would be appropriate.

(3) *Periodic examinations*. (i) The employer shall provide examinations

specified in this paragraph at least annually for all employees specified in paragraph (n)(1) of this section.

(ii) If an employee has not had the examinations prescribed in paragraph (n)(2) of this section within 6 months of termination of employment, the employer shall make such examination available to the employee upon such termination.

(4) *Additional examinations*. If the employee for any reason develops signs or symptoms commonly associated with exposure to AN, the employer shall provide appropriate examination and emergency medical treatment.

(5) *Information provided to the physician*. The employer shall provide the following information to the examining physician:

(i) A copy of this standard and its appendices;

(ii) A description of the affected employee's duties as they relate to the employee's exposure;

(iii) The employee's representative exposure level;

(iv) The employee's anticipated or estimated exposure level (for preplacement examinations or in cases of exposure due to an emergency);

(v) A description of any personal protective equipment used or to be used; and

(vi) Information from previous medical examinations of the affected employee, which is not otherwise available to the examining physician.

(6) *Physician's written opinion*. (i) The employer shall obtain a written opinion from the examining physician which shall include:

(A) The results of the medical tests performed;

(B) The physician's opinion as to whether the employee has any detected medical condition which would place the employee at an increased risk of material impairment of the employee's health from exposure to AN;

(C) Any recommended limitations upon the employee's exposure to AN or upon the use of protective clothing and equipment such as respirators; and

(D) A statement that the employee has been informed by the physician of the results of the medical examination and any medical conditions which require further examination or treatment.

(ii) The employer shall instruct the physician not to reveal in the written opinion specific findings or diagnoses unrelated to occupational exposure to AN.

(iii) The employer shall provide a copy of the written opinion to the affected employee.

(o) *Employee information and training*—(1) *Training program*. (i) The employer shall institute a training program for all employees where there is occupational exposure to AN and

shall assure their participation in the training program.

(ii) The training program shall be provided at the time of initial assignment, or upon institution of the training program, and at least annually thereafter, and the employer shall assure that each employee is informed of the following:

(A) The information contained in Appendices A, B and C;

(B) The quantity, location, manner of use, release or storage of AN and the specific nature of operations which could result in exposure to AN, as well as any necessary protective steps;

(C) The purpose, proper use, and limitations of respirators;

(D) The purpose and a description of the medical surveillance program required by paragraph (n) of this section;

(E) The emergency procedures developed, as required by paragraph (i) of this section; and

(F) The engineering and work practice controls, their function and the employee's relationship thereto; and

(G) A review of this standard.

(2) *Access to training materials.* (i) The employer shall make a copy of this standard and its appendices readily available to all affected employees.

(ii) The employer shall provide, upon request, all materials relating to the employee information and training program to the Assistant Secretary and the Director.

(p) *Signs and labels.*—(1) *General.* (i) The employer may use labels or signs required by other statutes, regulations, or ordinances in addition to, or in combination with, signs and labels required by this paragraph.

(ii) The employer shall assure that no statement appears on or near any sign or label, required by this paragraph, which contradicts or detracts from such effects of the required sign or label.

(2) *Signs.* (i) The employer shall post signs to clearly indicate all workplaces where AN concentrations exceed the permissible exposure limits. The signs shall bear the following legend:

DANGER

ACRYLONITRILE (AN)

CANCER HAZARD

AUTHORIZED PERSONNEL ONLY
RESPIRATORS REQUIRED

(ii) The employer shall assure that signs required by this paragraph are illuminated and cleaned as necessary so that the legend is readily visible.

(3) *Labels.* (i) The employer shall assure that precautionary labels are affixed to all containers of AN, and to containers of PAN and products fabricated from PAN, except for those materials for which objective data is provided as to the conditions specified in paragraph (a) (2) of this section. The

employer shall assure that the labels remain affixed when the AN or PAN are sold, distributed or otherwise leave the employer's workplace.

(ii) The employer shall assure that the precautionary labels required by this paragraph are readily visible and legible. The labels shall bear the following legend:

DANGER

CONTAINS ACRYLONITRILE (AN)

CANCER HAZARD

(q) *Recordkeeping.*—(1) *Objective data for exempted operations.* (i) Where the processing, use, and handling of products fabricated from PAN are exempted pursuant to paragraph (a)(2) of this section, the employer shall establish and maintain an accurate record of objective data reasonably relied upon in support of the exemption.

(ii) This record shall include the following information:

(A) The relevant condition in paragraph (a)(2) upon which exemption is based;

(B) The source of the objective data;

(C) The results of testing and analysis of the material being processed;

(D) A description of the operation exempted; and

(E) Other data relevant to the operations, materials, and processing covered by the exemption.

(iii) The employer shall maintain this record for the duration of the employer's reliance upon such objective data.

