DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Part 1910

[Docket No. H-004E]

Occupational Exposure to Lead; Revised Supplemental Statement of Reasons; Amendment of Final Rule

AGENCY: Occupational Safety and Health Administration, Labor.

ACTIONS: Revised Supplemental Statement of Reasons; Amendment of Final Rule.

SUMMARY: OSHA is revising the Supplemental Statement of Reasons, published on January 21, 1981 (46 FR 6134), concerning the feasibility of complying with the lead standard for certain industries. In addition, OSHA is amending paragraph (e)(1) of the lead standard, 29 CFR 1910.1025(e)(1), in several important respects. First, the language of paragraph (e)(1) has been amended, consistent with the decision in *United Steelworkers of America* v. *Marshall*, 647 F. 2d 1189 (D.C. Cir. 1980), *cert. denied* 101 S. Ct. 3148 (1981), to reflect the fact that only feasible engineering controls are required by the standard. Second, a limited exclusion, which would allow employers whose employees have 30 or fewer days of exposure per year above the PEL to be exempt from the requirement to control exposures through engineering controls has been incorporated into paragraph (e) to provide a solution to the problem of intermittent lead exposures. Third, table 1 of paragraph (e) has been amended to extend the compliance deadline for the "other industries" to two and one half years to allow sufficient time for the design and installation of controls and to prevent potential inequities to the affected industries as a result of the Secretary's reconsideration of the standard. Finally, OSHA is requesting that the Court of Appeals return the record to the Agency for eight industries because further proceedings on feasibility are necessary. In addition, OSHA has proposed to administratively stay the application of the entire standard in the stevedoring industry and has initiated rulemaking to evaluate the unique problems posed by application of the lead standard in this industry.

EFFECTIVE DATE: January 11, 1982.

FOR FURTHER INFORMATION CONTACT: Mr. John Martonik, Acting Director, Health Standards Directorate, Occupational Safety and Health Administration, U.S. Department of Labor, Third Street and Constitution Avenue, NW., Room N-3718, Washington, D.C. 20210. Telephone: (202) 523-7076.

SUPPLEMENTARY INFORMATION:

1. Regulatory and Judicial History

On November 14, 1978, OSHA published a final standard limiting occupational exposure to inorganic lead to airborne concentrations of 50 $\mu g/m^3$ based on an 8-hour time weighted average. 29 CFR 1910.1025 (43 FR 52952). This standard superseded the permissible exposure limit (PEL) which had been adopted from a national consensus standard pursuant to section 6(a) of the Occupational Safety and Health Act of 1970. Additional protective provisions included environmental monitoring, recordkeeping, employee education and training, medical surveillance, medical removal protection, hygiene facilities, and other requirements.

Immediately after promulgation, the lead standard was challenged by both industry and labor in several U.S. Courts of Appeals. All cases were transferred and consolidated in the U.S. Court of Appeals for the District of Columbia Circuit.

In an opinion issued on August 15, 1980, the United States Court of Appeals for the District of Columbia Circuit, per Chief Judge Wright, upheld the validity of OSHA's lead standard in most respects. However, the court found that OSHA failed to present substantial evidence or adequate reasons to support the feasibility of the standard with respect to certain industries, and remanded the standard to the Agency for reconsideration of the question of the technological and economic feasibility of the standard for thirty-eight industries, and for these industries stayed the requirement that the 50 $\mu g/m^3$ PEL must be met primarily through the use of engineering controls, while maintaining the requirement that these industries install engineering controls to meet the preexisting 200 $\mu g/m^3$ exposure level. *United Steelworkers, supra,* 647 F. 2d at 1311. The Court gave OSHA until February 15, 1981 to respond to the remand order.

Accordingly, on September 24, 1980, OSHA published a **Federal Register** notice (45 FR 63476) which reopened the rulemaking record for the limited and express purpose of soliciting and receiving additional information pertaining to the technological and economic feasibility of meeting the 50 $\mu g/m^3$ PEL solely by engineering controls and work practices. An informal public hearing was held on November 5-7, 1981. The record remained open for the receipt of additional comment and data until December 1, and, for posthearing argument until December 10, 1980. Final certification of the record was completed on December 17, 1980, by Administrative Law Judge Feirtag.

On January 19, 1981, OSHA filed its Supplemental Statement of Reasons with the Court of Appeals (46 FR 6134, January 21,1981). Thereafter, OSHA joined industry and requested that the Court defer further judicial proceedings on remand until the Agency had considered and decided petitions for administrative reconsideration of the Supplemental Statement. The Court has granted OSHA until December 10, 1981, to respond to the petitions for reconsideration; five such petitions were received requesting relief in eleven industry segments.

Concurrent with the remand proceedings, industry sought and obtained a stay of the lead standard from the United States Supreme Court pending the filing and disposition of petitions for *certiorari,* which paralleled the stay originally issued by the District of Columbia Circuit on March 1, 1979. On June 29, 1981, the Supreme Court refused to consider further challenges to the lead standard, thus leaving intact the Court of Appeals decision upholding the regulation and dissolving its previously issued stay of the lead standard.

The lead standard, including the requirement that the permissible exposure limit (PEL) be achieved by the use of engineering and work practice controls, is now fully effective in the following industries: Primary lead smelting; secondary lead smelting; battery manufacturing; electronics; gray iron foundries; ink manufacturing; paints & coating manufacturing; wallpaper manufacturing; can manufacturing; and printing. In the remaining industries every provision of the standard except paragraph (e)(1) is in effect. For these industries, however, the obligation to achieve the 200 $\mu g/m^3$ level remains in effect.

2. Conclusions

After receiving the petitions for reconsideration, OSHA recognized the need to reevaluate the remand findings; accordingly, the Agency administratively stayed the effective date of the Supplemental Statement of Reasons until December 10, 1981. Based upon a thorough review of the course of the lead proceedings and the entire remand record, OSHA reaffirms its previous conclusion that for most of the 46 industries,[1] the supplemental record again demonstrates that the standard is feasible either because exposure levels do not generally exceed the PEL, thus requiring minimal or no compliance actions, or because exposure levels above the PEL can be controlled by available and affordable engineering controls or work practices well within the extended time period of two and one half years permitted for compliance. The Agency has also concluded that further proceedings are necesssary to determine the feasibility of achieving the PEL with engineering controls and work practices in the following industries: Manufacture of lead pigments and lead chemicals; shipbuilding and ship repair; leaded steel manufacture; nonferrous foundries and lead casting; battery breaking in the collection and processing of scrap (excluding collection and processing of scrap which is part of a secondary lead smelting operation); and secondary smelting of copper. In addition, OSHA has proposed to administratively stay the application of the entire standard in the stevedoring industry and has initiated rulemaking to evaluate the unique problems posed by application of the lead standard in this industry. Accordingly, OSHA will ask the Court of Appeals to return the record to the Agency with respect to these industries so that supplementary proceedings may be initiated. During this period of review all provisions of the lead standard will remain in effect for these industries, except paragraph (e)(1). Again, the 200 $\mu g/m^3$ level of the prior standard must be achieved through primary reliance on engineering controls during this period of review.

The conclusions which follow are intended to supersede those in the Supplemental Statement of Reasons published on January 21, 1981 (46 FR 6134), where the conclusions herein differ from those reached in January. OSHA has amended paragraph (e) in three respects. First, the language of paragraph (e)(1) has been changed by substituting the language of OSHA's traditional compliance hierarchy with respect to the use of engineering controls and other means of protection; this change merely conforms the standard to the Court of Appeals decision. Second, a limited exclusion from the requirement that *all* exposures in excess of the PEL be reduced with engineering controls has been incorporated into the lead standard to ease the compliance problems faced by industries with intermittent exposures. Third, the compliance schedule for all the remand industries has been extended to two and one half years. Finally, the Agency will request that the Court of Appeals return the record for eight industries.

In reaching these decisions, OSHA relied on the definitions of "feasible" and "reasonably necessary or appropriate", and the decisional methodology employed during the original promulgation of the lead standard, *i.e.*, engineering controls are "feasible" where they are affordable and capable of reducing lead exposures, and "reasonably necessary or appropriate" where the controls are cost-effective. Thus, OSHA's feasibility findings here are fully consistent with those which were affirmed by the Court of Appeals on August 15, 1980. OSHA has reservations, however, about applying this methodology to the eight industries on which decision is being withheld because of potentially significant inaccuracies in the Agency's understanding of the feasibility problems faced therein. It should also be noted that a separate reconsideration of the entire standard is planned to address the possible application of alternative methodologies to determine the cost-effectiveness of the lead standard (45 FR 22764). OSHA's general response to the pending petitions for reconsideration is described below.

I. Amendments to the Standard

A. Means of Compliance

The lead standard provides:

> (e) Methods of compliance—(1) Engineering and work practice controls. The employer shall implement engineering and work practice controls (including administrative controls) to reduce and maintain employee exposure to lead in accordance with the implementation schedule in Table I below. Failure to achieve exposure levels without regard to respirators is sufficient to establish a violation of this provision.

29 CFR 1910.1025(e)(1). Earlier health standards, such as arsenic and cotton dust, on the other hand, explicitly incorporated the concept of feasibility into the methods of compliance section. *See, e.g.*, 29 CFR 1910.1018(g) (arsenic); 29 CFR 1910.1043(e) (cotton dust); 29 CFR 1910.1029(f) (coke oven emissions). The change of language in the lead standard, Lead Industries Association (LIA) contended, attempted "to declare the standard feasible without regard to respirators, and thus announces any failure to meet the PEL by engineering and work practice controls alone a violation of the standard." *United Steelworkers, supra*, 647 F.2d at 1270.

In reviewing the difference between the phraseology of OSHA's various "means of compliance" sections in health standards, the Court of Appeals explained:

> The cases have apparently treated these standards as creating a general presumption of feasibility for an industry. A company could not simply refuse to pursue engineering or work practice controls by asserting their infeasibility. Rather, it would have to attempt to install controls to the limits of contemporary technical knowledge and of its own financial resources.

Id. at 1271. Past OSHA policy, then, as reflected in general and specific air contaminant standards, has permitted employer use of respirators where engineering controls are technologically infeasible. The Court of Appeals interpreted the lead standard's compliance language to have the same meaning. *Ibid.*

Nevertheless, several remand participants claim that while substantial reductions in air lead levels can be achieved with engineering controls, there is no guarantee that the PEL will be reached (*e.g.*, Ex. 475–32). OSHA does not expect such a guarantee from employers, and the language of the standard, which leaves room for misinterpretation, has therefore been amended.

OSHA has previously assured the Court of Appeals that the lead standard did not in substance change the Agency's usual position concerning means of compliance. *See United Steelworkers, supra*, 647 F.2d at 1271. To clear up any remaining confusion, OSHA has amended paragraph (e)(1) so that the lead standard will reflect past compliance policy in form as well as substance. By explicitly incorporating the concept of feasibility directly into the standard, OSHA seeks to reassure concerned parties that it recognizes that engineering controls, even when coupled with effective work practices and administrative rotation, will not, in all cases, assure compliance with the regulation's PEL. Therefore, employers may use effective respiratory equipment to achieve compliance with the standard once they have demonstrated the infeasibility of alternative controls.

B. Intermittent Exposures.

In response to several petitions for reconsideration (Bell Pet.; LIA Pet. at 52, 58; SBC Pet. at 19) and instructions from the Court of Appeals (647 F.2d at n. 168), OSHA has determined that relief to industries with intermittent lead exposures is warranted. Accordingly,

[1] The Court's remand order listed thirty-eight industries. After recategorizing some industries and adding others to the list, OSHA's final conclusions apply to 46 industry categories.

paragraph (e) of the standard has been amended to provide that where employee exposure above the PEL does not exceed 30 days a year, the employer is exempt from the requirement that engineering controls be implemented to reduce lead exposure.

Previously, the lead standard required that all lead exposures which exceeded the PEL be reduced by implementing engineering and work practice controls regardless of the duration of exposure. Industries where lead exposures are intermittent have objected to this requirement in the lead standard for several reasons: (1) Engineering controls are inappropriate to control exposures which may be high but occur only briefly; (2) the exemption of the contruction industry from the lead standard, in part because of the intermittent nature of exposures, warrants a similar exemption for all intermittent exposure industries; and (3) OSHA failed to make significant risk findings applicable to their industries (Ex. 475–22; 475–28; 475–39).

OSHA rejects the contention that the exemption granted to the construction industry compels a similar exclusion for all intermittent industries, *see infra*. The Agency does agree, however, that the magnitude of the health problem posed by lead exposure in industries with intermittent exposures differs from the magnitude of the problem in the general lead industries and has fashioned a response which makes the regulatory obligations of the intermittent industries commensurate with the lead problem presented. OSHA believes that this action complies with the requirements of *Industrial Union Dept.* v. *American Petroleum Institute*, 448 U.S. 607 (1981) and meets the concerns of the intermittent industries.

Under paragraph (e) as amended, the requirement that engineering controls be implemented to reduce lead exposures will not apply until an employee has been exposed to lead above the PEL for more than thirty days per annum. This exclusion parallels that already contained in the medical surveillance program, *see* 29 CFR 1910.1025 (j)(1)(i), is administratively feasible for OSHA to monitor, and should assure that employee blood leads remain within acceptable limits. Where employers qualify for the exemption from the requirement that engineering controls be implemented, the PEL will remain applicable, but exposures may be reduced using any combination of controls. OSHA believes that this approach is a cost-effective means of providing an equivalent level of health protection to employees whose exposure to lead is only sporadic.

