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Part II

Department of Labor

**Occupational Safety and Health
Administration**

**29 CFR Parts 1910, 1915, 1917, 1918, and
1926**

**Powered Industrial Truck Operator
Training; Final Rule**

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Parts 1910, 1915, 1917, 1918, and 1926

[Docket S-008]

RIN 1218-AB33

Powered Industrial Truck Operator Training

AGENCY: Occupational Safety and Health Administration, Labor.

ACTION: Final rule.

SUMMARY: The Occupational Safety and Health Administration (OSHA) is revising its existing requirements for powered industrial truck operator training (codified at 29 CFR 1910.178(l)) and issuing new requirements to

improve the training of these operators. The new requirements are intended to reduce the number of injuries and deaths that occur as a result of inadequate operator training. They apply to all industries (general industry, construction, shipyards, marine terminals, and longshoring operations) in which the trucks are being used, except agricultural operations.

These provisions mandate a training program that bases the amount and type of training required on: the operator's prior knowledge and skill; the types of powered industrial trucks the operator will operate in the workplace; the hazards present in the workplace; and the operator's demonstrated ability to operate a powered industrial truck safely. Refresher training is required if: the operator is involved in an accident or a near-miss incident; the operator has been observed operating the vehicle in

an unsafe manner; the operator has been determined during an evaluation to need additional training; there are changes in the workplace that could affect safe operation of the truck; or the operator is assigned to operate a different type of truck. Evaluations of each operator's performance are required as part of the initial and refresher training, and at least once every three years.

OSHA estimates that this rule will prevent 11 deaths and 9,422 injuries per year. OSHA estimates that the annualized cost of this rule is approximately \$16.9 million for all affected industries.

DATES: Effective Date: The effective date is March 1, 1999.

Compliance Dates: The dates by which powered industrial truck operators must be trained are shown on the following table.

If the employee was hired	The initial training and evaluation of that employee must be completed
Before December 1, 1999.	By December 1, 1999.
After December 1, 1999.	Before the employee is assigned to operate a powered industrial truck.

On November 18, 1998, the Office of Management and Budget granted approval of the information collection requirements under Office of Management and Budget Control Number 1218-0242.

ADDRESSES: Send petitions for review of the provisions of this standard to the Associate Solicitor for Occupational Safety and Health; Office of the Solicitor, Room S-4004; U.S. Department of Labor; 200 Constitution Avenue, N.W.; Washington, D.C. 20210.

For additional copies of this publication contact USDOL, OSHA, Office of Publications, Room N3101; 200 Constitution Avenue, N.W.; Washington, D.C. 20210; telephone (202) 219-4667, FAX (202) 219-9266.

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FAX (202) 219-6599, all at U.S. Department of Labor, 200 Constitution Avenue, N.W.; Washington, D.C. 20210.

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I. Background

A. General Industry

On May 29, 1971 (36 FR 10466), OSHA adopted many existing Federal standards and national consensus standards as OSHA standards under Section 6(a) of the Occupational Safety and Health Act (OSH Act) (29 U.S.C. 655 et al.). Section 6(a) permitted OSHA to adopt these standards without rulemaking for a period of two years after the effective date of the OSH Act.

One of the consensus standards that was adopted under the Section 6(a) procedure was the American National Standards Institute (ANSI) B56.1-1969, *Safety Standard for Powered Industrial Trucks*. Among the provisions adopted from that consensus standard was the operator training requirement subsequently codified by OSHA at 29 CFR 1910.178(l). That requirement states:

“Only trained and authorized operators shall be permitted to operate a powered industrial truck. Methods shall be devised to train operators in the safe operation of powered industrial trucks.”

In that consensus standard, a powered industrial truck is defined as a mobile, power-driven vehicle used to carry, push, pull, lift, stack, or tier material. Vehicles that were commonly referred to as high lift trucks, counterbalanced trucks, cantilever trucks, rider trucks, forklift trucks; high lift platform trucks; low lift trucks, low lift platform trucks; motorized hand trucks, pallet trucks; narrow aisle rider trucks, straddle trucks; reach rider trucks; single side loader rider trucks; high lift order picker rider trucks; motorized hand/rider trucks; or counterbalanced front/side loader lift trucks¹ are included. Vehicles used for earth moving or over-the-road haulage are excluded from the scope of the consensus standard, and consequently from coverage by the OSHA standard.