(2) *Exposure monitoring.* (i) The employer shall establish and maintain an accurate record of all monitoring required by paragraph (e) of this section.

(ii) This record shall include:

(A) The dates, number, duration, and results of each of the samples taken, including a description of the sampling procedure used to determine representative employee exposure;

(B) A description of the sampling and analytical methods used;

(C) Type of respiratory protective devices worn, if any; and

(D) Name, social security number and job classification of the employee monitored and of all other employees whose exposure the measurement is intended to represent.

(iii) The employer shall maintain this record for at least 40 years or the duration of employment plus 20 years, whichever is longer.

(3) *Medical surveillance.* (i) The employer shall establish and maintain an accurate record for each employee subject to medical surveillance as required by paragraph (n) of this section.

(ii) This record shall include:

(A) A copy of the physicians' written opinions;

(B) any employee medical complaints related to exposure to AN;

(C) A copy of the information provided to the physician as required by paragraph (n) (6) of this section; and

(D) A copy of the employee's work history.

(iii) The employer shall assure that this record be maintained for at least forty (40) years, or for the duration of employment plus twenty (20) years, whichever is longer.

(4) *Availability.* (i) The employer shall assure that all records required to be maintained by this section be made available upon request to the Assistant Secretary and the Director for examination and copying.

(ii) The employer shall assure that employee exposure measurement records, as required by this section, be made available, upon request, for examination and copying to the affected employee, former employee, or designated representative.

(iii) The employer shall assure that employee medical records required to be maintained by this section, be made available, upon request, for examination and copying, to the affected employee or former employee, or to a physician designated by the affected employee, former employee, or designated representative.

(5) *Transfer of records.* (i) Whenever the employer ceases to do business, the successor employer shall receive and retain all records required to be maintained by this section.

(ii) Whenever the employer ceases to do business and there is no successor employer to receive and retain the records for the prescribed period, these records shall be transmitted to the Director.

(iii) At the expiration of the retention period for the records required to be maintained pursuant to this section, the employer shall transmit these records to the Director.

(r) *Observation of monitoring.*—(1) *Employee observation.* The employer shall provide affected employees, or their designated representatives, an opportunity to observe any monitoring of employee exposure to AN conducted pursuant to paragraph (e) of this section.

(2) *Observation procedures.* (i) Whenever observation of the monitoring of employee exposure to AN requires entry into an area where the use of protective clothing or equipment is required, the employer shall provide the observer with personal protective clothing or equipment required to be worn by employees working in the area, assure the use of such clothing and equipment, and require the observer to comply with all other applicable safety and health procedures.

(ii) Without interfering with the monitoring, observers shall be entitled:

(A) To receive an explanation of the measurement procedures;

(B) To observe all steps related to the measurement of airborne concentrations of AN performed at the place of exposure; and

(C) To record the results obtained.

(s) *Effective date.* This section shall become effective thirty (30) days following publication.

(t) *Appendices.* The information contained in the appendices is not intended, by itself, to create any additional obligations not otherwise imposed or to detract from any existing obligation.

APPENDIX A.—SUBSTANCE SAFETY DATA SHEET FOR ACRYLONITRILE

I. SUBSTANCE IDENTIFICATION

A. Substance: Acrylonitrile ($\text{CH}_2=\text{CHCN}$).

B. Synonyms: Propenenitrile; vinyl cyanide; cyanoethylene; AN; VCN; acrylon; carbacryl; fumigralin; ventox.

C. Acrylonitrile can be found as a liquid or vapor, and can also be found in polymer resins, plastics, polyols, and other polymers having acrylonitrile as a raw or intermediate material.

D. AN is used in the manufacture of acrylic and modacrylic fibers, acrylic plastics and resins, specialty polymers, nitrile rubbers, and other organic chemicals. It has also been used as a fumigant.

E. Appearance and Odor: Colorless to pale yellow liquid with a pungent odor which can only be detected at concentrations above the permissible exposure level, in a range of 13-19 parts AN per million parts of air (13-19 ppm).

F. Permissible Exposure: Exposure may not exceed either:

1. [Two parts; or one part; or two-tenths part] AN per million parts of air [2 ppm; or 1 ppm; or 0.2 ppm] averaged over the eight-hour workday; or

2. [Ten parts; or five parts; or one part] AN per million parts of air [10 ppm; or 5 ppm; or 1 ppm] averaged over any 15-minute period in the workday.

3. In addition, skin and eye contact with liquid AN is prohibited.

II. HEALTH HAZARD DATA

A. Acrylonitrile can affect your body if you inhale the vapor (breathing), if it comes in contact with your eyes or skin, or if you swallow it. It may enter your body through your skin.