Thirty days has been selected because it represents the point at which OSHA can be assured that the lack of engineering controls will not adversely affect employee health. Contrary to the suggestion of some commenters, the fact that lead exposure may be intermittent does not assure that employee blood leads will remain low. Based on the air lead/blood lead correlations from which the new PEL was derived (*See* Ex. 439), OSHA predicts that absent the new lead standard, *i.e.*, assuming compliance with the prior 100 $\mu g/m^3$ standard, blood leads would be expected to peak at a mean value of 48.2 $\mu g/100$ ml if an employee were exposed to lead continuously for thirty days (assuming five years job tenure), and rise to a mean value of 32 $\mu g/100$ ml if an employee were exposed to lead for thirty days evenly distributed over the entire year (also assuming five years job tenure).[2] Because employees are unlikely to be constantly exposed for thirty days per year in any of the intermittent industries and are equally as unlikely to have their exposures evenly spaced throughout the year, OSHA presumes that blood leads can be expected to rise to a level somewhere between these two figures.

While the lead standard was designed to maintain mean blood lead levels at about 36 $\mu g/100$ ml, that figure was not viewed by the Agency as representing a level which will assure that no employee will suffer material impairment of health if he or she is exposed to the substance for their entire working life. 29 U.S.C. 655(b)(5). Rather, in order to achieve this statutory goal, OSHA previously found that blood leads could be harmful as low as 30 $\mu g/100$ ml, but concluded that this blood level would correlate to an air lead level lower than 50 $\mu g/m^3$, and that this lower air level would prove generally infeasible. *See* 43 FR 54358, 54388. *See also* 647 F.2d at 1308–1309. Thus, even thirty days exposure at the old PEL presents a risk of material impairment based on the existing air lead/blood lead correlation in the record.[3]

Accordingly, OSHA will require that all employee exposures which rise above the PEL be controlled to 50 $\mu g/m^3$, but will permit the employer to use any method of control if employees will not be exposed above the PEL for more than thirty days per year. Based upon the air lead/blood lead correlations, OSHA is satisfied that blood leads under this formula will remain within acceptable limits for the reasons which follow.

First, the air lead/blood lead correlation predicts that blood leads of workers exposed to an air lead level of 50 $\mu g/m^3$ (*i.e.*, where engineering controls have brought the employer fully into compliance) will peak at a mean value of 30.3 $\mu g/ml$ if an employee were exposed to lead continuously for thirty days (assuming five years job tenure); and rise to a level of 24 $\mu g/ml$ if an employee were exposed to lead evenly distributed over the entire year (also assuming five years job tenure). Because either scenario is unlikely, OSHA presumes that the mean value would peak at a level somewhere between these figures, and in all probability would remain well below 30 $\mu g/ml$.

Second, some commenters stated (*see* 543 FR 52992–93) that a primary detraction from respirator effectiveness is worker resistance to wearing the devices for prolonged periods. This resistance, it is claimed, decreases the likelihood that employees will scrupulously keep the respirator on while working in lead-exposed areas, which in turn diminishes the protection the respirator would otherwise give. However, it is clear to the Agency that wearing a respirator only 30 days per year, particularly when those days are spaced throughout the year, would significantly ease any such employee resistance.

Third, the 200 $\mu g/m^3$ PEL, which requires implementation of feasible engineering controls, remains in force. Therefore, even if an employee's respirator use during 30 days of lead exposure is less than meticulous, the lead levels he or she breathes during these short periods of negligence will not be inordinately high.

Consequently, OSHA has concluded that the 30 day exposure rule for engineering controls will not result in the mean value of employee blood leads rising significantly above the level it would be at assuming compliance with 50 $\mu g/m^3$ using engineering controls. OSHA notes, moreover, that it is unlikely that any such small rise in the mean value would exceed the Agency's biological goal of 30 $\mu g/ml$.

The thirty day trigger which OSHA has adopted has several benefits. First, because it parallels the thirty day exclusion for medical surveillance already incorporated into the standard, it will not diminish OSHA's ability to monitor compliance with the lead standard. Any other exclusion, *e.g.*, forty

[2] These figures can be expected to rise as job tenure, and hence lead body burden, increase.

[3] This correlation and the previous health findings may, however, be refined on reconsideration if the evidence warrants it.

days per year, or a PEL averaged over the 40 hour work week would seriously impede efforts to determine compliance with the standard. The selection of thirty days as the trigger for the requirement that engineering controls be implemented is thus within the "zone of reasonableness" granted by the courts to numerical determinations by administrative agencies. *See Hercules, Inc.* v. *Environmental Protection Agency*, 598 F.2d 91, 107 (D.C. Cir. 1978) and cases cites therein. Second, the establishment of an engineering control trigger should provide industry with added flexibility to use a combination of work practices and rotation to achieve the PEL and will allow many industries to avoid the installation of more costly engineering controls, and is, therefore, a cost-effective means of controlling intermittent exposures. For example, several parties have maintained that rotation is not a feasible method of controlling daily exposures (Ex. 528-13); this problem will be ameliorated where employees may be rotated on a monthly basis. In addition, OSHA believes this intermittent trigger will ease the burden of the lead standard for small businesses where lead's use is necessary but infrequent. For example, in many small pottery establishments, lead pigments are used to form glazes. These glazes are mixed infrequently due to low usage by such small establishment. Under the original lead standard, engineering controls would have been required regardless of how infrequently glazes were mixed. Under paragraph (e) as amended, such an establishment could avoid the requirement that engineering controls be implemented.

C. Compliance Schedule

During the remand, several industries maintained that compliance with the lead standard could not be achieved in one year. (*See, e.g.*, Ex. 498; 475-35; TR. 353-34). The petitions for reconsideration reiterate the claim that one year provides an inadequate planning horizon in which to analyze, design, purchase and install emission control equipment. After careful evaluation of the rulemaking record and in light of the Agency's experience in compelling abatement of occupational hazards,[4] OSHA agrees that the compliance schedule for achieving the PEL should be extended to two and a half years for all remand industries.[5] Although the engineering problems faced by the various remand industries differ, OSHA does not believe that varied compliance schedules based on the nature and extent of the lead exposure problem are warranted in this instance. For industries where lead exposure levels are generally below the PEL, the extended compliance schedule will have no impact because the standard does not require additional engineering controls. All other industries, regardless of the magnitude of the control problem, face essentially the same design and procurement problems; OSHA therefore concludes that no basis exists for distinguishing between the ability of different industries to obtain and install engineering controls.

An additional reason for extending the compliance schedule is OSHA's previously announced intention to conduct an indepth reevaluation of the technological and economic feasibility, as well as the reasonable necessity and appropriateness of compliance with all the provisions of the lead standard (46 FR 22764, April 21, 1981).[6] Reconsideration of the lead standard will accordingly include a reassessment of the cost-effectiveness of various means of reducing worker exposure to lead. If prior to such a reconsideration affected employers are required to implement the policies being reexamined, the purposes of any resulting agency action may be frustrated. Under the current one year compliance schedule, the Agency's reconsideration of whether primary reliance on engineering controls is the most cost-effective means of complying with the lead standard cannot be completed. The Agency believes that similar problems are unlikely to arise under a two and one-half year compliance schedule.

D. Return of the Rulemaking Record

After careful evaluation of the rulemaking record, OSHA has decided to ask the Court of Appeals to return the record to the Agency for the following industries: lead pigments and lead chemical manufacture; shipbuilding and ship repair; leaded steel manufacture; nonferrous foundries and lead casting; battery breaking in the collection and processing of scrap; and secondary smelting of copper. This action is based on OSHA's conclusions that the petitions for reconsideration filed on behalf of these industries raise significant questions concerning the accuracy of the January remand statement. During the interim period, these industries will be required to install engineering controls to reduce lead exposures to 200 $\mu g/m^3$ and also comply with all provisions of the lead standard except paragraph (e)(1).

OSHA is not satisfied at this time that application of conventional control technology is capable of reducing lead exposures in these industries, either because exposure levels are particularly high, *e.g.*, pigment manufacture, or because lead is encountered in unique circumstances, *e.g.*, shipbuilding. OSHA recognizes, however, that it has a duty to protect *all* workers, *United Steelworkers, supra*, 647 F.2d at 1309-10, and does not view this action as an exemption from paragraph (e)(1) for the affected industries. Rather, OSHA believes that the announced reconsideration of the lead standard is the appropriate forum for resolving the remaining questions concerning the technological feasibility of the standard.

The industries for which OSHA will request that the record be returned differ from those included in the "other industries" category for which OSHA has extended the compliance schedule because each industry may face significant technological or economic problems in achieving compliance, and hence most of these industries must expend far larger capital sums to install equipment which may not reduce exposures to below the PEL. Manufacturing segments in the "other industries" category do not face these technological difficulties, either because exposures are generally below the PEL or because compliance requires little more than upgrading existing control equipment or enhancing work practices. For example, OSHA's analysis of lead exposures in the foundry industry apparently was predicated on exposure data from establishments using metals with little or no lead, an atypical occurrence in the nonferrous foundry industry.[7] *See* LIA Pet. at 42. Similarly, OSHA's analysis of battery breaking operations in scrap yards presumed that the methods of compliance employed by secondary lead smelters during battery breaking would also control exposures in scrap yards. However, OSHA now recognizes that while automated materials handling systems are a viable control strategy for large scale industrial operations, they are unlikely to be adaptable to smaller scrap facilities. *See* NARI Pet. at 15. The shipbuilding

[4] *See, e.g., Secretary of Labor* v. *Bethlehem Steel Corporation* OSHRC Docket No. 78-1362, Settlement Entered—September 12, 1979.

[5] The compliance schedule will remain intact for the industries affirmed by the Court of Appeals.

[6] While the advance notice of proposed rulemaking indicated OSHA's intent to employ cost-benefit analysis during reconsideration, the Supreme Court's subsequent decision in *American Textile Manufacturers Institute* v. *Donovan* precludes reliance on this analysis.

[7] For the purposes of this discussion, the lead casting industry has been grouped with the nonferrous foundry industry because of the similarity between the processes. Likewise, the lead chemical manufacture industry has been grouped with the lead pigment industry.

industry has also criticized OSHA for not adequately accounting for the varied sites where lead exposure may result—most of the ship repair work involving lead exposure occurs in confined spaces where engineering controls are allegedly ineffective—and the mobility of the shipbuilding workforce. *See* SBC Pet. at 8–12. More information is needed on these factors. The secondary copper smelting industry has been declining; there were twenty secondary copper smelters in 1965 while there are only five currently operating (NARI Pet. at 17). OSHA needs more information on the cause of this decline and the lead standard's impact on this industry. Likewise, in the manufacture of pigments, employing separate production lines for different pigment color groups apparently reduces lead exposure significantly (Ex. 476–244); OSHA needs more information to determine the extent of the resultant exposure reduction and the ability of the entire industry to accomplish this production change. Finally, OSHA's discussion of the steel industry focused on that industry's planned modernization and concluded that it would effectively control lead exposures. LIA's petition for reconsideration has convinced OSHA that until the Agency obtains more information on modernization, *e.g.*, which facilities and pieces of equipment are included, how long will the process take to complete, no conclusion can be reached regarding the effect this program will have on lead exposure levels.

Since OSHA is not satisfied that the current record supports any conclusions concerning technological feasibility for these industries, and since the Agency has announced its intent to conduct an in-depth inquiry on feasibility and cost-effectiveness questions, OSHA is drawing no conclusions at this time regarding the ability of these eight industries to meet the PEL.

E. Stevedoring

OSHA has decided to propose administratively staying application of the lead standard to the stevedoring industry. (A separate proposal will be published shortly.) Careful examination of the record evidence, in light of the concerns raised by industry's petition for reconsideration have convinced the agency of the need to determine whether any OSHA lead standard should cover this industry and, if so, what form that standard should take. Several factors have prompted the agency to reach this conclusion. First, the operations and exposure problems in the stevedoring industry closely resemble those found in the construction industry. Both industries have only low intermittent exposure to lead, more importantly both have workforces that move from place to place on the worksite and both have transient workforces. This striking parallel between construction and stevedoring has compelled OSHA to consider whether the peculiar operational characteristics of the stevedoring industry warrants the drafting of a separate lead standard for stevedoring, as the agency has previously announced for construction.

In addition, a claimed total shutdown of the export-import trade in lead ore forces OSHA to examine the earlier claim advanced by ASARCO and St. Joe that the stevedoring industry should be exempt from this lead standard (46 FR 622 1/2). According to industry's petition, publication of the lead standard led to a decision by the stevedoring companies not to handle shipments of lead ore. That decision was based on the stevedores' belief that the standard's provisions requiring companies to alert their employees to the hazards of lead would trigger the filing of an extensive number of frivolous compensation claims by longshoremen (LIA Pet. at 53–56). ASARCO and St. Joe argued that this anticipated wave of claims would increase the cost of worker's compensation insurance so dramatically that handling lead shipments would become unprofitable (Tr. 721, 723). Presently, the agency does not possess the information to evaluate the veracity of the insurance compensation argument of ASARCO and St. Joe, nor does it have any evidence to assist it in measuring the economic impact of the termination of the lead ore carrying trade on the lead mining and smelting industries. This lack of information on such fundamental economic questions provided additional impetus to the agency's decision to reconsider the standard's application to this industry.

Accordingly, OSHA proposes to administratively stay implementation of the lead standard to the stevedoring industry and will provide interested parties until February 10, 1982 to comment on: (1) Whether the stevedoring industry should be subject to this, or any lead standard, and (2) if the industry should be subject to a different lead standard, what form should that standard take.