B. Shipyards and Marine Cargo Handling

In 1958, Congress amended the Longshore and Harbor Workers' Compensation Act (LHWCA) (33 U.S.C. 901 *et seq.*) to provide maritime employees with a safe work environment. The amendments (Pub. L. 85-742, 72 Stat. 835) required employers covered by the LHWCA to "furnish, maintain and use" equipment and to establish safe working conditions in accordance with regulations promulgated by the Secretary of Labor. Two years later, the Bureau of Labor Standards issued the first set of safety and health regulations for shipyards as parts 6, 7, and 8, and longshoring activities as 29 CFR part 9 (25 FR 1565, February 20, 1960). However, the longshoring regulations only covered those activities taking place aboard vessels.

As discussed earlier, the OSH Act authorized the Secretary of Labor to adopt established Federal standards issued under other statutes, including the LHWCA, as occupational safety and health standards. Accordingly, the Secretary adopted the existing shipyards and longshoring regulations (39 FR 22074, June 19, 1974). These regulations are at 29 CFR part 1915 for shipyards and 29 CFR part 1918 for longshoring. Because the OSH Act comprehensively covers all private employments, the longshoring standards also were applied to shoreside cargo handling operations

¹ The use of a single characteristic to describe a truck, such as "high lift" truck, does not fully describe a single type of truck but rather defines a group of different trucks that have that same characteristic. A given truck can only be accurately described by referring to all of its characteristics. For example, the common type of truck used in a warehouse is a high lift, counterbalanced, sit-down rider truck.

(i.e., marine terminal operations). (See 29 CFR 1910.16.) OSHA's requirements for using mechanically powered vehicles aboard vessels were codified at § 1918.97, which includes a general requirement for the training of all vehicle operators.

In addition, in accordance with established policy codified at 29 CFR 1910.5(c)(2), OSHA has applied its general industry standards to shoreside activities not covered by its older longshoring rules. Under section 1910.5(c)(2), a general industry standard covering a hazardous condition applies to shoreside activities not covered by a specific standard addressing that hazard. Shipyards are covered by the general industry standard.

On July 5, 1983 (48 FR 30886), OSHA published its final standard for Marine Terminals (29 CFR part 1917). This rule was intended to further address the shoreside segment of marine cargo handling. Section 1917.27, Personnel, states:

(a) *Qualifications of machinery operators.*

(1) Only those employees determined by the employer to be competent by reason of training or experience, and who understand the signs, notices and operating instructions and are familiar with the signal code in use shall be permitted to operate a crane, winch or other power operated cargo handling apparatus, or any power operated vehicle, or give signals to the operator of any hoisting apparatus.

Exception: Employees being trained and supervised by a designated person may operate such machinery and give signals to operators during training.

The marine terminals standard also includes requirements for powered industrial trucks at § 1917.43, Powered industrial trucks. However, these requirements are for operating, maintaining, and outfitting these vehicles and do not expand on the training requirements found at § 1917.27.

On July 25, 1997, OSHA published in the **Federal Register** (62 FR 40147) final rules revising the marine terminals standard (29 CFR part 1917) and the longshoring standard (29 CFR part 1918). Those final rules left to this rulemaking the issue of improving the training requirements for powered industrial truck operators in the marine cargo handling industries. Accordingly, the final rule being published today includes requirements for the training of powered industrial truck operators in shipyards, longshoring operations, and marine terminals to ensure that all covered employees operating such vehicles have improved protection.

C. Construction

In 1969, Congress amended the Contract Work Hours Standards Act (CWHSA) (40 U.S.C. 327 *et seq.*) by adding a new section 107 (40 U.S.C. 333) to provide employees in the construction industry with a safer work environment and to reduce the frequency and severity of construction accidents and injuries. The amendment, commonly known as the Construction Safety Act (CSA) (Pub. L. 91-54; August 9, 1969), significantly strengthened employee protection by providing for the adoption of occupational safety and health standards for employees of the building trades and construction industry working on Federally financed or Federally assisted construction projects. Accordingly, the Secretary of Labor issued safety and health regulations for construction at 29 CFR part 1518 (36 FR 7340, April 17, 1971) pursuant to section 107 of the CWHSA.

As noted earlier, the OSH Act authorized the Secretary of Labor to adopt existing Federal standards issued under other statutes as occupational safety and health standards.

Accordingly, in 1971, the Secretary of Labor adopted the standards that had been issued under the CWHSA at 29 CFR 1518 as OSHA construction standards. These standards were redesignated as part 1926 on December 30, 1971 (36 FR 25232). The provisions pertaining to powered industrial trucks used in construction are contained at § 1926.602(c). Paragraph 1926.602(c)(1)(vi) states:

(vi) All industrial trucks in use shall meet the applicable requirements of design, construction, stability, inspection, testing, maintenance, and operation, as defined in American National Standards Institute B56.1-1969, Safety Standards for Powered Industrial Trucks.