B. Effects of Overexposure:

1. Short-term Exposure: Acrylonitrile can cause eye irritation, nausea, vomiting, headache, sneezing, weakness, and light-headedness. At high concentrations, the effects of exposure may go on to loss of consciousness and death. When acrylonitrile is held in contact with the skin after being absorbed into shoe leather or clothing, it may produce blisters following several hours of no apparent effect. Unless the shoes or clothing are removed immediately and the area washed, blistering will occur. Usually there is no pain or inflammation associated with blister formation.

2. Long-term Exposure: Acrylonitrile has been shown to cause cancer in laboratory animals and has been associated with higher incidences of cancer in humans. Repeated or prolonged exposure of the skin to acrylonitrile may produce irritation and dermatitis.

3. Reporting Signs and Symptoms: You should inform your employer if you develop

any signs or symptoms and suspect they are caused by exposure to acrylonitrile.

III. EMERGENCY FIRST AID PROCEDURES

A. Eye Exposure: If acrylonitrile gets into your eyes, wash your eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. Get medical attention immediately. Contact lenses should not be worn when working with this chemical.

B. Skin Exposure: If acrylonitrile gets on your skin, immediately wash the contaminated skin with water. If acrylonitrile soaks through your clothing, especially your shoes, remove the clothing immediately and wash the skin with water. If symptoms occur after washing, get medical attention immediately. Thoroughly was the clothing before re-using. Contaminated leather shoes or other leather articles should be discarded.

C. Inhalation: If you or any other person breathes in large amounts of acrylonitrile, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

D. Swallowing: When acrylonitrile has been swallowed, give the person large quantities of water immediately. After the water has been swallowed, try to get the person to vomit by having him touch the back of his throat with his finger. Do not make an unconscious person vomit. Get medical attention immediately.

E. Rescue: Move the affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency procedures. Do not become a casualty yourself. Understand your emergency rescue procedures and know the location of the emergency equipment before the need arises.

F. Special First Aid Procedures: First aid kits containing an adequate supply (at least two dozen) of amyl nitrite pearls, each containing 0.3 ml, should be maintained at each site where acrylonitrile is used. When a person is suspected of receiving an overexposure to acrylonitrile, immediately remove that person from the contaminated area using established rescue procedures. Contaminated clothing must be removed and the acrylonitrile washed from the skin immediately. Artificial respiration should be started at once if breathing has stopped. If the person is unconscious, amyl nitrite may be used as an antidote by a properly trained individual in accordance with established emergency procedures. Medical aid should be obtained immediately.

IV. RESPIRATORS AND PROTECTIVE CLOTHING

A. Respirators: You may be required to wear a respirator for non-routine activities, in emergencies, and while your employer is in the process of reducing acrylonitrile exposures through engineering controls. If respirators are worn, they must have a Mining Enforcement and Safety Administration (MESA) or National Institute for Occupational Safety and Health (NIOSH) approval label. (Older respirators may have a Bureau of Mines approval label.) For effective protection, respirators must fit your face and head snugly. Respirators should not be loosened or removed in work situations where their use is required.

Acrylonitrile does not have a detectable odor except at levels above the permissible

exposure limit. Do not depend on odor to warn you when a respirator cartridge or canister is exhausted. Cartridges or canisters must be changed daily or before the end-of-service-life, whichever comes first. Re-use of these may allow acrylonitrile to gradually filter through the cartridge and cause exposures which you cannot detect by odor. If you can smell acrylonitrile while wearing a respirator, proceed immediately to fresh air. If you experience difficulty breathing while wearing a respirator, tell your employer.

B. Supplied-air Suits: In some work situations, the wearing of supplied-air suits may be necessary. Your employer must instruct you in their proper use and operation.

C. Replace or repair impervious clothing that has developed leaks. Protective Clothing: You must wear impervious clothing, gloves, face shield, or other appropriate protective clothing to prevent skin contact with liquid acrylonitrile. Where protective clothing is required, your employer is required to provide clean garments to you weekly.

Acrylonitrile should never be allowed to remain on the skin. Clothing and shoes should not be allowed to become contaminated with acrylonitrile, and if they do, the clothing should be promptly removed and laundered or discarded and placed in appropriately labeled containers and the shoes should be discarded. Once acrylonitrile penetrates shoe leather or other leather articles, they should not be worn again.

D. Eye Protection: You must wear splash-proof safety goggles in areas where liquid acrylonitrile may contact your eyes. In addition, contact lenses should not be worn in areas where eye contact with acrylonitrile can occur.

V. PRECAUTIONS FOR SAFE USE, HANDLING, AND STORAGE

A. Acrylonitrile is a flammable liquid and its vapors can easily form explosive mixtures in air.

B. Acrylonitrile must be stored in tightly-closed containers in a cool, well-ventilated area, away from heat, sparks, flames, strong oxidizers (especially bromine), strong bases, copper, copper alloys, ammonia, and amines.