II. Industry-by-Industry Analysis

Based upon a thorough review of the remand findings, OSHA reaffirms its conclusion of January 21, 1981 that application of the lead standard in the industries listed below is feasible, particularly in light of the extended compliance schedule and thirty day exclusion from the requirement that engineering controls be installed, discussed above. OSHA expects that these two changes will reduce the economic impact of the standard for these industries, but cannot calculate the exact cost savings attributable to the amendments to paragraph (e)(1) due to a lack of information on the frequency of lead exposure in individual workplaces. The industries for which the feasibility findings are reaffirmed are:

Agricultural Pesticides
Artifical Pearl Processing
Book Binding
Brick Manufacture
Cable Coating
Cutlery
Diamond Processing
Electroplating
Explosives Manufacture
Jewelry Manufacture
Lamp Manufacture
Leather Manufacture
Machining
Nickel Smelting
Soldering
Textiles
Glass Manufacture
Primary and Secondary Smelting of Gold, Silver, and Platinum
Pipe Galvanizing
Plastics and Rubber Manufacture
Ammunition Manufacture
Pottery & Ceramics
Solder Manufacture
Terne Metal
Miscellaneous Lead Products
Auto Manufacturing/Solder Grinding
Gasoline Additive Manufacture
Sheet Metal Manufacture
Tin Rolling & Plating
Plumbing
Lead Burning

For the industries listed below, OSHA has also concluded that its remand findings demonstrate the feasibility of the lead standard, but they are being discussed separately so as to provide an opportunity to respond to issues raised in the petitions for reconsideration. These industries differ from the eight industries for which decision has been withheld because the petitions for reconsideration either raise insubstantial criticisms to the supplemental statement or because those criticisms are adequately addressed in the record. Accordingly, the following discussion for these industries focuses on points that the Supplemental Statement of Reasons did not address or modifies specific conclusions set forth in the Supplemental Statement. Each section, as supplemented, has been reproduced for these industries, for the convenience of the reader. The industries for which the feasibility findings are reaffirmed are:

Aluminum Smelting
Collection and Processing of Scrap (Excluding Battery Breaking)
Primary Copper Smelting
Glass Manufacture
Spray Painting
Steel Manufacture (Excluding Leaded Steel Manufacture)
Telecommunictions
Zinc Smelting

Aluminum Smelting

Substitute the following for the discussion entitled "2. *Aluminum Smelting*" appearing at 46 FR 6144:

Aluminum Smelting

(a) *Uses.* Aluminum is used in the manufacture of chemical vessels; kitchenware, electrical transmission lines, and other products. It has architectual applications and is used extensively in the land, sea, and air transportation industries. (Ex. 476–5G).

(b) *Process Description and Exposure Areas.* Although aluminum ores are widely distributed in the earth's crust, only bauxite has proven to be economical as an ore from which the metal can be smelted (Ex. 476–5G). Bauxite is usually mined through the open-pit method, crushed, sometimes washed to remove clay, and dried. It is then refined through the Bayer process into aluminum oxide or "alumina." In this process, dried, finely ground bauxite is charged into a digester where it is treated, under elevated pressure and temperatures, with caustic NaOH solution to form sodium aluminate. (Ex. 476–5K).

After the digestion process is completed, the residue (containing impurities) is forced out of the digester through filter presses and discarded. The liquid, which contains extracted aluminum in the form of sodium aluminate, is pumped to precipitator tanks where seed crystals are added to aid in separating aluminum hydroxide from the solution. The aluminum hydroxide that settles out from the liquid is filtered and then calcined in kilns which convert the alumina to a form suitable for smelting (*id.*).

Metalic aluminum is produced by an electrolytic process that reduces the alumina into oxygen and aluminum. In this process, pure alumina is dissolved in a batch of molten cryolite (sodium aluminum fluoride) in large electrolytic furnaces called reduction cells or "pots." An electric current is passed through a carbon anode suspended in the bath mixture, causing metallic aluminum to be deposited on the carbon cathode at the bottom of the cell. The heat generated by passage of this electric current keeps the bath molten so that alumina can be added as necessary to make the process a continuous one. At intervals, aluminum is siphoned from the pots and the molten metal is transferred to holding furnaces either for alloying or impurity removal. It is then cast into ingots of various sizes for further fabrication.(*id.*).

Exposure to lead arises from trace amounts in the ore. Exposures may occur at materials handling equipment or during pyrometallurgical processing (Ex. 481). Since most of the bauxite processed in this country comes primarily from Jamaica, Brazil, Surinam, Australia, and Ghana and contains only traces of lead (Ex. 476–56), very little exposure occurs during the handling of raw ore. In fact, the principal source of lead exposure during ore handling is not from the ore itself but rather from acid leach (the process by which the impurities are separated from the ore) which contains traces of lead (0.004) percent lead sulfite) (Ex. 476–57).

The primary exposure problems in the pyrometallurgical process occur when ores containing lead undergo smelting, thereby releasing fugitive emissions, such as lead oxide, or from emissions resulting from impurities which rise to the top of the molten aluminum and must be periodically skimmed off as dross from the melting and holding furnaces. This dross is transferred to a floor area known as a dross pad where it is dumped and raked out to cool. After cooling, the dross is mixed with salts and charged into a rotary melting furnace, where more of the aluminum is recovered.

Secondary smelting of aluminum differs only slightly from primary aluminum smelting. The process begins with scrap aluminum that arrives at the plant by rail car from a wide variety of sources. A quantity of the scrap plus additives such as chromium, magnesium, iron, copper and manganese are weighed and charged into melting furnaces. The molten metal is transferred to holding furnaces where it is fluxed with chlorine or sometimes a mixture of chlorine and nitrogen. Ingots of aluminum ranging from 15,000 to 20,000 pounds are formed by a process known as direct cooling where fine streams of cold water actually form the sides of the ignots. (Ex. 476–58). Thereafter, the secondary process do not significantly differ from the primary process.

(c) *Controls Currently Used.* (i) Materials handling controls include: Pneumatic conveyance; elimination, by redesign or use of dead drops or long material drops; belt wipes; conveyor curtains and skirts; ventilation hoods at transfer points; complete enclosure of conveyors; liquid sprays to suppress dust; chemical dust suppressants; vacuuming (preferably wet vacuuming) instead of dry sweeping of spilled or otherwise deposited materials; and clean air pulpits (Ex. 481).

The selection of the appropriate control strategy depends upon the material being handled, the extent of the exposure problem, the process involved, and the extent to which engineering controls are already in place.

(ii) Pyrometallurgical controls include: Exhaust hoods for tapping and skimming ports; exhaust hoods for ladles, pots and kettles; covers and hoods for launders; maintaining the unit at negative pressure; enclosure of the entire unit or pertinent parts of the unit; ventilation to capture fugitive emissions which cannot be otherwise contained; enclosed control rooms supplied with clean air; and controlled air pulpits (Ex. 481).

Secondary aluminum operations are also well untilated. The reverberatory furnace usually has primary hooding which effectively eliminates particulate emissions (Ex. 476–133 at 41, 65).

(d) *Exposure Levels.* During aluminum smelting, lead is present as lead sulfide in bauxite ores. Bauxite containing. .04% lead would produce an air lead concentration of 4 $\mu g/m^3$ when bauxite concentrations are 10 mg/m^3. Therefore, lead exposure would be well below existing or proposed limits." (Ex. 491). Kaiser and Alco Aluminum also indicated that lead exposure is not a problem in aluminum smelting (Ex. 476–56, 47). Similarly, lead exposures in secondary aluminum smelting are not problematic.

Sampling data in a NIOSH report on the Martin Marietta Aluminum Company in Lewisport, Kentucky (Ex. 476–58) revealed nondetectable lead exposure levels, in most instances, although one sample showed 7.5 $\mu g/m^3$ of inorganic lead (*Id.*). These figures indicate that exposure levels are well below the OSHA permissible exposure limit of 50 $\mu g/m^3$ and the 30 $\mu g/m^3$ action level. An indepth study of the secondary nonferrous smelting industry indicated that lead exposures were insignificant during secondary aluminum smelting (Ex. 476–133 at 42, 43, 46, 150).

(e) *Additional Controls.* The exposure data indicate that lead levels in aluminum smelting are well below 30 $\mu g/m^3$. Control technology already in use has been effective in maintaining lead exposure levels below the PEL. Additional engineering controls, work practices, housekeeping and worker rotation are not needed. Compliance with the PEL has been achieved (481).

(f) *Conclusion: Technological Feasibility.* The record shows that bauxite ores processed in the United States contain only trace quantities of lead and that alumina (aluminum oxide), from which aluminum is reduced, contains virtually no lead (Ex. 476–56, 57; Ex. 22). Exposures to lead above the PEL are unlikely to occur, as representatives from both Kaiser and Alcoa Aluminum have acknowledged (Ex. 476–56, 57).

Control technologies already in use will be sufficient to control any exposure to lead which may occur.

(g) *Economic Feasibility.* Because the exposure levels are so low, the industry need not enhance existing ventilation systems, establish additional work practice programs, enhance housekeeping practices or rotate workers as a result of this regulation. Therefore, there will be no costs of compliance nor any economic impact incurred as a result of the lead standard.

Collection and Processing of Lead Scrap

Substitute the following for the discussion entitled "9. *Collection and Processing of Lead Scrap* appearing at 46 FR 6151/2:

Collection and Processing of Lead Scrap

(a) *Uses.* The lead scrap from radiators, solder, telecommunications parts, cables, sheet lead, batteries, lead bearing dross, etc., is received by scrap metal recyclers who sort, pack and ship the scrap lead to secondary lead smelters (Tr. 245–246). Some recyclers melt the scrap prior to shipment in an effort to handle the scrap more efficiently (*Id.*). However, Mr. Ness of the National Association of Recycling Industries indicated that waste recyclers usually do not melt scrap (Ex. 476–103), and the record indicates that only 200 scrap dealers remelt metals (Ex. 480). While many scrap dealers process lead-acid batteries for secondary lead smelters, those activities are beyond the scope of this discussion.

(b) *Processing Scrap Metal.*—(i) *Process Description and Exposure Areas.* Scrap may be merely cut, bundled and shipped to secondary smelters or may be melted, cut, bundled and shipped. Processors of scrap fall into two broad categories: melters and non-melters (Tr. 245–246).

Non-melters may be scrap processors who handle dross and flue dust. They must ship, transfer, load, unload, weigh and store the scrap. Where lead is present in the scrap metal, the potential for lead exposure occurs at all handling operations and in mechanized processes at transfer points (Ex. 22, pg. 143).

The Metal Salvage Company of Salt Lake City, Utah, is another type of non-melting scrap processor. It receives scrap lead sheets, radiators, etc., and sorts, chops or cuts, and bales or bundles the lead scrap to be sold to secondary smelters (Ex. 476–102). It does not melt lead scrap, nor does it process dross or flue dust (Ex. 476–102).

NARI testified, however, that "many of these companies do *not* handle any lead bearing scrap materials, or they handle only a very small volume of lead bearing on an irregular, sporadic basis. Most of these small concerns operate open scrap yards, wherein employees regularly move about in the open air and thus are not usually confined to any one work station, and they are not regularly, continuously exposed to lead in their work activities" (Ex. 498 at 35).

(ii) *Controls Currently Used.* The technology available and currently being used by these scrap processors includes water sprays to suppress dusts and local exhaust or portable ventilation (Ex. 476–101). Melting pots are provided with exhaust ventilation (Ex. 476–112).

(iii) *Exposure Levels.* Little exposure data was provided to OSHA (Ex 476–94, 96, 101, 102). Some companies, however, did indicate that controlling lead exposure presents no problem (Ex. 476–101, 102). These firms represent both melters and non-melters. One company stated that it is very close to compliance with the 50 $\mu g/m^3$ standard (Ex. 476–112). Base on NARI's comments, airborne lead exposures are apparently directly related to the amount of lead contained in the scrap metal (Ex. 498).

(iv) *Population Exposed.* No data were available on the number of workers exposed. The number of workers employed by scrap processors appears to range between 6 and 25 (Ex. 476–93–117). Since available data indicate that many of these companies may be nearly in compliance with the standard, OSHA estimates that the number of employees exposed above 50 $\mu g/m^3$ is probably very small.

(v) *Additional Controls.* Based on the data available, controls other than those existing and already applied in some cases, are probably not necessary (Ex. 476–101, 112). One melting scrap processor, which indicated that it was in compliance used both wet suppression and local exhaust ventilation (Ex. 476–101). Another processor that used only exhaust ventilation was very nearly in compliance (Ex. 476–112). A third processor that did no melting indicated that no controls were necessary and mentioned no compliance problems (Ex. 476–101). Thus the application of controls already existing within the industry seems sufficient to achieve compliance (Ex. 476–102, 112). If particularly large amounts of lead are contained in the scrap metal, portable ventilation should be adequate to reduce exposures.

(c) *Conclusion: Technological Feasibility.* The National Association of Recycling Industries argued extensively regarding the infeasibility of the standard for collectors and processors as well as secondary smelters and refiners in achieving compliance with the 50 $\mu g/m^3$ limit. Basically, the Association contends that collectors and processors should have the same 5 to 10 years compliance period as do secondary smelters and refiners. They also stated that these small collectors and processors could not comply within one year, particularly through the use of engineering controls alone. (Ex. 477–17). In its post-hearing submission, the Association argued that it is "technologically infeasible for these additional scrap collectors and processors to comply with the OSHA lead standard—without the continued use of respirators in most of their operations." (Ex. 498, p. 37). OSHA requested the NARI provide data on exposure, on controls being used, and on controls to be implemented. However, the Agency has not received compelling data indicating that compliance is not technologically or economically feasible for the industry. OSHA therefore concludes on the basis of record evidence that the controls discussed in the general feasibility section of this document could also be used to reduce exposures in the recycling industry.