Therefore, by incorporating by reference the same ANSI standard that was the source document for 29 CFR 1910.178, this provision imposes the identical truck operator training requirements on the construction industry as they apply to general industry.

D. Development of Proposal

Since promulgation of the OSHA standards for powered industrial trucks in 1971, interested persons have requested that OSHA improve its training requirements for powered industrial truck operators. In the interval since 1971, the ASME B56.1 Committee has also substantially upgraded its training provisions for powered industrial truck operators.

On March 15, 1988, the Industrial Truck Association (ITA) petitioned

OSHA to revise its standard for the training of powered industrial truck operators (Ex. 3-2). The petition contained suggested language for a proposed requirement and a model operator training program that would meet the ITA-recommended requirement. OSHA responded to the petition on April 8, 1988, stating that it would revise the OSHA powered industrial truck operator training requirements when it completed work on other priority rulemaking projects.

Congress has expressed a special interest in this rulemaking. A resolution urging OSHA to revise its regulations on powered industrial truck operator training was introduced in the Senate during the 103rd Congress. Senate Concurrent Resolution 17 had 55 cosponsors and broad bipartisan support. Its companion measure in the House of Representatives, H. Con. Res. 92, had 236 cosponsors from both parties. No formal vote was ever taken on either resolution, however.

On March 14, 1995, OSHA published in the **Federal Register** (60 FR 13782) a notice of proposed rulemaking (NPRM) to revise the training requirement of the general industry standard for powered industrial trucks (§ 1910.178(l)). This notice also proposed to add training requirements for powered industrial truck operators in the shipyard industry (1915.120(a)), marine terminal industry (1917.43(i)), and the longshoring industry (1918.77(a)).

OSHA provided copies of a draft of the March 14, 1995, **Federal Register** NPRM to the Advisory Committee on Construction Safety and Health (ACCSH) at the Committee's meetings on February 28 and March 1, 1995. The Committee advised OSHA that it would like additional time to study the proposal and would finalize its recommendations by its next meeting on May 25-26, 1995. Because ACCSH had provided no recommendations or other information, OSHA decided to delay proposing the revision of the training requirements for powered industrial truck operators in the construction industry until the Committee had concluded its deliberations.

ACCSH met on May 25-26, 1995, at which time the Committee prepared its comments and recommendations. The Committee recommended that OSHA propose somewhat different requirements for powered industrial truck operator training for construction workers than the Agency had proposed for general industry, longshoring, shipyards, and marine terminals. OSHA reviewed the ACCSH recommendations and determined that these changes might be appropriate for other

industries as well. OSHA decided that the most effective way to fully consider the Committee's recommendations was to raise a series of issues in the preamble of the proposed training requirements for construction and to invite public comment.

On Jan. 30, 1996, OSHA published an NPRM in the **Federal Register** (61 FR 3094) proposing to adopt as a new paragraph 1926.602(d) essentially the same training requirements for powered industrial truck operators in the construction industry as had been proposed for general industry and the shipyard and marine cargo handling industries. OSHA also published in that notice the following four issues that responded to the ACCSH recommendations:

1. In the construction industry, should an employer be allowed to accept the certification of training by a third party such as a union, manufacturer, consultant, or other private or public organization? Since OSHA does not accredit certifiers, what criteria should be used to establish their credibility?

2. What type of testing should be conducted during initial training to judge the competency of the trainee (performance testing and oral and/or written tests)?

A. If tests are administered, what subjects should be tested, and what methods, if any, should be used to judge that the tests are reliable and address the subject matter adequately?

B. What, if any, should be the acceptable pass/fail requirement for the tests?

3. Are some of the listed training subjects not needed?

4. Should an employee receive refresher or remedial training only if operating a vehicle unsafely or if involved in an accident? Is there any fixed operator retraining frequency suitable for the construction industry?

In a companion **Federal Register** notice (61 FR 3092), OSHA announced that a public hearing would be held. The hearing was to cover all industry sectors. That notice also advised the public that the issues raised in the construction notice should be considered for general industry and the shipyard and marine cargo handling industries and invited public comment. The hearing was held on April 30 through May 2, 1996.

There were 109 commenters who responded to the proposals outlined above and 22 participants at the public hearing. The presiding Administrative Law Judge allowed 60 days for post-hearing comments and an additional 30 days for post-hearing briefs. All

comments, transcripts, and other evidence have been placed in the rulemaking record and are available for public inspection and copying. The rulemaking record was closed and certified as complete and final by the Administrative Law Judge on June 1, 1998. In preparing these final rules, OSHA has considered the entire rulemaking record and has made changes to the general industry, construction, shipyard, and marine cargo handling industries standards, as appropriate, based on the comments, testimony, and other evidence received.