C. Sources of ignition such as smoking and open flames are prohibited wherever acrylonitrile is handled, used, or stored in a manner that could create a potential fire or explosion hazard.

D. You should use non-sparking tools when opening or closing metal containers of acrylonitrile, and containers must be bonded and grounded when pouring or transferring liquid acrylonitrile.

E. You must immediately remove any non-impervious clothing that becomes contaminated with acrylonitrile, and this clothing must not be reworn until the acrylonitrile is removed from the clothing.

F. Clothing wet with liquid acrylonitrile can be easily ignited. You must promptly remove this clothing, and it must not be reworn until the acrylonitrile is removed from the clothing.

G. If your skin becomes wet with liquid acrylonitrile, you must promptly and thoroughly wash or shower with soap or mild detergent to remove any acrylonitrile from your skin.

H. You must not keep food, beverages, or smoking materials in areas where acrylonitrile is handled, processed, or stored, nor are you permitted to eat or smoke in these areas.

I. If you handle acrylonitrile, you must wash your hands thoroughly with soap or

mild detergent and water before eating, smoking, or using toilet facilities.

J. Fire extinguishers and quick drenching facilities must be readily available, and you should know where they are and how to operate them.

K. Ask your supervisor where acrylonitrile is used in your work area and for any additional plant safety and health rules.

VI. ACCESS TO INFORMATION

A. Each year, your employer is required to inform you of the information contained in this Substance Safety Data Sheet for acrylonitrile. In addition, your employer must instruct you in the proper work-practices for using acrylonitrile, emergency procedures, and the correct use of protective equipment.

B. Your employer is required to determine whether you are being exposed to acrylonitrile. You or your representative has the right to observe employee measurements and to record the results obtained. Your employer is required to inform you of your exposure. If your employer determines that you are being overexposed, he or she is required to inform you of the actions which are being taken to reduce your exposure to within permissible exposure limits.

C. Your employer is required to keep records of your exposures and medical examinations. These records must be kept by the employer for at least forty (40) years or for the period of your employment plus twenty (20) years, whichever is longer.

D. Your employer is required to release exposure and medical records to your physician upon your written request.

APPENDIX B—SUBSTANCE TECHNICAL GUIDELINES FOR ACRYLONITRILE

I. PHYSICAL AND CHEMICAL DATA

A. Substance Identification

1. Synonyms: AN; VCN; vinyl cyanide; propenenitrile; cyanoethylene; Acrylon; Carba-cryl; Fumigrain; Ventox.

2. Formula: $\text{CH}_2=\text{CHCN}$.

3. Molecular Weight: 53.1

B. Physical Data.

1. Boiling Point (760 mm Hg.): 77.3° C (171° F).

2. Specific Gravity (water=1): 0.81 (at 20° C or 68° F).

3. Vapor Density (air=1 at boiling point of acrylonitrile): 1.83.

4. Melting Point: -83° C (-117° F).

5. Vapor Pressure at 20° F: 83 mm Hg.

6. Solubility in Water, percent by weight at 20° C (68° F): 7.35.

7. Evaporation Rate (Butyl Acetate=1): 4.54.

8. Appearance and Odor: Colorless to pale yellow liquid with a pungent odor at concentrations above the permissible exposure level. Any detectable odor of acrylonitrile may indicate overexposure.

II. FIRE, EXPLOSION, AND REACTIVITY HAZARD DATA

A. Fire.

1. Flash Point: -1° C (30° F) (closed cup).

2. Autoignition Temperature: 481° C (898° F).

3. Flammable limits air, percent by volume: Lower: 3, Upper: 17.

4. Extinguishing media: Alcohol foam, carbon dioxide, dry chemical.

5. Special fire-fighting procedures: Do not use a solid stream of water, since the stream will scatter and spread the fire. Use water spray to cool containers exposed to a fire.

6. Unusual fire and explosion hazards: Acrylonitrile is a flammable liquid. Its vapors can easily form explosive mixtures with air. All ignition sources must be controlled where acrylonitrile is handled, used, or stored in a manner that could create a potential fire or explosion hazard. Acrylonitrile vapors are heavier than air and may travel along the ground and be ignited by open flames or sparks at locations remote from the site at which acrylonitrile is being handled.

7. For purposes of compliance with the requirements of 29 CFR 1910.106, acrylonitrile is classified as a Class IB flammable liquid. For example, 7500 ppm, approximately one-fourth of the lower flammable limit, would be considered to pose a potential fire and explosion hazard.