NARI contends that most scrap handlers only handle lead scrap occasionally and also that they are small businesses that lack the resources to implement costly controls. As a result of these factors, NARI believes OSHA should designate collectors and processors of scrap as part of the construction industry and thus relieve them of the burdens of complying with the standard (Ex. 498, p. 37). For the reasons detailed below, OSHA has decided that the exemption for the construction industry should not be extended to scrap processors. However, The 30 day exemption from the requirement that engineering controls be installed should ease compliance obligations where on an "irregular and sporadic" basis lead content of scrap is higher than usual.

Also, based on the data submitted to the record, it appears that in processing scrap, other than batteries, the simplest control technologies are being used, including wet suppression and local exhaust ventilation (Ex. 476–101), with substantial success. Many of the companies that supplied data to OSHA were small businesses (less than 10 employees) who indicated that lead exposure posed no problem (Ex. 476–101, 102).

Melting operations may require somewhat more effort for exposure control. However, as one commenter contended, melting pots are provided with exhaust ventilation (Ex. 476–112). Containment of fugitive emissions from melting pots is standard practice in many different industries using general ventilation, local ventilation at emission points, negative pressures, maintenance of seals, etc., to achieve compliance with many standards, in addition to lead. These controls are "tried and true" and used by industry as a whole, as noted by Billings and First (Ex. 487, 104).

(d) *Cost of Compliance.* The record contains some industry estimates of costs of compliance in several scrap facilities. One recycler of lead scrap reported that the installation of $6,000 a water spray system and the use of administrative controls were effective in achieving compliance with the standard (Ex. 476–100). Another recycler had a 20 ton remelting operation in which all pots were equipped with exhaust hoods. These hoods were installed at a cost of $15,000 and the firm was reported to be very close to compliance with the standard. With increased attention to personal hygiene, the firm expected to achieve full compliance (Ex. 476–112).

The majority of scrap recyclers are not remelters; therefore, potential compliance costs for most firms will be low. Remelters may require more equipment. A multifaceted approach to reducing air lead levels can result in cost-effective compliance with the lead standard, while simultaneously controlling exposures to other toxic substances present in scrap.

(e) *Industry Profile.* There are an estimated 7428 establishments in SIC 5093. Scrap and Waste Materials (Ex. 476–109). These establishments are primarily engaged in collecting, cleaning, breaking, sorting, chopping, baling, and distributing all types of scrap for delivery to remelters and secondary smelters (Ex. 476–103). The public record indicates that approximately 4,000 to 5,000 of these establishments employ a total of 40,000 workers to potentially handle lead scrap (Tr. 246). These scrap processors, however, do not ordinarily melt lead (Ex. 476–103) and, in fact, it is estimated that only 200 of these establishments may perform remelting operations (Tr. 246).

The continuing national emphasis on the recovery and reuse of natural resources supports positive prospects for the scrap industry in the future (Ex. 476–106). In addition, current deposits of lead bearing ores are diminishing (Ex. 476–108).

Firms within the industry are widely distributed across the nation with concentrations in California, New York, Pennsylvania, Illinois, and Texas (Ex. 476–109). Because of the high cost of transportation, it is unlikely that potential increases in price as a result of compliance would cause major changes in market structure or increased concentration. During ebbs in the business cycle, scrap dealers may be forced to cut prices if their customers, also complying with the lead standard, attempt to shift costs back to them. However, on balance the potential economic impact on the industry should be negligible, since the firms that engage in remelting operations are generally the larger firms that will be able to afford any required additional capital investment. The smaller firms do not ordinarily melt lead and, therefore, will face few new compliance costs.

(f) *Conclusion: Economic Feasibility.* In its petition for reconsideration NARI argued that OSHA "must clearly prescribe the least costly compliance alternative" for scrap collectors and processors, because the great majority of these companies are small businesses (NARI Pet. at 14). The Agency has established precisely such a compliance alternative. OSHA will now permit those scrap collectors and processors whose employees are exposed above the PEL for less than thirty days to be exempt from the requirement that engineering controls be implemented to reduce lead exposure. This measure will substantially reduce the cost of compliance for those small businesses whose lead exposures are generally low, but who on occasion experience exposures above the PEL. Additionally, the change in language in paragraph (e)(1) of the standard clarifies the fact that employers need only install engineering controls up to the point where they are technologically feasible, so that a collector or processor may be able to avoid or limit the expense associated with engineering controls, if he can demonstrate that they are not technologically feasible past a certain point. The standard would then allow the employer to supplement engineering controls with the use of respirators. Finally, OSHA has provided this industry with an extended compliance period of two and one-half years, so the costs of complying with the standard can be amortized over a longer period of time.

Copper Smelting

(a) *Primary Copper Smelting.* Substitute the following for the discussion entitled "(vii) *Conclusion: Technological Feasibility.*" appearing at 46 FR 6156/2.

(vii) *Conclusion: Technological Feasibility.* ASARCO submitted comments during the hearing stating that the technology for controlling lead exposure in copper smelters does not exist (Ex. 475–28). The company's position was premised on the notion tht processes involved in the primary production of copper and zinc are similar to those involved in primary lead production, and that similar technology is necessary to control exposures to lead in zinc and copper operations. ASARCO also argued that primary lead smelters were given extended periods to comply because innovation was necessary (Ex. 475–28) and that allowing copper smelters one year to comply was inconsistent with the number of years allowed for primary lead smelting (10 years) and secondary lead smelting (5 years).

While there may be similarities in processes, the underlying problems associated with control of lead exposure depend on the percentage of lead in the ore. Wagner testified that this percentage was extremely variable and that copper ore lead content ranges from less than .01 to 1.3 percent lead (Ex. 481). Smelters using ores containing a higher percentage of lead may have more difficulty in controlling lead exposures and may require additional time to come into compliance than those using ores with lead concentrations at the lower end of the range. (Tr. 353–354). This is one factor which led OSHA to extend the schedule for compliance.

However, the comparison to primary lead smelting is not completely accurate. Both primary and secondary lead smelters process sulfide ores with lead content far greater than 1 percent and, therefore, have much higher lead exposures. The technology necessary to reduce these exposures is not the same; it requires a much greater degree of control, and sometimes equipment modifications. Upgrading and modifying existing controls is all that is required for most copper smelters in the United States and two and one-half years is an appropriate time limit for these smelters. ASARCO has also claimed that lead emissions from copper smelting at El Paso cannot be effectively controlled independently of the adjoining primary lead smelter. More information is necessary for OSHA to determine whether El Paso's copper operations should be viewed as an integrated part of the lead smelting operations.

Many of these copper smelters must also comply with the OSHA arsenic standard (29 CFR 1910.1018). The control technology necessary to comply with that standard will also serve to control lead concentrations and achieve compliance with this standard (Ex. 481). In addition, OSHA has established a joint technical group composed of industry, union, and government engineers to explore further the feasibility and propriety of the various available means for controlling occupational arsenic exposures on a plant by plant basis. Asarco, Kennecott Copper, and the United Steelworkers of America have agreed to participate in this experimental effort toward cooperative compliance with occupational health standards. The joint committees have been asked to expand the scope of their discussions to include lead controls, thus providing a forum where the parties may agree on an integrated control strategy to reduce lead and arsenic exposures.

(b) *Secondary Copper Smelting.* Delete the discussion entitled "(b) *Secondary Copper Smelting*" appearing at 46 FR 6156/3.

Economic Feasibility

Substitute the following for the discussion entitled "(c) *Economic Feasibility: Primary and Secondary Copper Smelting*" appearing at 46 FR 6157/3:

(c) *Economic Feasibility: Primary Copper Smelting.*—(i) *Cost of Compliance.* ASARCO has submitted data on the cost of compliance with the lead standard in primary copper smelters (Ex. 475–28). The following compliance expenditures have been estimated for ASARCO's four facilities: Hayden, Arizona, $16,628,000; Tacoma, Washington, $20,941,000; Amarillo, Texas, $667,000; and El Paso, Texas, $18,504,500. These calculations are based on the cubic feet of air per minute necessary to ventilate specific areas of the plants and on the costs of vacuum systems. Costs of associated devices designed and installed to prevent the emission of pollutants into the general atmosphere also appear to be included in these estimates. For instance, wet scrubbers and wet scrubber gas cleaning systems, costing a total of $1,540,000 have been included in three of the estimates. Thus, ASARCO claims that total expenditures of $56,740,000 would be required and also claims that this amount would not guarantee compliance with the standard.

For several reasons, OSHA believes that the standard can be complied with less expensively by copper smelters. First, industry estimates focus on the mechanical ventilation approach to the control of lead when, in fact, housekeeping, work practices, and administrative controls in combination with ventilation should be both less expensive and more effective in achieving compliance (Ex. 481). Therefore, OSHA believes that the proper approach to reducing exposure levels is through an effective, multi-faceted approach to the problem. In this way, industry can minimize the resources spent on achieving a given level of lead in the workplace. Second, industry estimates are not offset by the value obtained from the reclamation of copper and other metals that are captured by control systems. However, industry has not presented data indicating the magnitude of the offset. Third, primary copper smelters have simultaneous legal obligations to comply with other regulations, such as the arsenic regulation. To the extent that actions taken to reduce arsenic levels also reduce lead levels, these expenditures are not attributable solely to the lead standard. In addition, costs attributable to EPA regulations are sometimes mistakenly included in the estimates. Since compliance with different regulations and different agencies is a cumbersome process, OSHA has established tripartite committees to work together in seeking cost-effective compliance strategies.

Considering the above factors, OSHA concludes that Wagner's estimates of the total costs for all potentially affected copper smelters are reasonable counterestimates to the compliance costs submitted by industry. However, because Wagner did not have definitive data on the compliance status of all firms in the industry, he placed caveats on his estimate. Wagner stated that he could have underestimated the costs by as much as 200 percent. Assuming an underestimate of this magnitude, the upper bound on capital costs for the primary copper producers would be only $18 million. Annualized over the useful life of the equipment, primary copper producers will incur $3.2 million in total annual costs.

(ii) *Industry Profile.* The primary copper industry consists of establishments engaged in smelting copper from ore and in refining copper by electrolytic or other processes. Total value of shipments cycled over the last available five years of data and amounted to $3.9 billion in 1977, (Ex. 476–20). Historical statistics show that, since 1967, the number of companies in the industry declined from 15 firms, operating 32 establishments, to 11 firms, with 31 establishments in 1972, and 9 firms, with 27 establishments in 1977.

More recent Bureau of Mine data list the primary producers ranked in order of output as: (1) Phelps Dodge, (2) Kennecott, (3) ASARCO, (4) Magma Copper, (5) Copper Range, (6) Inspiration Consolidated Copper, and (7) Cities Services. These companies operate smelters and/or refineries. Several domestic producers, through subsidiaries or stock holdings, have interests in foreign copper-producing facilities in Australia, Canada, Peru, Mexico, South Africa, and Namibia (Ex. 476–122).

Prior to the exit of Anaconda from the market in October 1980, the top three companies produced about 60 percent of the total industry output (Ex. 476–119). The net profit margins in 1979 for Phelps-Dodge, Kennecott, and ASARCO were 8.7 percent, 5.4 percent, and 15 percent, respectively, with estimated net profit margins in 1982 through 1984 of 11 percent, 7.2 percent, and 15.9 percent (Ex. 476–130, 476–131, 476–132). Kennecott's lower profits were attributed to its relatively high and rising cost structure, which results from "ancient and outdated equipment" (Ex. 476–131).

Although the market shares and profitability of the top three producers indicate that the domestic market is moderately concentrated, the copper market is internationally competitive. Hence, the ability of the primary producers, regardless of individual market share, to raise prices is limited. Although it appears that the domestic market is not currently threatened by foreign copper imports, forward shifting of costs to customers is to some extent constrained. Producers largely eliminated foreign price advantages by basing domestic prices on the New York Commodity Exchange (COMEX) in 1978 (Ex. 476–26). Proximity to markets, a stable political situation, the existence of an advanced infrastructure, and scale of operations should maintain a viable domestic copper industry even in the face of a potentially worsened position vis-a-vis foreign competition (Ex. 476–122).

The ability to pass costs on is also limited by potential substitutes for copper. For instance, in electrical applications, aluminum, cryogenic power transmission techniques, microminiaturization circuitry, and use of statellites may impede the growth in demand for copper. In construction, the trend toward multiple housing units (which reduces the materials needed per unit), and the substitution of plastic pipes may curtail the demand for copper. Uses of copper in transportation vehicles is expected to continue to decline. In 1975, 34 pounds of copper per automobile were used, and in 1979, this was reduced to 29 pounds. The use of only 25 pounds of copper per automobile is forecast for 1985 (Ex. 467–33). However, growth in armaments production may increase the demand for copper. On balance, total U.S. demand for copper is forecast to rise by the year 2000 to 5.1 million tons, representing an annual growth rate of 3.6 percent (Ex. 476–122). This demand is expected to strain supply sources as growth in demand for electrical equipment, computers, and underground power distribution systems rises.