As the following discussion demonstrates, OSHA concludes that upgrading the training requirements for powered industrial truck operators will substantially reduce the significant risk of death and injury caused by the unsafe operation of powered industrial trucks driven by untrained or inadequately trained operators.

E. Updated Consensus Standard

Since promulgation of the OSHA safety and health standards in 1971, the consensus standard (ANSI B56.1-1969) (now ASME B56.1) on which the general industry powered industrial truck standard was based has undergone four complete revisions (dated 1975, 1983, 1988, and 1993). The current edition standard, ASME B56.1-1993 (Ex. 3-1), addresses truck operator training as follows.

4.19 Operator Training

4.19.1 Personnel who have not been trained to operate powered industrial trucks may operate a truck for the purposes of training only, and only under the direct supervision of the trainer. This training should be conducted in an area away from other trucks, obstacles, and pedestrians.

4.19.2 The operator training program should include the user's policies for the site where the trainee will operate the truck, the operating conditions for that location, and the specific truck the trainee will operate. The training program shall be presented to all new operators regardless of previous experience.

4.19.3 The training program shall inform the trainee that:

(a) The primary responsibility of the operator is to use the powered industrial truck safely following the instructions given in the training program.

(b) Unsafe or improper operation of a powered industrial truck can result in: death or serious injury to the operator or others; damage to the powered industrial truck or other property.

4.19.4 The training program shall emphasize safe and proper operation to

avoid injury to the operator and others and prevent property damage, and shall cover the following areas:

- (a) Fundamentals of the powered industrial truck(s) the trainee will operate, including:
- (1) characteristics of the powered industrial truck(s), including variations between trucks in the workplace;
 - (2) similarities to and differences from automobiles;
 - (3) significance of nameplate data, including rated capacity, warnings, and instructions affixed to the truck;
 - (4) operating instructions and warnings in the operating manual for the truck, and instructions for inspection and maintenance to be performed by the operator;
 - (5) type of motive power and its characteristics;
 - (6) method of steering;
 - (7) braking method and characteristics, with and without load;
 - (8) visibility, with and without load, forward and reverse;
 - (9) load handling capacity, weight and load center;
 - (10) stability characteristics with and without load, with and without attachments;
 - (11) controls—location, function, method of operation, identification of symbols;
 - (12) load handling capabilities; forks, attachments;
 - (13) fueling and battery charging;
 - (14) guards and protective devices for the specific type of truck;
 - (15) other characteristics of the specific industrial truck.
- (b) Operating environment and its effect on truck operation, including:
- (1) floor or ground conditions including temporary conditions;
 - (2) ramps and inclines, with and without load;
 - (3) trailers, railcars, and dockboards (including the use of wheel chocks, jacks, and other securing devices);
 - (4) fueling and battery charging facilities;
 - (5) the use of "classified" trucks in areas classified as hazardous due to risk of fire or explosion, as defined in ANSI/NFPA 505;
 - (6) narrow aisles, doorways, overhead wires and piping, and other areas of limited clearance;
 - (7) areas where the truck may be operated near other powered industrial trucks, other vehicles, or pedestrians;
 - (8) use and capacity of elevators;
 - (9) operation near edge of dock or edge of improved surface;
 - (10) other special operating conditions and hazards which may be encountered.
- (c) Operation of the powered industrial truck, including:

- (1) proper preshift inspection and approved method for removing from service a truck which is in need of repair;
 - (2) load handling techniques, lifting, lowering, picking up, placing, tilting;
 - (3) traveling, with and without loads; turning corners;
 - (4) parking and shutdown procedures;
 - (5) other special operating conditions for the specific application.
- (d) Operating safety rules and practices, including:

- (1) provisions of this Standard in Sections 5.1 to 5.4 addressing operating safety rules and practices;
- (2) provisions of this Standard in Section 5.5 addressing care of the truck;
- (3) other rules, regulations, or practices specified by the employer at the location where the powered industrial truck will be used.

(e) Operational training practice, including:

- (1) if feasible, practice in the operation of powered industrial trucks shall be conducted in an area separate from other workplace activities and personnel;
- (2) training practice shall be conducted under the supervision of the trainer;
- (3) training practice shall include the actual operation or simulated performance of all operating tasks such as load handling, maneuvering, traveling, stopping, starting, and other activities under the conditions which will be encountered in the use of the truck.