8. For purposes of compliance with 29 CFR 1910.157, acrylonitrile is classified as a Class B fire hazard.

9. For purposes of compliance with 29 CFR 1910.309, locations classified as hazardous due to the presence of acrylonitrile shall be Class I, Group D.

B. Reactivity:

1. Conditions contributing to instability: Acrylonitrile will polymerize when hot, and the additional heat liberated by the polymerization may cause containers to explode. Pure AN may self-polymerize, with a rapid build-up of pressure, resulting in an explosion hazard. Inhibitors are added to the commercial product to prevent self-polymerization.

2. Incompatibilities: Contact with strong oxidizers (especially bromine) and strong bases may cause fires and explosions. Contact with copper, copper alloys, ammonia, and amines may start serious decomposition.

3. Hazardous decomposition products: Toxic gases and vapors (such as hydrogen cyanide, oxides of nitrogen, and carbon monoxide) may be released in a fire involving acrylonitrile and certain polymers made from acrylonitrile.

4. Special precautions: Liquid acrylonitrile will attack some forms of plastics, rubbers, and coatings. Acrylonitrile monomer should be checked at least weekly to determine inhibitor content.

III. SPILL, LEAK, AND DISPOSAL PROCEDURES

A. If acrylonitrile is spilled or leaked, the following steps should be taken:

1. Remove all ignition sources.

2. The area should be evacuated at once and re-entered only after thorough ventilation.

3. If liquid acrylonitrile, collect for reclamation or absorb in paper, vermiculite, dry sand, earth, or similar material.

4. If acrylonitrile polymer, collect spilled material in the most convenient and safe manner for reclamation or for disposal.

B. Persons not wearing protective equipment should be restricted from areas of spills or leaks until clean-up has been completed.

C. Waste disposal methods: Waste material shall be disposed of in a manner that is not hazardous to employees or to the general population. Spills of acrylonitrile and flushing or such spills shall be channeled for appropriate treatment or collection for disposal. They shall not be channeled directly into the sanitary sewer system. Containers of AN and PAN wastes shall be appropriately labeled. In selecting the method of waste disposal, applicable local, state, and federal regulations should be consulted.

IV. MONITORING AND MEASUREMENT PROCEDURES

A. Exposure above the Permissible Exposure Limit:

1. Eight-hour exposure evaluation: Measurements taken for the purpose of determining employee exposure under this section are best taken so that the average eight-hour exposure may be determined from a single 8-hour sample or two (2) 4-hour samples. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee.)

2. Ceiling evaluation: Measurements taken for the purpose of determining employee exposure under this section must be taken during periods of maximum expected airborne concentrations of acrylonitrile in the employee's breathing zone. A minimum of three (3) measurements should be taken on one work shift. The highest of all measurements taken is an estimate of the employee's ceiling exposure.

3. Monitoring techniques: The sampling and analysis under this section may be performed by collecting the acrylonitrile vapor on charcoal absorption tubes or other composition absorption tubes, with subsequent chemical analysis. Sampling and analysis may also be performed by instruments such as detector tubes certified by NIOSH under 42 CFR Part 84, portable direct-reading instruments, or passive dosimeters, as well as by gas and vapor absorption tubes. The method of measurement chosen should determine airborne acrylonitrile levels to an accuracy of plus or minus 25% for concentrations at or above the permissible exposure limits, and plus or minus 35% for concentrations at or above the action level but below the permissible exposure limits. Analysis of resultant samples should be by gas chromatograph.

4. Survey of operations. At least on a weekly basis, the employer shall use a direct-reading instrument, such as a portable infra-red analyzer, or equivalent point-monitoring system, to survey all operations involving liquid AN or PAN to determine points at which AN vapor or liquid may be released into the workplace. A listing of points monitored, together with levels of acrylonitrile detected, if any, shall be prepared from this survey, and the listing shall be displayed prominently in the workplace. As an alternative survey method, grab samples, utilizing vapor collection bags, with subsequent gas chromatographic analysis, can be used.

B. Since many of the duties relating to employee exposure are dependent on the results of monitoring and measuring procedures, employers shall assure that the evaluation of employee exposures is performed by a competent industrial hygienist or other technically qualified person.

V. PROTECTIVE CLOTHING

Employees shall be provided with and required to wear appropriate protective clothing to prevent any possibility of skin contact with liquid AN or PAN. Because acrylonitrile is absorbed through the skin, it is important to prevent skin contact with liquid AN or PAN. Protective clothing shall include impermeable coveralls or similar full-body work clothing, gloves, head-coverings, as appropriate to protect areas of the body which may come in contact with liquid AN or PAN.

Employers should ascertain that the protective garments are impermeable to acry-

VII. COMMON OPERATIONS

Common operations in which exposure to acrylonitrile is likely to occur include the following: manufacture of the acrylonitrile monomer; synthesis of acrylic fibers, ABS and SAN plastics and resins, nitrile rubber, surface coatings, specialty chemicals, use as a chemical intermediate, use as a fumigant and in the cyanoethylation of cotton.