Because the demand for copper parallels the demand for durable goods, the market is volatile and quite sensitive to national economic business cycles. The demand for copper also increases with growing military activity because of its use in ammunition and military equipment. Typically, the industry expands to meet military demand and suffers from overcapacity during times of peace (Ex. 476–118).

In 1978, the International Trade Commission recommended that an import quota be imposed through 1982 to protect domestic copper producers. However, the petition was rejected, largely because the action carried an unacceptable risk of accelerating inflation, but also because the copper market was in the process of recovering from its depressed condition (Ex. 476–122).

At least two factors have contributed to increasing costs in the copper industry. First, fuel costs, which account for a major portion of production costs in smelting and refining, rose significantly between 1974 and 1978. The second major factor affecting production costs is the long-term declining yield of copper from ores. From 1950 to 1977, average yield has dropped from 18 pounds of copper per ton of ore to 10 pounds, with some deposits containing only 8 pounds of copper per ton of ore. (The cutoff grade is 4 pounds.) In addition, surface mines, which now account for 82 percent of domestic output, have large ratios of overburden (earth that must be removed during mining operations) to ore (Ex. 476–122).

However, a new process has been developed to recover copper from low ore concentrates (Ex. 476–124). The new hydrometallurgical process is pollution-free. Initial testing demonstrates that it is competitive with conventional smelting techniques. Diffusion of this new process throughout the industry may result in significant changes since costs of producing copper are both currently variable and highly dependent on location and physical composition of ore deposits.

Capital expenditures for new buildings, plant, and equipment in 1977 in the copper industry were withheld by the Commerce Department to avoid disclosing operations of individual companies. However, expenditures rose steadily from 1963 to 1975 from $13.1 million to $164.6 million. In 1976, the industry's investments dropped to $52.4 million, reflecting the depressed state of the market beginning in 1974 (Ex. 476–20).

Copper production is considered to be a capital intensive industry. On average, $7,000 per annual ton of new capacity for facilities is required for a totally integrated facility. Expansion of existing facilities requires about $5,000 per annual ton in capital costs (Ex. 476–122).

The primary copper industry employs about 10,000 production workers at smelters and refineries. The ratio of skilled to unskilled laborers has risen with increasing mechanization, and large-scale operations have generated demand for mechanics, technicians, and machine operators. In 1971, employee hours per ton of copper averaged 20.3 hours; whereas in 1977, there were 18.2 employee hours per ton of copper (Ex. 476–122), indicating a slight increase in productivity.

Conclusion: Economic Feasibility

The copper market has demonstrated past volatility and remains sensitive to the demand for durable goods. Thus, the demand for copper will fluctuate with swings in the national economy. However, on balance, the demand for copper is expected to grow at an annual rate of 3.6 percent.

Copper is produced and sold in a world market. The domestic industry has a demonstrated ability to compete successfully in this world market. Foreign price advantages no longer pose a threat to the domestic industry, and the stable political situation in the U.S., the existence of an advanced infrastructure, and the domestic scale of operations are expected to contribute to the continued viability of the domestic producers.

The primary copper industry, which produced shipments valued at almost $4 billion in 1977 (Ex. 467–20), will be required to spend a maximum of $3.2 million in annualized compliance costs. Therefore, OSHA concludes that the domestic copper industry will be able to comply with the lead standard within two and one-half years, and that compliance will not adversely affect the economic viability of the industry.

Glass Manufacture

Substitute the following for the discussion entitled *"(c) Conclusion: Technological Feasibility (Primary and Secondary Processes)"* appearing at 46 FR. 6165/1.

(c) *Conclusion: Technological Feasibility (Primary and Secondary Processes).* Primary and secondary glass operations can achieve the 50 $\mu g/m^3$ PEL. Primary operations will have to make use of engineering controls, to the extent feasible, and supplement them with worker rotation (as the industry is currently doing) to bring areas of high or intermittent peak exposures into compliance with the standard. In addition, improved housekeeping and maintenance operations will be necessary. Compliance with the lead standard will probably also bring about a significant reduction in employee exposure to silica.

Secondary glass operations appear to require minimal controls such as local exhaust ventilation (movable or stationary). Extensive control technology does not appear to be necessary and only in a few instances will worker rotation be necessary.

Representatives of the glass industry emphasized in their submissions that compliance with the 50 $\mu g/m^3$ standard was not possible through engineering controls alone. Based on the evidence submitted, OSHA agrees that the success experienced by this industry in meeting the 50 $\mu g/m^3$ limit has been based on multi-faceted control strategies that include enhancement of existing controls, automation of many processes, stringent work practice programs, improved housekeeping and maintenance and worker rotation. This approach avoids the more costly strategy of relying solely upon engineering controls to achieve compliance. OSHA believes that the use of such balanced controls strategies, rather than reliance upon a single method of control, is perfectly consistent with the lead standard, since the Agency's ultimate goal in regulating worker exposure to lead is to reduce workers' exposures through the combined use of engineering controls, work practices, housekeeping, and some worker rotation. The industry did not dispute the feasibility of achieving compliance using this combination of controls. Owens-Illinois has requested reconsideration of OSHA's finding that the lead standard is technologically feasible because: (1) Administrative controls are unworkable; and (2) maintenance personnel are exposed to lead levels in excess of the PEL (Ex 528-13). Neither problem would justify a finding of infeasibility.

Owens-Illinois has installed an enclosed, automated materials handling system which has reduced batch house employees' exposure to lead below the PEL. *Id.* The feasibility of worker rotation under these circumstances is virtually irrelevant since further reductions in airborne lead levels are not required. Moreover, OSHA recognizes that the PEL may be exceeded during maintenance operations, *see infra.* The fact that these repair or maintenance operations may result in exposures exceeding the PEL does not detract from OSHA's general finding that the lead standard is feasible for most glass manufacturing firms during most operations.

Lead Casting

Delete the discussion entitled "21. *Lead Casting*" appearing at 46 FR 6174/3.

Lead Chemical Manufacture

Delete the discussion entitled "22. *Lead Chemical Manufacture*" appearing at 46 FR 6175/2.

Lead Pigments Manufacture

Delete the discussion entitled "23. *Lead Pigments Manufacture*" appearing at 46 FR 6176/2.

Nonferrous Foundries

Delete the discussion entitled "29. *Nonferrous Foundries*" appearing at 46 FR 6184/3.

Shipbuilding

Delete the discussion entitled "35. *Shipbuilding*" appearing at 46 FR 6200/1.

Spray Painting

Substitute the following for the discussion entitled "(g) *Conclusion: Technological Feasibility*" appearing at 46 FR 6214/2.

(g) *Conclusion: Technological Feasibility.* OSHA has determined that substitution of non-lead based paints is one feasible alternative for the industry during some applications. Lead and other toxic metal pigments should be eliminated where possible.

Spray booths can be used which maximize the enclosure of the painting operation. The choice of a downdraft or sidedraft booth depends largely on the configuration of the object that is to be painted. Air flow must be in a direction which will carry contaminated air away from the breathing zone of the painter. If necessary, work platforms, product rotators, or other means must be provided in order that the proper orientation of air flow can be maintained.

Application equipment is available which minimizes the energy expended in the atomization process, thus reducing the amount of stray mist that is generated. The recommendations of the paint formulator concerning the method of application and the atomization parameters should be strictly followed.

Several commenters discussed the problems associated with applying lead paint to surfaces. Billings noted problems encountered with "bounce back" and suggested that application be automated or be done by brush or roller in these instances where possible (Ex. 487). However, it appears that in some cases, depending on the number of spray painters, the size of the object, and numerous other environmental factors, the PEL in spray painting can be achieved through the use of currently acceptable control technologies and without reliance on a respirator, as OSHA's compliance activities demonstrate (Ex. 476-16). Even in industries such as the automobile industry which were previously felt to be at the state-of-the-art, new techniques are achieving consistently lower air lead levels. Certain operations, such as painting deep recesses or confined spaces cannot be effectively controlled by ventilation. In some instances, airless application methods can be used for these operations.

LIA's interpretation that engineering controls are absolutely prohibited during spray paint operations is incorrect. As noted in the Supplemental Statement of January 21, 1981, OSHA recognizes that in some spray painting operations engineering controls alone will not be adequate to achieve the PEL, and that respirators may have to be used in addition to currently available controls. *See* 46 6214/3. This position does not differ from that taken by the National Paint and Coatings Association, Inc., (NPCA):

> The NPCA urges that personal protective devices, namely respirators, not be eliminated where engineering and work practice controls are not feasible as a means of protecting the worker potentially exposed to lead. NPCA agrees that engineering and work practice controls should be the first line of defense, but that respirators should be permitted in the future compliance programs where feasible technology has not been developed to perfect engineering and work practice controls.

Ex. 475-9. NPCA's statement regarding primary reliance on engineering controls and supplemental use of respirators in instances where such controls are not technologically feasible precisely parallels OSHA's traditional compliance policy. To remove any remaining doubts concerning methods of compliance the Agency has amended the wording of paragraph (e)(1) of the lead standard so that it parallels the compliance language of other OSHA health standards. Moreover, the adoption of a thirty day trigger for the requirement that engineering controls be implemented should further reduce the number of painting establishments facing substantial compliance obligations. This change allows an employer to use respirators when the employer can demonstrate that engineering controls are not feasible. Therefore, this explicit change in regulatory language grants NPCA the flexibility it sought in the remand hearings and should additionally eliminate any lingering problems of interpretation.

Steel Manufacture

Substitute the following material for the discussion entitled "39. *Steel Manufacture* (a) *Primary Steel Production*" appearing at 46 FR 6214/3.

Steel Manufacture

(a) *Steel Production.* This discussion does not apply to the production of leaded steel which is still under consideration by OSHA.

(i) *Process Description and Exposure Areas.* The basic oxygen steelmaking process uses as its principal raw material molten pig iron from a blast furnace. The other source of metal is scrap. Scrap is processed similar to the methods used in scrap processing and collection; hydraulic scrap cutters may be used. Only the processing of lead scrap poses a problem. Lime, rather than limestone, is the fluxing agent. As the name implies, heat is provided by the use of oxygen.

The basic oxygen furnace (BOF) is a steel shell lined with refractory materials which is supported on horizontal trunnions so that it can be tilted. Usually these furnaces are installed in pairs so that while one is making steel the other can be filled with raw materials.

The first step for making a heat of steel in a BOF is to tilt the furnace and charge it by larry car with steel scrap. Immediately following the scrap charge, an overhead crane presents a ladle of molten iron from a blast furnace or from a holding device called a mixer.

As soon as the furnace is charged, and set uprighted the oxygen lance is lowered and the oxygen is turned on. In a very short time the heat increases and lime, fluorspar are added via a retractable chute to the metallic charge. From that point on, the blowing procedure is uninterrupted. Oxygen combines with carbon and other unwanted elements eliminating those impurities from the molten charge and converting it to steel. The lime and fluorspar help to carry off the impurities as a flowing layer of slag on top of the metal which is now entirely molten.

When the batch of steel is complete, the oxygen is shut off, the clamps on the lance are released, and the lance is retraced through the hood. The furnace is then tilted in the direction opposite to that in which it is charged, and molten steel flows through a tap hole that is located near the top of the furnace. A ladle receives the molten steel. The slag, which floats on top of the steel, stays above the taphole by the progressive tilt of the furnace.

Electric arc furnaces are used for producing alloy, stainless, tool and other specialty steels. More recently operators have also learned to make larger heats of carbon steels in these furnaces. Therefore, the electric steel making process is becoming a high-tonnage producer.

Electric arc furnaces are shallow steel cylinders lined with the refractory brick. They are charged in one operation from buckets or other containers brought in by overhead cranes. The roof of an electric furnace is pierced so that three carbon or graphite electrodes can be lowered into the furnace. These electrodes provide the current arcs from one electrode to the metallic charge and then from the charge to the next electrode, causing intense heat.

In each process the end product is molten steel in a ladle. Generally, the molten steel is solidified into forms that are suitable for further shaping by the steel industry's rolling mills and other finishing facilities. Molten steel direct from furnaces is rarely cast into finished products.

The traditional method of handling raw steel from a furnace is to "teem" it from the ladle into ingot molds of various sizes and shapes. Alloys are added to the ladle of steel often by chutes extended from above the teeming floor. However, injection may be by gun.

The ladle into which the molten steel from the furnace has been tapped is usually mounted on a railcar which is moved to a position where an overhead crane can lift it. The overhead crane lifts the ladle of molten steel to a position where it can be poured into ingot molds, (or into a strand or continuous casting machine) for a solidification.

The size and shape of an ingot is determined by the desired product. Roughing mills produce semifinished forms of steel such as blooms, which are roughly square in cross section; slabs, which are rectangular in cross section; and billets which are smaller than bloom in cross section and usually much longer.

A more modern technique than the traditional ingot procedure is the use of a strand casting machine to receive molten steel and produce such semifinished solid products or slabs or billets. In so doing, they bypass ingot teeming, stripping, soaking and rolling.

There are several kinds of strand casting machines, but the principles of their operation are similar. Molten steel from a furnace is carried in a ladle to the top of the strand caster. A stopper in the bottom of the furnace ladle is lifted so that molten metal drops into the tundish (which provides an even pool of molten metal to be fed into the casting machine), which also acts as a reservoir allowing an empty ladle to be removed and a full ladle to be positioned and to start pouring without interrupting the flow of metal to the casting machine. In some strand casters the descending column of steel is cut to desired lengths while still in a vertical position. This is done by traveling cutting torches.