4.19.5 Testing, Retraining, and Enforcement

(a) During training, performance and oral and/or written tests shall be given by the employer to measure the skill and knowledge of the operator in meeting the requirements of the Standard. Employers shall establish a pass/fail requirement for such tests. Employers may delegate such testing to others but shall remain responsible for the testing. Appropriate records shall be kept.

(b) Operators shall be retrained when new equipment is introduced, existing equipment is modified, operating conditions change, or an operator's performance is unsatisfactory.

(c) The user shall be responsible for enforcing the safe use of the powered industrial truck according to the provisions of this Standard.

Note: Information on operator training is available from such sources as powered industrial truck manufacturers, government agencies dealing with employee safety, trade organizations of users of powered industrial trucks, public and private organizations, and safety consultants.

Since 1971, the national consensus committee has adopted other volumes² for specific types of vehicles that fall within the broad definition of a powered industrial truck. Supplementary volumes have been developed and adopted for: guided industrial vehicles; rough terrain forklift trucks; industrial crane trucks; personnel and burden carriers; operator controlled industrial tow tractors; and manually propelled high lift industrial trucks. The training provisions OSHA is adopting are performance-oriented and could be applied to operator training for all types of industrial trucks. However, this final rule covers only those types of powered industrial trucks that fall within the scope of 29 CFR 1910.178(a) for general industry, construction, and shipyards. That scope includes some types of powered industrial trucks that have supplementary ASME volumes, such as rough terrain forklift trucks, but does not include earth moving equipment or vehicles for over-the-road haulage, for which ASME has also developed specific volumes.

II. Powered Industrial Truck Characteristics

The term "powered industrial truck" is defined in the ASME B56.1 (formerly the ANSI B56.1) standard as a "mobile, power propelled truck used to carry, push, pull, lift, stack, or tier material." Vehicles that are used for earth moving and over-the-road hauling are excluded.

Powered industrial trucks are classified by their manufacturers according to their individual characteristics. There are seven classes of powered industrial trucks:

Class 1—Electric Motor, Sit-down Rider, Counter-Balanced Trucks (Solid and Pneumatic Tires).

Class 2—Electric Motor Narrow Aisle Trucks (Solid Tires).

Class 3—Electric Motor Hand Trucks or Hand/Rider Trucks (Solid Tires).

Class 4—Internal Combustion Engine Trucks (Solid Tires).

Class 5—Internal Combustion Engine Trucks (Pneumatic Tires).

Class 6—Electric and Internal Combustion Engine Tractors (Solid and Pneumatic Tires).

Class 7—Rough Terrain Forklift Trucks (Pneumatic Tires).

Each of the different types of powered industrial trucks has its own unique characteristics and some inherent hazards. To be most effective, training must address the unique characteristics

²The national consensus committees call the standards for different pieces of equipment "volumes" and all of the volumes produced by the committee the "standard."

of the type of vehicle(s) the employee is being trained to operate.

Powered industrial trucks may operate on almost any type of surface, from smooth and level floors to rocky, uneven ground, provided they were manufactured to operate on that type of floor or ground and the surface does not have an excessive slope. For example, construction forklift trucks (most commonly, those that are classified as Class 7, rough terrain forklifts) are more often operated on uneven, ungraded terrain than is the case for trucks in other industries.

Different trucks are designed and manufactured to operate in different work environments. Some powered industrial trucks are used for moving material in a particular type of workplace. For example, high lift trucks can be used to raise loads up to 30 or 40 feet above the ground, deposit the material on a rack, mezzanine, roof under construction, scaffold, or another elevated location, and subsequently retrieve and lower the material. Some vehicles are used to raise a palletized load just a few inches above the floor and move that load to another location in a warehouse or other indoor workplace.

Powered industrial trucks can be equipped with, or can be modified to accept, attachments that permit the truck to move odd-shaped material or carry out tasks that may not have been envisioned when the truck was designed and manufactured. Many of these attachments are added to or installed on the vehicle by the dealer or the employer. For example, there are powered industrial truck attachments for grasping barrels or drums of material. Some of these attachments not only grasp a barrel or drum but allow the vehicle operator to rotate the barrel or drum to empty it or lay it on its side.

OSHA recognizes that certain attachments may limit the safe use of the vehicle. To ensure that modifications or additions do not adversely affect the safe use of the vehicle, OSHA requires at § 1910.178(b)(4) that:

(ii) Modifications and additions which affect capacity and safe operation shall not be performed by the customer or user without manufacturer's prior written approval. Capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly.

Note: A similar provision for construction is contained at § 1926.602(c)(1)(ii).