APPENDIX C—MEDICAL SURVEILLANCE GUIDELINES FOR ACRYLONITRILE

I. ROUTE OF ENTRY

Inhalation; skin absorption; ingestion.

II. TOXICOLOGY

Acrylonitrile vapor is an asphyxiant due to inhibitory action on metabolic enzyme systems. Animals exposed to 75 or 100 ppm for 7 hours have shown signs of anoxia; in some animals which died at the higher level, cyanomethemoglobin was found in the blood. Two human fatalities from accidental poisoning have been reported; one was caused by inhalation of an unknown concentration of the vapor, and the other was thought to be caused by skin absorption or inhalation. Most cases of intoxication from industrial exposure have been mild, with rapid onset of eye irritation, headache, sneezing, and nausea. Weakness, lightheadedness, and vomiting may also occur. Exposure to high concentrations may produce profound weakness, asphyxia, and death. The vapor is a severe eye irritant. Prolonged skin contact with the liquid may result in absorption with systemic effects, and in the formation of large blisters after a latent period of several hours. Although there is usually little or no pain or inflammation, the affected skin resembles a second-degree thermal burn. Solutions spilled on exposed skin, or on areas covered only by a light layer of clothing, evaporate rapidly, leaving no irritation, or, at the most, mild transient redness. Repeated spills on exposed skin may result in dermatitis due to solvent effects.

Results after one year of a planned two-year animal study on the effects of exposure to acrylonitrile have indicated that rats ingesting as little as 35 ppm in their drinking water develop tumors of the central nervous system. The interim results of this study have been supported by a similar study being conducted by the same laboratory, involving exposure of rats by inhalation of acrylonitrile vapor, which has shown similar types of tumors in animals exposed to 80 ppm.

In addition, the preliminary results of an epidemiological study being performed by duPont on a cohort of workers in their Camden, South Carolina acrylic fiber plant indicate a statistically significant increase in the incidence of colon and lung cancers among employees exposed to acrylonitrile.

III. SIGNS AND SYMPTOMS OF ACUTE OVEREXPOSURE

Asphyxia and death can occur from exposure to high concentrations of acrylonitrile. Symptoms of overexposure include eye irritation, headache, sneezing, nausea and vomiting, weakness, and light-headedness. Prolonged skin contact can cause blisters on the skin with the appearance of a second degree burn, but with little or no pain. Repeated skin contact may produce scaling dermatitis.

IV. TREATMENT OF ACUTE OVEREXPOSURE

Remove employee from exposure. Immediately flush eyes with water and wash skin with soap or mild detergent and water. If AN has been swallowed, and person is conscious, induce vomiting. Give artificial resuscitation if indicated. More severe cases, such as those associated with loss of consciousness, may be treated by the intravenous administration of sodium nitrite, followed by sodium thiosulfate, although this is not as effective for acrylonitrile poisoning as for inorganic cyanide poisoning.

V. SURVEILLANCE AND PREVENTIVE CONSIDERATIONS

A. As noted above, exposure to acrylonitrile has been linked to increased incidence of cancers of the colon and lung in employees of the duPont acrylic fiber plant in Camden, S.C. In addition, the animal testing of acrylonitrile has resulted in the development of cancers of the central nervous system in rats exposed by either inhalation or ingestion. The physician should be aware of the findings of these studies in evaluating the health of employees exposed to acrylonitrile.

Most reported acute effects of occupational exposure to acrylonitrile are due to its ability to cause tissue anoxia and asphyxia. The effects are similar to those caused by hydrogen cyanide. Liquid acrylonitrile can be absorbed through the skin upon prolonged contact. The liquid readily penetrates leather, and will produce burns of the feet if footwear contaminated with acrylonitrile is not removed.

It is important for the physician to become familiar with the operating conditions in which exposure to acrylonitrile may occur. Those employees with skin diseases may not tolerate the wearing of whatever protective clothing may be necessary to protect them from exposure. In addition, those with chronic respiratory disease may not tolerate the wearing of negative-pressure respirators.

B. Surveillance and screening.

Medical histories and laboratory examinations are required for each employee subject to exposure to acrylonitrile above the action level. The employer must screen employees for history of certain medical conditions which might place the employee at increased risk from exposure.

1. *Central nervous system dysfunction.* Acute effects of exposure to acrylonitrile generally involve the central nervous system. Symptoms of acrylonitrile exposure include headache, nausea, dizziness, and general weakness. The animal studies cited above suggest possible carcinogenic effects of acrylonitrile on the central nervous system, since rats exposed by either inhalation or ingestion have developed similar CNS tumors.