Molten metal is often received from conventional steelmaking furnaces and refined to remove impurities quickly before the steel solidifies. Among the vessels and other facilities used in this operation are those for vacuum stream degassing, vacuum/ladle degassing, argon-oxygen decarburization and vacuum/oxygen decarburization. Electron beam processing generally begins with carefully selected and prepared cold raw materials. These remelting processes are used mostly in the production of sophisticated alloys and specialty steels.

Generally speaking, lead exposure only occurs after lead has been added to molten steel to produce leaded steel and in subsequent working of leaded steel. Neither process is included in the scope of this discussion. Otherwise the use of scrap steel, which can contain lead solder or may be covered with lead-based paint, may produce lead emissions earlier in the process at the steelmaking furnace as fugitive emissions and in the scrapyard, where the scrap is cut (sized) to fit the furnace. AISI characterized exposures resulting from lead in scrap metal as intermittent and sporadic (Ex. 475–39A at 8). The fugitive lead emissions from the furnace are a function of the amount of scrap lead added to the furnace.

(iv) *Controls Currently Used.* Materials handling is often done mechanically. In the scrapyard, processing for steel making is comparable to general scrap processing and requires sorting, chopping and cutting. Scrap is processed by using hydraulic cutters (Ex. 500, p. 5) or by using torches to reduce its size prior to charging furnaces. Local exhaust ventilation of furnace areas, ladles carrying molten melts and casting areas are also used.

(ii) *Population Exposed.* The precise number of employees exposed to lead in the steel industry is unknown. The Short report estimates 4000 potentially exposed employees, 500 of whom are directly involved in lead processing in 16 plants. AISI, on the other hand, estimates 7234 potentially exposed employees, 1673 of whom are potentially exposed above the PEL (Ex. 475–39A). These figures include employees whose sole source of exposure is leaded steel production.

(iii) *Exposure Levels.* Exposure data is fragmentary and may not be representative of employees' time weighted exposures. Some samples were run over a full-shift (7 hours); others for only 2 to 3 hours. Moreover, because of the intermittent and varied nature of lead exposure in steel making, determining the average and peak exposures at a particular operation is much more difficult than with continuous exposures.

Available exposure data indicate that notwithstanding high air lead levels during the production of leaded steel, industry-wide exposures generally are less than 100 $\mu g/m^3$, and may be less than 50 $\mu g/m^3$.

Specifically, in the scrap yard, out of 31 samples taken at CF & I all but 3 were below 50 $\mu g/m^3$; these three, however, were quite high (180, 190 and 790 $\mu g/m^3$) (Ex. 476–457).

No data were received showing furnace exposures, however, because of the fugitive and unpredictable nature of lead emissions at the steelmaking furnace, and because of the relatively low quantity of lead present at this stage of steel production. OSHA believes most exposures are insignificant.

(iv) *Additional Controls.* Materials handling operations should include more local exhausting of emissions sources. No additional controls appear necessary.

(v) *Conclusion: Technological Feasibility.* AISI has described lead emissions from scrap handling and furnace emissions as intermittent because "the scrap steel does not always contain significant amounts of lead;" emissions were characterized as fugitive and random. (Ex. 475–39A) On a time weighted basis these exposures are unlikely to exceed the PEL. If exposures nevertheless do exceed the PEL, rotation of employees on a monthly basis should assure that few if any capital controls will be required of the industry to comply. Thus, the adoption of a thirty day exemption from the requirement that engineering controls be installed should solve the steel industry's compliance problem.

(b) *Secondary Steel Manufacture.* Delete the discussion entitled "(b) *Secondary Steel Manufacture*" appearing at 46 FR 6216/2.

Substitute the following material for the discussion entitled "(e" *Economic Feasibility*" appearing at 46 FR 6218/1.

(e) *Economic Feasibility.* (i) *Cost of Compliance.* There are several potential sources of lead exposure in the steel industry. These include relatively low fugitive emissions at the steelmaking furnace and during scrap handling, and higher exposures during the production of leaded steel and terne metal (a lead-tin alloy), and in processes such as annealing, patenting, grinding and scarfing leaded steel products (USWA, Ex. 477-5). The scope of this discussion includes only fugitive emissions at the furnace, and in wire patenting and terne metal. No cost data were submitted with respect to control of fugitive lead emissions at the furnace.

Estimates for substitution of two salt baths, which have been substituted for lead baths in wire patenting processes, were $85,000 to $115,000 where existing controls were in place. Replacement of existing controls with a fluidized bed system was estimated to cost $750,000. The Stelmor process, which reduces but does not eliminate the need for patenting operations in the production of wire or rod (EX. 475-500), requires capital investment of about $100,000,000 for new plant construction (Ex. 476-482). However, about 25 steel works in the steel industry have already switched to the Stelmor process (Ex. 474-22), and some steel plants have substituted salt baths for lead baths in annealing and patenting operations (Ex. 476-486). Bethlehem Steel has instituted a process change in wire patenting operations that enables it to achieve compliance, but neither the details of the process nor the costs were specified (Ex. 476-481). According to the International Wire Association, the use of the lead in wire patenting is being phased out by replacement with other processes (Ex. 476-484).

OSHA estimates, based on the data of DBA (Ex. 474-65B) capital costs for the wire patenting firms would range between $7 million to $14 million, with annualized capital costs ranging between $1.25 million and $2.5 million. In addition, firms may also need to spend $3 million in annual operating costs. AISI did not submit cost data on control of lead for terne metal producers.

(ii) *Industry Profile.* Within the steel industry there are an estimated 58 companies in SIC 33122 producing steel ingot and semifinished shapes, 85 companies in SIC 33124 producing hot rolled bars, bar shapes, and plate, and 24 companies in SIC 33125 producing steel wire as part of steel mill operations. Steel wire, some of which is produced by lead patenting or annealing, manufactured in steel mills was valued at $606,300,000 in 1977. The quantity and value of long ternes (SIC 3312317) and short ternes (SIC 3312329) were not disaggregated from other tin mill products in the published data (EX. 476-438), but represent a relatively small portion of steel mill production (Ex. 476-475). All processes that potentially involve exposure to lead in steel production are included in the industrial classification above.

Very few companies produce terne metal products (Ex. 476-475). Long ternes (sheet steel that has been coated with a tin-lead alloy) can be produced in continuous and single-sheet coating processes. The latter is less efficient than the continuous process which eliminates some intermittent operations associated with sheet pots and produces a higher quality product since the coating is more uniform. All long terne production processes at U.S. Steel facilities are continuous, but other companies may still use single-sheet coating, which has the advantage of being more adaptable to small, varied orders, especially with respect to the size of sheets needed. Gasoline tanks for tractors, trucks, and automobiles are the major end use of long ternes (Ex. 476-475). Terne plate, occasionally known as short terne, is produced in very small quantities today. It is no longer used at all for roofing material, firedoor plates, or other former uses (476-475).

An estimated 100 plants produce wire by using lead patenting operations (Ex. 474-22). Not all patented wire is produced by steel companies, however, and those steel companies that do produce wire usually have separate purposes. At least two of these producers have used substitution or other controls to comply with the lead standards. CF&I has switched to a sodium bath (Ex. 476-435), and Bethlehem Steel has controlled lead exposures by improving local exhaust ventilation and adding a surface active agent to the molten lead (Ex. 476-454).

Another producer, who produces lead patented wire only when orders are received from customers, considers the operation "marginal." Exposures, which occur intermittently, are not controlled by ventillation at all. However, housekeeping, including vacuuming of dust created in scale from the dragout operation, is performed (Ex. 476-431).

OSHA recognizes that data specific to the producers of lead patented wire and terne metal within the steel industry would be preferable to data for the steel industry in general. However, neither the published data nor the submission of AISI are disaggregated in this manner. Therefore, the following discussion of economic conditions in the steel industry is assumed to be applicable to those firms within the steel industry that are affected by the lead standard.

The steel-related operations of wire patenting and terne metal production will be required to comply with the lead standard within two and one-half years. In these operations, compliance can be achieved through simple modifications of existing equipment; redesign or extensive retrofitting is not required.

To determine the economic feasibility for wire patenting firms to comply with this standard, estimates of the capital and operating costs of compliance are needed. These were provided by DBA and presented in the cost of compliance section above. Using those estimates and assuming a 12 percent rate of interest and a life expectancy of ten years for the required capital equipment, OSHA estimates that the annualized capital costs to this industry will range between $1.25 million and $2.5 million. (Ex. 65(B)). New capital expenditures for this industry in 1977 were $79.4 million. (Ex. 476-20). Thus, as these annualized capital costs represent, at most, only 3.1 percent of the total new capital expenditures in this industry, the rate of return of these firms' investments will not be appreciably lowered by compliance with this standard. DBA further supplies estimates of the annual operating costs of complying with this standard which ranged between $3 million and $5 million. Total 1977 shipments in this industry were $2,258.6 million. Thus, the annual operating costs represent only 0.4% of the total shipments. Therefore, on the basis of the available data, OSHA concludes that this standard would impose very small costs upon the wire patenting industry. That conclusion, in turn, implies that this standard will have a minimal impact upon the price of lead coated wire, the prices of goods and services produced by industries using lead coated wire, the output and employment of firms producing lead coated wire, and the profitability of wire patenting operations, and, hence, the economic viability and health of small businesses, would not be altered by the costs of complying with this standard.

DBA estimated that the total annual costs of compliance constituted approximately zero percent of value of shipments for terne metal producers (Ex. 26). The available data indicate that as few as three companies manufacture long terne metal plate (Ex. 22) and that technological and economic efficiency dictates the use of large scale production technology. Furthermore, this product has no substitute (within the feasible price range) for automobile gas tanks and in gasoline truck tanks. Thus, this industry's costs of complying with the standard are likely to be passed on to the industrial purchaser of long terne metal plate. The effect which this passed on cost will have upon the prices of the final goods using long terne metal plate (automobiles and gasoline tanker trucks) will be very small because the cost of the long terne metal products is only a minor component of the price of the final goods. Thus, the costs of complying with this standard will not measurably effect the prices of goods produced by industries using long terne metal plate, the output and employment of firms producing long terne metal plate, and the profitability of long terne metal plate operations.

Stevedoring

Discussion entitled "40. *Stevedoring*" appearing at 46 FR 6220/2.

Telecommunications

Substitute the following for the discussion entitled "(g) *Conclusion: Technological Feasibility*" appearing at 46 FR 6221.

(g) *Conclusion: Technological Feasibility*

The industry maintained that its difficulties in complying with the lead standard were comparable to the difficulties associated with the construction industry, and that OSHA should exempt the telecommunications industry from the standard's coverage (Ex. 475–22 and 22(a)). OSHA does not agree that the similarities warrant an exemption. While workers may be required to move from site to site, the sites themselves are stationary and the company has been able to determine representative exposure levels for lead related tasks. Furthermore, the work force is highly specialized and not transient in nature, as it is in the construction industry. Thus, the same employees continue to have potential lead exposures. The fact that telecommunications repairmen move site to site and that sites infrequently have leaded cable, tends to aid employer compliance by naturally eliminating continuous worker exposure to lead. In addition, the general discussion concerning the breadth of the construction exemption, *infra*, applies with equal force here.

Contrary to AT & T's claims (Bell Pet. at 20–23), the record demonstrates that the PEL is technologically feasible because it can be met by application of work practices coupled with minimal rotation. As the Court of Appeals has previously recognized:

> * * * the ease with which this industry can adapt to the standard technologically essentially moots the economic question.

United Steelworkers, supra, 647 F.2d at 1302. Besides, the adoption of an engineering control trigger to ease the burden of the lead standard where exposures are intermittent will further ensure that no obligation to install engineering controls will ever arise in the telecommunications industry.

AT & T further maintains that application of environmental monitoring provisions of the lead standard is impractical in the telecommunications industry and no sound reason exists for differentiating between monitoring requirements in the construction and telecommunications industry. OSHA disagrees. Several factors support the requirement that environmental monitoring should be performed.

First, contrary to AT & T's suggestion, OSHA did not exempt the construction industry from the air sampling requirements of the standard solely because lead exposure within the industry was intermittent, but among other factors because the length of time necessary to obtain the monitoring results would usually exceed the duration of the construction job and the next job was not likely to have the same source of exposure. 43 FR 52986. While OSHA recognizes that AT & T's employees encounter lead exposures at varying locations, these workers are exposed to lead during the same operations, *i.e.*, lead cable splicing and repairing. Thus, air monitoring data showing the representative exposures of workers splicing lead cable are useful indicators of the nature and extent of lead exposure problem during these operations and may serve as the basis for the development of effective work practices which reduce those exposures.

Second, OSHA has resolved AT & T's concern over the monitoring provisions of the lead standard by issuing an interpretive letter which indicates that the requirement for "representative" monitoring may be fulfilled by monitoring the exposures of a typical cable splicer rather than by monitoring lead exposures at every manhole or telephone pole where lead may be encountered.

Industry has further maintained that compliance with the standard would require the installation of hygiene facilities at every location where lead cable may be found and that this requirement rendered the standard infeasible in the context of the telecommunications industry (Tr. 203, 206). This fear is unfounded because the standard requires hygiene facilities to be constructed only when employee exposures exceed the PEL. Since worker rotation and work practices will assure that no telecommunications employee's exposure to lead exceeds the PEL, no requirement to furnish hygiene facilities need ever arise.

Zinc Smelting

Substitute the following for the discussion entitled "46. *Zinc Smelting*" appearing at 46 FR 6224.