When a powered industrial truck is used with specialized attachments, or when the truck is used for hazardous operations (such as when the truck is used to lift people), operator training

must include instruction on the safe conduct of those operations so that the operator knows and understands the restrictions or limitations imposed on vehicle operation in these situations.

III. Powered Industrial Truck Hazards

Powered industrial trucks are used in almost all industries. They can be used to move, raise, lower, or remove large objects or a number of smaller objects on pallets or in boxes, crates, or other containers. Because powered industrial truck movement is controlled by the operator and is not restricted by the frame of the machine or other impediments, virtually unrestricted movement of the vehicle about the workplace is possible.

The hazards commonly associated with powered industrial trucks vary for different vehicle types, makes, and models. Each type of truck presents different operating hazards. For example, a sit-down, counterbalanced high lift rider truck is more likely than a motorized hand truck to be involved in a falling load accident, because the sit-down rider trucks can lift a load much higher than can a hand truck.

The method or means to prevent an accident and to protect employees from injury varies for different types of trucks. For example, operators of sit-down rider trucks are often injured in tipover accidents when they attempt to jump clear of the vehicle as it tips over. Because the operator's natural tendency is to jump downward, he or she lands on the floor or ground and is then crushed by the vehicle's overhead guard. Therefore, operators of sit-down trucks need to be trained to remain in the operator's position in a tipover accident and to lean away from the direction of fall to minimize the potential for injury.

On the other hand, when a stand-up rider truck tips over, the truck operator can exit the vehicle by simply stepping backward, perpendicular to the direction of the vehicle's fall, to avoid being crushed. In this situation, the operator usually should attempt to jump clear of the vehicle, and should be trained accordingly.

Driving a powered industrial truck at excessive speed can result in loss of control, causing the vehicle to skid, tip over, or fall off a loading dock or other elevated walking or working surface. This condition can be made more dangerous because the load being carried sometimes partially obscures the operator's vision. A vehicle that is out of control or being operated by a driver whose view in the direction of travel is restricted can strike an employee, run into a column or other part of the

building, or strike stored material, causing the material to topple and injure employees in the area. Effective driver training teaches operators to act properly to minimize these hazards to themselves and other employees.

Other characteristics of a powered industrial truck that affect safe truck operation are: the truck's tendency to become unstable; its ability to carry loads high off the ground; and its characteristic mode of steering, i.e., with the rear wheels while being powered by the front wheels. Moving loads upward, downward, forward, and backward causes a shift of the center of gravity and can adversely affect the vehicle's stability. When a load is raised or moved away from the vehicle, the vehicle's longitudinal stability is decreased.³ When the load is lowered or moved closer to the vehicle, its longitudinal stability is increased. Training also is needed to avoid accidents that can be caused by these characteristics.

To reduce the instability hazard caused by the shifting of the material being handled, the ANSI B56.1-1969 standard had seven provisions that addressed proper operation of a powered industrial truck. Knowledge of these principles, as well as the requirements of the OSHA standard, are essential for safe vehicle operation:

604 Q. While negotiating turns, speed shall be reduced to a safe level by means of turning the hand steering wheel in a smooth, sweeping motion. Except when maneuvering at a very low speed, the hand steering wheel shall be turned at a moderate, even rate.

605 A. Only stable or safely arranged loads shall be handled. Caution shall be exercised when handling off-center loads which cannot be centered.

605 B. Only loads within the rated capacity of the truck shall be handled.

605 C. The long or high (including multiple-tiered) loads which may affect capacity shall be adjusted.

605 D. Trucks equipped with attachments shall be operated as partially loaded trucks when not handling a load.

605 E. A load engaging means shall be placed under the load as far as possible; the mast shall be carefully tilted backward to stabilize the load.

605 F. Extreme care shall be used when tilting the load forward or backward, particularly when high tiering. Tilting forward with load engaging means elevated shall be

³This assumes that the load is moved forward of the vehicle. When a load is on a side loader vehicle, moving the load away from the vehicle will reduce the longitudinal and lateral stability of the vehicle.

prohibited except to pick up a load. An elevated load shall not be tilted forward except when the load is in a deposit position over a rack or stack. When stacking or tiering, only enough backward tilt to stabilize the load shall be used.

Note: The corresponding provisions appear at §§ 1910.178(n)(15) and (o)(1) through (o)(6) of the general industry standard and are also incorporated by reference in part 1926.

The hazards addressed in this final rule are those associated with industrial trucks in general, as well as those posed by specific makes or models of truck. Each powered industrial truck has distinct characteristics that make its operation different from the operation of other trucks. Therefore, operators must know how these differences affect safe truck operation.