2. *Respiratory disease.* The duPont data indicate an increased risk of lung cancer among employees exposed to acrylonitrile.

3. *Gastrointestinal disease.* The duPont data indicate an increased risk of cancer of the colon among employees exposed to acrylonitrile. In addition, the animal studies show possible tumor production in the stomachs of the rats in the ingestion study.

4. *Skin disease.* Acrylonitrile can cause skin burns when prolonged skin contact with the liquid occurs. In addition, repeated skin contact with the liquid can cause dermatitis.

5. *General.* The purpose of the medical procedures outlined in the standard is to es-

lonitrile. Non-impermeable clothing and shoes should not be allowed to become contaminated with liquid AN and PAN. If permeable clothing does become contaminated, it should be promptly removed and not worn again until completely free of the material. If leather footwear or other leather garments become wet from acrylonitrile, they should be replaced and not worn again, due to the ability of leather to absorb acrylonitrile and hold it against the skin. Since there is no pain associated with the blistering, it is essential that the employee be informed of this hazard so that he or she can be protected.

Any protective clothing which has developed leaks or is otherwise found to be defective shall be repaired or replaced. Clean protective clothing shall be provided to the employee at least weekly, and whenever the clothing becomes wet with liquid AN or PAN. Employees are also required to wear splash-proof safety goggles where there is any possibility of acrylonitrile contacting the eyes.

VI. HOUSEKEEPING AND HYGIENE FACILITIES

For purposes of complying with 29 CFR 1910.141, the following items should be emphasized:

A. The workplace should be kept clean, orderly, and in a sanitary condition;

B. Dry sweeping and the use of compressed air is unsafe for the cleaning of floors and other surfaces where liquid AN or PAN may be found.

C. Adequate washing facilities with hot and cold water should be provided, and maintained in a sanitary condition. Suitable cleansing agents should also be provided to assure the effective removal of acrylonitrile from the skin.

D. Change or dressing rooms with individual clothes storage facilities should be provided to prevent the contamination of street clothes with acrylonitrile. Because of the hazardous nature of acrylonitrile, contaminated protective clothing should be stored in closed containers for cleaning or disposal.

VII. MISCELLANEOUS PRECAUTIONS

A. Store acrylonitrile in tightly-closed containers in a cool, well-ventilated area, and take necessary precautions to avoid any explosion hazard.

B. High exposures to acrylonitrile can occur when transferring the liquid from one container to another.

C. Non-sparking tools must be used to open and close metal acrylonitrile containers. These containers must be effectively grounded and bonded prior to pouring.

D. Never store uninhibited acrylonitrile. The inhibitor content shall be determined weekly.

E. Acrylonitrile vapors are not inhibited. They may form polymers and clog vents of storage tanks.

F. Use of supplied-air suits or other impervious coverings may be necessary to prevent skin contact with and provide respiratory protection from acrylonitrile where the concentration of acrylonitrile is unknown or is above the ceiling limit. Supplied-air suits should be selected, used, and maintained under the immediate supervision of persons knowledgeable in the limitations and potential life-endangering characteristics of supplied-air suits.

G. Employers shall advise employees of all areas and operations where exposure to acrylonitrile could occur.

establish a baseline for future health monitoring. Persons unusually susceptible to the effects of anoxia or those with anemia would be expected to be at increased risk. In addition to emphasis on the CNS, respiratory and gastro-intestinal systems, the cardiovascular system, liver, and kidney function should also be stressed.

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Register
of
Federal
Law

TUESDAY, JANUARY 17, 1978
PART V



DEPARTMENT OF
LABOR

Employment and
Training Administration

■
INTERSTATE
ARRANGEMENT
FOR COMBINING
EMPLOYMENT
AND WAGES

[4510-30]

Title 20—Employees' Benefits

CHAPTER V—EMPLOYMENT AND TRAINING
ADMINISTRATION, DEPARTMENT OF LABORPART 616—INTERSTATE ARRANGEMENT FOR
COMBINING EMPLOYMENT AND WAGES

Amendment of Regulations

AGENCY: Employment and Training
Administration, Labor

ACTION: Final rule

SUMMARY: The Interstate Arrangement for Combining Employment and Wages is a permanent part of the Federal-State Unemployment Compensation Program which is designed to pay unemployment compensation to those individuals whose base period employment was performed and wages were earned in two or more States. The Department of Labor is revising the combined-wage regulations to reflect recent amendments to the laws. The recent amendments require the Virgin Islands to participate in the Interstate Arrangement when it becomes a cooperating State in the Federal-State Unemployment Compensation Program, and change the rules for determining the Federal share of the costs of benefits on claims filed jointly under Federal and State unemployment compensation laws. Amendment of the regulations is necessary to conform them to the amended laws.