46. *Zinc Smelting*.—(a) *Uses*. Zinc metal is used for galvanizing, brass and bronze products, and metal casting. In addition to metallic applications, significant quantities of zinc are consumed in pigments or other chemicals (Ex. 476–491).

(b) *Process Description and Exposure Areas*. The processing of zinc from its ore begins with the milling of the ore to prepare a concentrate that can be treated to recover zinc and its associated byproduct and coproduct metals (Id.).

The mineralogy of zinc-containing ores determines the technology and economics of the milling practice. Heavy-media separation pretreatment prior to zinc flotation has been designed into newer mills. About one-half of the mill feed can be floated at relatively coarse size with the reject fraction assaying as low as 0.04 percent zinc (Ex. 476, 491).

Flotation is the basic mineral reduction process. The general scheme for the flotation of mixed sulfide ore is: (1) Flotation of the lead copper minerals and depression of the zinc and iron minerals; (2) separation, also by flotation, of the lead-copper concentrate into separate lead and copper concentrates; (3) activation and flotation of the sphalerite from the iron and gangue minerals; and (4) flotation of the pyrite if recovery is desired (Id.).

Reduction of the zinc ores and concentrates is accomplished by electrolytic deposition from a sulfate solution or by distillation retorts or furnaces. In either method, the zinc concentrate is roasted to eliminate most of the sulfur to produce roasted concentrate or calcine (Id.).

At electrolytic zinc plants, the roasted zinc concentrate is leached with dilute sulfuric acid to form a zinc sulfate solution. The solution is then purified and piped to electrolytic cells, where the zinc is electrolytically deposited on aluminum cathodes (Ex. 476, 491). The cathodes are lifted from the tanks at intervals and stripped of the zinc, which is then melted in a furnace and cast into slabs (Ex. 476, 491).

There are three types of distillation retort plants—batch horizontal retorts, continuous vertical retorts heated by fuel, and continuous vertical retorts.

A blast furnace process for producing zinc, also known as the Imperial Smelting Process, was developed by Imperial Smelting Corporation, Ltd., of Avonmouth, England. This process is similar to the normal blast furnace practice of burning coke in intimate association with the ore to be reduced but, as in the retort process, the zinc is released as a vapor and must be condensed (Id.).

The Kivcet-CS process, developed in the U.S.S.R. and available for commercial distribution, combines the functions of sintering, blast furnacing, and slag fuming in one autogenous smelting unit. It offers the possibility of recovering, along with lead, either zinc metal or zinc oxide. The process is characterized by high metal recoverings, low environmental contamination, and low labor and capital costs compared with those of a conventional smelter (Ex. 476, 491).

Potential lead exposure occurs during the handling and storing of concentrates and charging of concentrates to the roaster. Typical operations involve the receipt of concentrates by railcar or dump truck, storage in the open or in storage buildings, moving of concentrates by front-end loader to open conveyors, drying in a rotary dryer, holding in storage bins, and charging by conveyor to the roaster. Exposures in this area are due largely to dust emissions from mechanical screens and conveying equipment, overflow from front-end loaders, and reentrainment by wind (Ex. 481).

Zinc may also be extracted from scrap metal or scrap zinc using a distilling process, during which trace amounts of lead may be present. However, even if lead is present in the metal, it remains in slag form during recovery, and no lead fumes or dust are generated (Ex. 22 at 237).

(c) *Controls Currently Used.* Undisputed evidence that the technology necessary to control lead is available. Mr. Wagner's analysis of available control technology is consistent with the practices which ASARCO, St. Joe, etc. current employ (Ex. 481). In some cases, such as the American Chemet Co., enhanced housekeeping practices are all that would be necessary to achieve compliance with the standard (Ex. 476-501). St. Joe also outlined control technologies consistent with the recommendations made by Mr. Wagner and others. (Ex. 475-36).

(d) *Exposure Levels.* The level of exposure to lead is dependent on the lead content of the concentrates. Lead concentrations in ore range from 0.3 percent (Ex. 481-35) to 1.5 percent (Ex. 481-19). For example, airborne lead exposures among concentrate handlers at National Zinc (Ex. 481-25) and Jersey-Miniere (Ex. 481-25) did not exceed 30 $\mu g/m^3$.

Other potential lead exposures occur in the roasting department: These exposures vary with the type of roaster. Levels at New Jersey Zinc were in the 150-200 $\mu g/m^3$ range where closed, multiple hearth roasters are employed (Ex. 481-20). At National Zinc, where a fluidized bed roaster is used, no lead levels in excess of 30 $\mu g/m^3$ were measured in the roasting department (Ex. 481-25).

In the electrolytic process, calcine and dilute sulfuric acid are introduced into a series of tanks for the leaching operation. Since the concentrates become wet and stay wet throughout the remaining processes, little potential lead exposure occurs (Ex. 481). In the recast process at National Zinc, lead exposure levels for the workers casting the anodes averaged 200 $\mu g/m^3$ (Ex. 481-25), with one exposure measured as high as 1200 $\mu g/m^3$. The cathode strippers have lead exposures that average slightly in excess of 50 $\mu g/m^3$ (Ex. 481-19, 25).

In the pyrometallurgical process, the sintering machine represents the last significant lead exposure area. Lead levels as high as 200 $\mu g/m^3$ have been measured in the fume equipment operator at New Jersey Zinc (Ex. 481-20) and in excess of 50 $\mu g/m^3$ for the other workers in this department. Most of the lead and cadmium is fumed off at this operation, thus little potential for significant lead exposure exists in remaining processes (Ex. 481). Approximately, 65 percent of employees are exposed below 30 $\mu g/m^3$ (Ex. 476-386) and 35 percent of all employees are exposed above 50 $\mu g/m^3$ (Ex. 476-386). Zinc fuming processes showed that most lead levels were below 50 $\mu g/m^3$ (Ex. 481).

In a NIOSH Health Hazard Evaluation survey at the American Chemet Co., of 8 samples taken at the zinc smelter (Ex. 476, American Chemet) 6 were below 50 $\mu g/m^3$. NIOSH recommended that housekeeping be used to reduce levels significantly. An OSHA inspection of the National Zinc Co. found that 360 workers were exposed below 30 $\mu g/m^3$ and only 17 above 50 $\mu g/m^3$ (Ex. 476-503). Based on these findings, OSHA believes exposure to lead is probably not a significant problem in most zinc smelting operations (Ex. 481).

(e) *Population Exposed.* There are an estimated 2,000 production workers potentially exposed to lead in the zinc smelting and refining industry, 70 percent of whom are exposed to less than 30 $\mu g/m^3$. Fifteen percent are exposed to between 30 $\mu g/m^3$ and 50 $\mu g/m^3$, and 15 percent are exposed to over 50 $\mu g/m^3$ (Ex. 481, p. 16).

(f) *Additional Controls.* To bring zinc smelters into compliance requires that some firms upgrade existing ventilation equipment so that it has an increased capture potential. Other firms may need to automate more processes or to rotate workers, while some need only enhance their housekeeping practices to achieve compliance with 50 $\mu g/m^3$.

(g) *Conclusion: Technological Feasibility.* The record evidence indicates that most operations within most zinc smelters are in compliance, and that in those which are not fully in compliance many of their processes are below 50 $\mu g/m^3$ and some are even below 30 $\mu g/m^3$. Thus, compliance for the industry, as a whole, appears feasible within two and one-half years.

(h) *Cost of Compliance.* Two primary producers of zinc—ASARCO and St. Joe Minerals—provided OSHA with written submissions on the feasibility of meeting the lead standard in their operations. Other primary producers and the secondary producers did not respond to OSHA's request for information.

ASARCO provided estimates of compliance costs in its Corpus Christi, Texas, primary zinc facility and its Sand Springs, Oklahoma, secondary zinc facility. In addition, costs for the zinc department of ASARCO's El Paso, Texas, primary copper facility were provided. (Zinc dust from this operation is transported to Corpus Christi for recovery.)

ASARCO claims that the total cost of compliance will be $13,308,000 for its zinc operations. These costs include ventilation and vacuum systems and are divided between primary production ($13,002,000) and secondard production ($306,000) (Ex. 475-28). The Corpus Christi plant estimates do not consider potential changes in work practices which are necessary to eliminate some of their worst exposures resulting from power sweeping (Tr. 531). ASARCO also overlooks potentially less costly solutions by omitting stand-by pulpits with pressurized filtered air for intermittent operations, such as sampling (Tr. 532). ASARCO did not consider the use of pressurized cabs for mobile equipment (Tr. 532).

OSHA also suggests that other methods of control could be used, such as chemical dust suppressants, traveling ventilation systems, and secondary and tertiary hoods (which are currently used in Japan). These methods are available, effective, and economically attractive.

St. Joe Minerals submitted a compliance cost estimate of $13 million in capital costs and $400,000 in annual operating costs (both in 1978 dollars). This estimate reflects use of "conventional control techniques" (Ex. 475-36A). St. Joe stated that this estimate originated from its prior experience in meeting safety, health, and environmental regultions, and that derivation of the figure was available in its submission to the 1977 rulemaking proceedings (Tr. p. 770).

OSHA estimates that the costs of compliance with the lead standard will the range between OSHA's estimate of $10.5 million and industry's estimate of $26 million (Ex. 481 and Tr. 345; Ex. 475-28; Ex. 475-36A). The lower bound estimate factors in the use of a broad array of control technologies and work practices. Some of these work practices are very inexpensive or carry no costs at all (Tr. 349). In addition, other controls, such an air-lock entry anteroom systems and boot-washing facilities could be used at St. Joe's zinc smelter (Tr. 561). The record shows that some zinc smelters are currently in compliance or near compliance with the lead standard in most of their operations. Hence, not all smelters will incur significant costs. OSHA also recognizes but does not have data to measure the value of reclamation of other metals, which will offset compliance costs for some firms in the industry (Tr. 348). Furthermore, expenditures for compliance are considered business expenses, thereby reducing the after tax burden of these firms (Tr. 349).

In addition, zinc smelters are already under an obligation to control exposures to arsenic. OSHA estimated that the industry would spend $9.3 million in capital costs and $940,000 in annual costs to comply with the arsenic standard (Ex. 476-488). To the extent that resources have been allocated for this purpose, and that they will have reduced lead levels simultaneously, these costs should not be doubled-counted. In light of these considerations, OSHA concludes that the high estimate of $26,000,000 is a reasonable assessment of the upper bound of the potential costs for the zinc industry. Annualized capital costs, therefore, are not expected to exceed $4.6 million.

(i) *Industry Profile.* In 1976, there were 10 companies operating 18 establishments and employing 6,400 production workers in the primary zinc industry (SIC 3333). By 1977, there were 8 companies operating 8 facilities and employing 3,500 production workers. Value added per production worker rose from $8.65 to $16.03 per hour while average hourly earnings of production workers rose from $3.17 to $7.17 per hour (Ex. 476-20). Investments in new capital fell from $25.8 million to a low of $5.9 million in 1969, but have risen since then to $39.8 million in 1977 (Ex. 426-20). Total shipments were valued at $430.7 million in 1977 (Ex. 476-20).

Since 1969, there has been a continuous decline in the production of domestic zinc coinciding with the closure of 9 smelters (Ex. 476-490). Thus, although United States demand for zinc metal over the decade has remained relatively stable, smelting capacity has declined by almost 50 percent. Smelters closed for a variety of reasons, including obsolescence, failure to meet environmental standards, and an inability to obtain sufficient concentrate feed (Ex. 476-490).

ASARCO commented that several operations closed as a result of a downturn in demand lagging the recessionary period of 1974 to 1975 and the long-run trend in substitution away from zinc in the automotive industry (Ex. 475-28). However, the industry has made steady progress in developing and promoting the use of thin-wall zinc diecastings, which are lighter in weight. Thus, zinc has begun to recapture some of the market and currently is used in 150 automotive diecastings compared with 100 in 1978. In addition, the rising costs of substitute materials, such as plastic and aluminum, have increased the competitiveness of zinc in some markets (Ex. 472-26).

Historically, the demand for zinc correlates closely with economic activity (Ex. 476-490). The major use of zinc metal is in the construction industry, which is the major market for zinc-coated or galvanized products, such as structural steel, roofing, siding, guttering and duct material in air conditioning, ventilating and heating systems. Transportation accounts for the second major use of zinc metal. The largest use within this sector is diecastings for automobile components. Zinc is also used as a nonmetallic oxide in the rubber industry, production of photocopying chemicals, and paints. Zinc is most vulnerable to substitution in these nonmetallic uses (Ex. 476-490).

There are currently four domestic producers of primary zinc: AMAX, ASARCO, Jersey-Miniere, and National Zinc. (Ex. 476-489). In addition, St. Joe Minerals has reactivated at 25 percent of capacity its zinc smelting operation. This decision was made because of the discovery of a high-grade zinc deposit in New York (Tr. p. 762-763). Depletion of this deposit is expected to occur within 15 years (Tr. p. 764).

The tenor of zinc ores in the United States tends to be lower than that of foreign ores. Therefore, to ensure a continuing domestic supply and to foster development of domestic low-grade ores, incentives exist to develop and implement efficient mining and extraction processes (Ex. 476-490). However, major United States companies also have substantial interests in foreign zinc mining activities (Ex. 476-49B).

Also, foreign investment by a Belgian firm in the United States zinc industry supplied capital for a joint venture to build an electrolytic, highly automated facility in Tennessee and to develop four mines. In addition, several Japanese companies and a United States oil firm entered into a 3-year partnership to explore for zinc deposits in Tennessee (Ex. 476-49B).