The workplaces where these trucks are being used also present a variety of different hazards. The safety of industrial truck operations can be decreased by workplace conditions such as rough, uneven, or sloped surfaces; unusual loads; hazardous areas; narrow aisles, blind spots, or intersections; and pedestrian traffic or employees working close to the path of travel. Finally, there are hazardous work practices that relate to all trucks, including driving at excessive speed, poor loading, and carrying unauthorized passengers. In addition, poor truck maintenance can contribute to accidents.

The record contains evidence of many accidents that have occurred because of unsafe truck operation, as discussed below. For example, employees have

fallen from trucks while using them to change light bulbs on overhead fixtures or riding on the forks to manually retrieve items from high racks. Many accidents have occurred when an operator has attempted to drive with an obstructed view in the direction of travel and has run into another employee. Improper truck maintenance has caused death from over exposure to carbon monoxide, loss of brakes, or rupture of hydraulic lines.

As the above discussion indicates, it is not possible to identify all the hazards that are encountered in all industrial truck operations. Accordingly one cannot develop a single "generic" training program that covers in detail all hazards for all powered industrial trucks and all workplaces.

Four major areas of concern need to be addressed in an effective powered industrial truck training program: (1) the general hazards that apply to the operation of all or most powered industrial trucks; (2) the hazards associated with the operation of particular types of trucks; (3) the hazards of workplaces generally; and (4) the hazards of the particular workplace where the vehicle operates. The requirements that OSHA is promulgating are performance-oriented to permit employers to tailor a training program to the characteristics of their workplaces and the particular types of powered industrial trucks operated.

IV. Studies of Accident and Injury Data and Training Effectiveness

This section of the preamble discusses the reports, studies, and other sources of

data and information that were analyzed to determine the magnitude and extent of the problems that powered industrial truck operator training can mitigate. It also contains a discussion of the studies that demonstrate how better training can improve safety.

A. Accident and Injury Data

1. The Census of Fatal Occupational Injuries

The Bureau of Labor Statistics (BLS) maintains a database entitled *Census of Fatal Occupational Injuries (CFOI)*. The CFOI is a compilation of information on fatal work injuries that occurred in the 50 States and the District of Columbia. BLS gathers pertinent information from death certificates, workers' compensation reports, and other Federal and State records. Information is verified by using at least two source documents.

The census contains a collection of information on the workers and the circumstances surrounding each fatality. The data are compiled annually.

In April, 1994, BLS published a booklet entitled *Fatal Workplace Injuries in 1992: A Collection of Data and Analysis* (Ex. 3-4). This booklet contains an article written by Gary A. Helmer entitled *Fatalities Involving Forklifts and Other Powered Industrial Carriers, 1991-1992*. This report contains information from the CFOI on 170 fatal powered industrial truck accidents. Table 1 lists the reported causes of these accidents.

TABLE 1.—CLASSIFICATION OF FORKLIFT FATALITIES, CFOI, 1991-1992

How the accident occurred	Number	Percent
Forklift overturned	41	24
Forklift struck something or ran off dock	13	8
Worker pinned between objects	19	11
Worker struck by material	29	17
Worker struck by forklift	24	14
Worker fell from forklift	24	14
Worker died during forklift repair	10	6
Other accident	10	6
Total	170	100

Source: Bureau of Labor Statistics, *Fatal Workplace Injuries in 1992, A Collection of Data and Analysis*, Report 870, April 1994.

2. Characteristics of Work-Related Injuries Involving Forklift Trucks

In 1987, Nancy Stout-Wiegand of the National Institute for Occupational Safety and Health (NIOSH) published an article in the *Journal of Safety Research* (Winter 1987, Vol. 18, No. 4, pp. 179-190) entitled *Characteristics of Work-Related Injuries Involving Forklift*

Trucks (Ex. 8-6). This article contained an analysis of powered industrial truck injuries reported in two occupational injury databases—the National Electronic Injury Surveillance System (NEISS) and the Bureau of Labor Statistics' Supplementary Data System (SDS).

The NEISS database is composed of records from a national sample of 200

hospital emergency rooms and burn centers handling all types of injuries. The NEISS database was originally established by the Consumer Product Safety Commission, and its original intent was to gather data about accidents involving consumer products rather than industrial injuries. The hospital emergency rooms included in the sample were not necessarily those

located in industrial areas, predominantly treating industrial injuries and illnesses. The data from this sample are weighted to represent the nation in numbers and characteristics of traumatic injuries treated in emergency rooms and burn centers.