EFFECTIVE DATE: February 16, 1978.

FOR FURTHER INFORMATION
CONTACT:

Lawrence E. Weatherford, Jr., Administrator, Unemployment Insurance Service, Employment and Training Administration, U.S. Department of Labor, 601 D Street NW., Washington, D.C. 20213, telephone 202-376-7032.

SUPPLEMENTARY INFORMATION: Part 616, Chapter V, Title 20 of the Code of Federal Regulations implements the Interstate Arrangement for Combining Employment and Wages, which was created under the Employment Security Amendments of 1970 (Pub. L. 91-373: 84 Stat. 695, 708). These amendments to Part 616 have been developed in consultation with the duly designated representatives of the Interstate Conference of Employment Security Agencies, who pursuant to § 616.2 of Part 616, are recognized by the Secretary of Labor as agents of the State unemployment compensation agencies for the purposes of the consultation required by section 3304(a)(9)(B) of the Internal Revenue Code of 1954 (26 U.S.C. 3304(a)(9)(B)).

The amendments to Part 616 reflect recent amendments to pertinent statutes, and were published as a proposal

with opportunity for public participation at 42 FR 57252, on November 1, 1977. No change is made in the amendments as proposed. Although comments were received from three sources, the comments speak to points which are beyond the scope of the proposed amendments. To give consideration to these comments, the same process of consultation with the duly designated representatives of the Interstate Conference of Employment Security Agencies must be undertaken as noted above. Therefore, responses to the comments received will be undertaken in accordance with established procedures.

The published proposal fully explains the substantive changes in the regulations. In summation the amendments include the following significant changes:

1. Section 616.8(a) is changed to make it possible for the Virgin Islands to participate in the Interstate Arrangement for Combining Employment and Wages when the Virgin Islands becomes a cooperating State in the Federal-State Unemployment Compensation Program.

2. Section 616.8(f) is amended by adding paragraph 3. This new paragraph prescribes how benefit costs shall be charged to the United States when the wage credits in a Combined-Wage Claim include wage credits under the Unemployment Compensation Program for Ex-Servicemen and Women and the Unemployment Compensation Program for Federal Civilian Employees.

NOTE.—The Department of Labor has determined that this document does not contain a major proposal requiring the preparation of an Economic Impact Statement under Executive Order 11949 and applicable authority.

This document was prepared under the direction and control of Lawrence E. Weatherford, Jr., Administrator, Unemployment Insurance Service, Employment and Training Administration, U.S. Department of Labor, 601 D Street NW., Washington, D.C. 20213, telephone: 202-376-7032.

Accordingly, amendments to Part 616 of Chapter V of Title 20, Code of Federal Regulations, are set forth below.

Signed at Washington, D.C., on January 11, 1978.

ERNEST G. GREEN,
Assistant Secretary for
Employment and Training.

1. In § 616.8, paragraphs (a) and (e)(2) are amended to read as follows:

§ 616.6 Definitions.

(a) "State". "State" includes the States of the United States, the District of Columbia and the Common-

wealth of Puerto Rico, and includes the Virgin Islands effective on the day after the day on which the Secretary approves under section 3304(a) of the Internal Revenue Code of 1954 (26 U.S.C. 3304(a)), an unemployment compensation law submitted to the Secretary by the Virgin Islands for approval.

(e) *Paying State.*

(2) If the State in which a Combined-Wage Claimant files a Combined-Wage Claim is not the Paying State under the criterion set forth in paragraph (e)(1) of this section, or if the Combined-Wage Claim is filed in Canada or the Virgin Islands, then the Paying State shall be that State where the Combined-Wage Claimant was last employed in covered employment among the States in which the claimant qualifies for unemployment benefits on the basis of combined employment and wages: *Provided*, That, this paragraph (2) shall read as if the Virgin Islands was not referred to therein, effective on the day after the day on which the Secretary approves under section 3304(a) of the Internal Revenue Code of 1954 (26 U.S.C. 3304(a)), an unemployment compensation law submitted to the Secretary by the Virgin Islands for approval.

2. In § 616.8 paragraph (f) is amended by adding thereto a new subparagraph (3) to read as follows:

§ 616.8 Responsibilities of the paying State.

(f) *Statement of benefit charges.*

(3) With respect to new claims establishing a benefit year effective on and after July 1, 1977, the United States shall be charged directly by the Paying State, in the same manner as is provided in paragraphs (f)(1) and (f)(2) of this section, in regard to Federal civilian service and wages and Federal military service and wages assigned or transferred to the Paying State and included in Combined-Wage Claims in accordance with this Part and Parts 609 and 614 of this chapter. With respect to new claims effective before July 1, 1977, prior law shall apply.

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