Pilot research in the field of zinc recovery has shown that ores that were previously used to a limited extent or not at all as sources of zinc can become commercial sources of the metal. Specifically, the Kivet CS shaft furnace allows simultaneous smelting of lead and zinc and is ready for industrial scale application in the Soviet Union. Advantages of the process include reduced volumes of waste gas, high metal recovery, improved environmental control of emissions, and lower labor and capital costs compared with conventional smelters (Ex. 476-49B).

The construction of electrolytic plants and the development of hydrometallurgical processes, which will eliminate roasting, can also produce unintended benefits, such as reduced environmental pollution. The newest plant in the United States, a $97 million joint venture of New Jersey Zinc and Union Miniere, uses a highly automated electrolytic process. Some of the plants that closed between 1969 and the present were utilizing obsolete technology and could not meet environmental standards (Ex. 476-490).

Foreign producers with more modern technology and lower labor costs enjoy competitive advantages over domestic producers. Foreign penetration into the domestic market is approaching 50 percent (Ex. 476–493), and may reach 63 percent by 1981 (Ex. 476–38(b)). However, even absent the OSHA lead regulation, this trend is expected to continue and in fact may be accelerated. Given the current depressed condition of zinc prices in spite of an international cartel active in supporting zinc prices since 1965 (Ex. 476–493), primary producers probably will continue to defer decisions concerning reinvestment in new plant and equipment and more modern technology. Perhaps the cost of such investments will induce a rise in the number of joint ventures to cover the risks of investing in the zinc industry until the development of new markets secures the future of zinc as an industrially important metal.

(j) *Conclusion: Economic Feasibility.* OSHA estimates that the annualized compliance costs in this industry will not exceed $4.6 million, which is only 1.1 percent of the industry's total value of shipments. Therefore the convergence of many factors more significant than the OSHA lead regulation will determine the future of the zinc industry. Current market conditions have resulted in depressed prices in the industry, and the strength of foreign competition is increasing as domestic producers retire obsolete, inefficient plants and deplete domestic ores. Developments of new zinc markets and modernization of technology in the industry may contribute to a brighter outlook for producers. However, if world producers ignore demand, excess supply could force prices down, resulting in lower profits. This might impel additional capacity reductions, which would reduce available supplies in the late 1980s.

OSHA recognizes that the zinc industry is operating is a depressed world market. However, the estimated annualized compliance costs ($4.6 million) are only 1.1 percent of the industry's total value of shipments based on the most recent available data (Ex. 476–20). In addition, most zinc smelters are currently in or close to compliance in most operations.

However, St. Joe contends that it cannot afford to comply with the lead standard at its Monaca smelter because of adverse conditions in the zinc market. This smelter was recently reopened at 25 percent capacity because of the discovery of an ore deposit, which will be depleted in about 15 years. The decision to reopen this smelter was made after promulgation of the lead standard. Therefore, OSHA assumes that St. Joe concluded that the venture would be profitable within the context of a 50 $\mu g/m_3$ lead standard. Operation of the Monaca Smelter at reduced capacity should result in lower air lead levels. However, if unforeseen compliance problems occur, the Agency is willing to discuss those problems with St. Joe.

III. Other Issues

A. *Scope of the Construction Exemption.* The construction industry was exempted from the new lead standard. Since the standard was issued, almost all industries where lead exposures are intermittent, *i.e.*, telecommunications, stevedoring, and shipbuilding, have claimed that this fact alone requires that the exemption be extended to cover their operations.

OSHA's exemption of the construction industry was based on the fact that:

> Construction is a diverse activity about which no valid generalizations can be drawn concerning the nature of lead exposure, the duration of a project, or the duration of an employer-employee relationship, and the record does not support drawing rational distinctions between groups that can feasibly be covered by the standard and groups that cannot.
>
> * * * * *
>
> Accordingly, OSHA intends to utilize the expertise of the Construction Advisory Committee and will request that it review the rulemaking record and make recommendations on the most appropriate way the lead standard can be applied to the construction industry. These recommendations will then become the basis for a proposed modification to part 1926.
>
> (43 FR 52986)

OSHA's exemption of the construction industry from the lead standard was subsequently challenged by labor and carefully scrutinized by the Court of Appeals, which:

> Agree[d] with the union that OSHA's decision to exclude the workers in one industry from the standard require[d] some explanation, since the statute requires OSHA to protect all workers.
>
> * * * * *
>
> Of course, OSHA would be shirking its statutory responsibilities if it made no effort to protect workers in the construction industry from lead exposure. But we construe OSHA's decision here as one only to exempt the construction industry from this particular standard, not from OSHA jurisdiction generally.
>
> * * * * *
>
> The agency has stated that it has requested its Construction Advisory Committee to review the rulemaking record and to recommend how the agency might fashion a scheme to give construction workers the protection they need. We have no reason to doubt OSHA's assurance that it will take reasonably prompt steps to fashion this protection. So long as it does so, OSHA has met its duty.
>
> *USWA* v. *Marshall, supra,* 647 F. 2d at 1309–10.

Applying these criteria, OSHA believes additional exemptions from the standard are appropriate only for similarly "diverse" industries about which no generalizations regarding the nature and source of lead exposures can be made. Because no other industry shares the characteristics which justify an exemption of the construction industry with the possible exception of stevedoring which has a highly transient workforce, all pending requests for such an exemption are denied.

No other industry except stevedoring can fairly be characterized as sharing the diverse traits of the construction industry. Where the tasks generating lead exposures are repetitive although not necessarily performed at the same location, monitoring results which reflect the levels occurring during lead operations can be obtained and engineering and work practice controls can be designed to contain those exposures; in construction work this would usually not be possible since the nature of exposure for each job differs. Similiarly, where intermittent lead exposures occur at a fixed site (or employees return to a fixed site) hygiene facilities can be constructed; in construction, these facilities would have to be moved with each new job. Finally, since the telecommunications and shipbuilding industries, unlike construction and stevedoring employ stable workforces, the medical survelliance and medical removal provisions of the standard remain applicable; indeed, the importance of these provisions is augmented in light of the 30 day trigger for engineering controls provided for intermittent exposure industries.

B. Maintenance and Repair

OSHA recognizes that workers involved in maintenance and repair operations are placed in circumstances where engineering controls often cannot be used to control lead exposure. Obviously, one of the functions of these workers is to repair the control devices designed to capture airborne lead. Since these devices would be idle during repair and maintenance operations, workers would have to be protected from lead exposure by means other than engineering controls. OSHA acknowledged this condition of industrial life in its discussion of maintenance operations for primary and secondary smelters. The agency conceded that respirators would be necessary for the protection of maintenance workers in each of these industries. *See* 43 FR 54482/1–2, 54483/3; *United Steelworkers, supra*, 647 F.2d at 1281, n. 128, 1286. Accordingly, if maintenance workers in other industries operate under similar working conditions [8] it would be inconsistent for OSHA not to permit the use of respirators to protect them from lead exposure. In OSHA's view, the fact that respiratory protection may be required during maintenance and repair operations does not detract from a general finding of feasibility for an industry. *See United Steelworkers, supra*, 647 F.2d at 1281, n. 138. Therefore, if an employer can demonstrate that the engineering controls which normally control exposure cannot feasibly be used to control exposure for repair and maintenance operations, the employer may permissibly protect those workers with proper respiratory equipment.

C. Burden of Proof during OSHA Rulemaking

LIA's petition for reconsideration (Pet. at 10) also argues that the remand record must be reopened, *inter alia*, because OSHA failed to carry its burden of proof during the supplemental proceedings. LIA's argument presupposes that during 6(b) rulemaking OSHA must produce evidence supporting its position in a manner similar to that of a plaintiff in an adjudicatory hearing. LIA further implies that OSHA must introduce, by way of direct testimony, evidence supporting the feasibility of a standard, which industry must then be permitted to rebut. LIA continues to argue that if OSHA fails to carry this burden of proof during informal rulemaking proceedings, then the promulgated standard is invalid.

OSHA believes this argument misconstrues the nature of 6(b) proceedings and hereby denies all pending requests for relief from the remand findings which are based on OSHA's alleged evidentiary failures. This is not to say that OSHA has ignored claims for relief where the petitions for reconsideration have highlighted factual errors. The remand findings have been corrected or altered where they were based on inaccurate information.

The Court of Appeals has found that "an OSHA proceeding to set a safety and health standard is obviously rulemaking, not adjudication," *United Steelworkers, supra*, 647 F.2d at 1213 (citations omitted). Since informal agency proceedings are designed to elicit information, no party bears the burden of proof. Once the rulemaking record closes, the Agency then evaluates the evidence and reaches a decision. Should this final rule be challenged, OSHA must demonstrate to the Court of Appeals that its ultimate decisions are based upon "substantial evidence in the record considered as a whole." 29 U.S.C. 655(f). This informal nature of rulemaking proceedings under section 6(b) of the Act should not be altered simply because the proceedings are commenced pursuant to a court ordered remand.

D. Remaining Procedural Claims

The remaining procedural claims in the petitions for reconsideration were raised during the remand proceedings (e.g. Ex. 516) and rejected by OSHA as being "without merit" (46 FR 6136–37). OSHA again rejects these procedural challenges because the Agency believes the remand was conducted in accordance with the requirements of section 6(b) of the Act and the Administrative Procedure Act. No more is required. *See Vermont Yankee Nuclear Power Corp.* v. *Natural Resources Defense Council*, 435 U.S. 519 (1978).

IV. EXECUTIVE ORDER 12291

A final regulatory impact analysis has been prepared for this action and is available for copying and inspection by interested persons in OSHA's Docket Office, Docket H–004E, Room S6212, U.S. Department of Labor, Washington, D.C. 20210.

Authority

This document was prepared under the direction of Thorne G. Auchter, Assistant Secretary of Labor for Occupational Safety and Health, 200 Constitution Avenue, N.W., Washington, D.C. 20210.

Accordingly, pursuant to section 6(b) and 8(c) of the Occupational Safety and Health Act of 1970 (84 Stat. 1593, 1599, 29 U.S.C. 655, 657), Secretary of Labor's Order No. 8–76 (41 FR 25059), and 29 CFR Part 1911, Part 1910 of Title 29, Code of Federal Regulations is hereby amended, for the reasons set forth in the preamble, by revising section 1910.1025 (e)(1) and Table I thereof as set forth below.

Signed at Washington, D.C., this 8th day of December 1981.

Thorne G. Auchter,

Assistant Secretary of Labor.

PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS

Part 1910 of Title 29 of the Code of Federal Regulations is hereby amended by revising § 1910.1025(e)(1) and Table I thereof to read as follows:

§ 1910.1025 Lead.

* * * * *

(e) *Methods of compliance*.—(1) *Engineering and work practice controls.* (i) Where any employee is exposed to lead above the permissible exposure limit for more than 30 days per year, the employer shall implement engineering and work practice controls (including administrative controls) to reduce and maintain employee exposure to lead in accordance with the implementation schedule in Table I below, except to the extent that the employer can demonstrate that such controls are not feasible. Wherever the engineering and work practice controls which can be instituted are not sufficient to reduce employee exposure to or below the permissible exposure limit, the employer shall nonetheless use them to reduce exposures to the lowest feasible level and shall supplement them by the use of respiratory protection which complies with the requirements of paragraph (f) of this section. (ii) Where any employee is exposed to lead above the permissible exposure limit, but for 30 days or less per year, the employer shall implement engineering controls to reduce exposures to 200 $\mu g/m^3$, but thereafter may implement any combination of engineering, work practice (including administrative controls), and respiratory controls to reduce and maintain employee exposure to lead to or below 50 $\mu g/m^3$.

TABLE I—IMPLEMENTATION SCHEDULE

Industry [1]	Compliance dates [2]		
	200 $\mu g/m^3$	100 $\mu g/m^3$	50 $\mu g/m^3$
Primary lead production	(3)	3	10
Secondary lead production	(3)	3	5
Lead acid battery manufacture	(3)	2	5
Automobile manufacture/solder grinding	(3)	N/A	7
Electronics, gray iron foundries, ink manufacture, paints and coatings manufacture, wall paper manufacture, can manufacture, and printing	(3)	N/A	1

[8] In its petition for reconsideration the Owens-Illinois Corporation reported that its maintenance workers will necessarily be exposed to air lead levels above 200 $\mu g/m^3$ (Ex. 528–13 at 2).

TABLE I—IMPLEMENTATION SCHEDULE—Continued

Industry [1]	Compliance dates [2]		
	200 μg/m³	100 μg/m³	50 μg/m³
Lead pigment manufacture, nonferrous foundries, leaded steel manufacture, lead chemical manufacture, shipbuilding and ship repair, battery breaking in the collection and processing of scrap (excluding collection and processing of scrap which is part of a secondary smelting operation), secondary lead smelting of copper, and lead casting	(3)	N/A	N/A
All other industries	(3)	N/A	2½

[1] Includes ancillary activities located on the same worksite.
[2] Expressed as the number of years from the effective date by which compliance with the given airborne exposure level, as an 8-hour TWA must be achieved.

3. On effective date. This continues an obligation from Table Z-2 of 29 CFR 1910.1000, which had been in effect since 1971 but which was deleted upon the effectiveness of this section.

* * * * *

(Secs. 6, 8, 84 Stat. 1599 (29 U.S.C. 655, 657); Secretary of Labor's Order 8-76 (41 FR 25059); 29 CFR Part 1911)

[FR Doc. 81-35472 Filed 12-10-81; 8:45 am]

BILLING CODE 4510-26-M