A subset of this database—the work-related injuries—is maintained by NIOSH. Because the NEISS database records only injuries treated in emergency rooms and burn centers, traumatic work injuries treated by private practitioners or by industry or private clinics are not included.

Moreover, chronic injuries, such as those caused by overexertion, are not as likely to be treated in emergency rooms as are acute traumatic injuries and, therefore, are probably under-represented in the NEISS database.

Other probable sources of error in calculating accident rates include misclassification of the sources of injury or the agent of injury. For example, if an employee fell from the elevated forks of a powered industrial truck, the accident could be misclassified as a fall from elevation rather than a fall from a forklift. Similarly, if an employee were struck in the head by part of a load that fell from a powered industrial truck, the accident could be classified as an

“employee struck by falling object” accident. In either case, the accident would have involved a powered industrial truck, but in neither case would it be classified as a powered industrial truck accident.

The Supplementary Data System (SDS) database is composed of workers’ compensation claims for injuries involving lost workdays. Thirty states provide information to the SDS system. The SDS system reports the occupations of injured workers and states where the claims are filed. The SDS includes only compensable injuries. The definition of a compensable injury varies from state to state. In some states, injuries are compensable, for example, if they result in one day or more away from work. In other states, the time away from work may be up to 7 days before the injury becomes compensable.

The SDS and NEISS data do not necessarily include the same injuries because injuries treated in emergency rooms do not always result in lost workdays. At the same time, compensable injuries included in the SDS may not have been treated in emergency rooms and thus would not be represented in NEISS. However, both of these databases represent the more serious injuries involving powered industrial trucks, that is, those requiring

treatment in emergency rooms and those that result in compensable injuries.

In 1983, the SDS system identified 13,417 workers’ compensation claims for lost-workday injuries involving powered industrial trucks. Assuming that the 30 states in the SDS system are representative of and proportional in population to the whole country (50 states), approximately 22,400 compensation claims ($\frac{5}{3} \times 13,417$) are filed nationally for lost-workday injuries involving powered industrial trucks. This number is comparable to the estimated 24,000 forklift-related injuries that were treated in U.S. emergency rooms in 1983 as reported by NIOSH from information gathered by the NEISS system. In 1985, the NEISS system reported a total of approximately 34,000 powered industrial truck-related accidents that were treated in emergency rooms. This reflects an increase in the number of such accidents reported by NEISS studies of about 39% over the three-year period from 1983 to 1985.

The SDS report also contained a tabulation of the occupations of the injured workers. The breakdown of the occupations of those employees and the corresponding percentage of accidents are listed in Table 2.

TABLE 2.—PERCENTAGE DISTRIBUTION OF POWERED INDUSTRIAL TRUCK INJURIES BY OCCUPATION OF INJURED EMPLOYEE

Occupation	Percentage
Professional, technical, and kindred workers	0.3
Managers and administrators (except farm)	2.0
Sales workers	0.8
Clerical and kindred workers	5.0
Craftsmen and kindred workers	(15.5)
Mechanics	6.5
Foremen	3.0
Other craftsmen and kindred workers	6.0
Operatives (except transportation)	(17.5)
Assemblers	1.4
Packers/wrappers	1.1
Welders	0.9
Miscellaneous/unspecified operatives	9.2
Other operatives	4.9
Transportation equipment operatives	(20.8)
Powered industrial truck operators	12.3
Truck drivers	5.5
Motor men	1.7
Deliverymen	1.2
Other transportation equipment operators	0.1
Laborers (except farm)	(33.9)
Warehousemen	10.4
Freight and material handlers	7.3
Stock handlers	4.4
Construction laborers	2.2
Miscellaneous/unspecified laborers	8.0
Other laborers	1.6
Farmers (managers and laborers)	1.5
Service workers	1.8
Occupation Unspecified	1.1

Source: Characteristics of Work-Related Injuries Involving Forklift Trucks, Journal of Safety Research, Vol. 18, No. 4, Winter 1987, pp. 179-190.

3. Industrial Forklift Truck Fatalities—
A Summary
OSHA's Office of Data Analysis
(ODA) examined 53 investigative case

files involving powered industrial truck fatalities that occurred between 1980 and 1986 (Ex. 3-7). The results of ODA's analysis are summarized in Table 3,

below. Note: the columns do not always add to 100 percent in various tables because of rounding.

TABLE 3. OFFICE OF DATA ANALYSIS—TYPE ACCIDENTS, 53 POWERED INDUSTRIAL TRUCK FATALITIES

Type Accident	Number	Percent
Crushed by tipping vehicle	22	42
Crushed between vehicle and surface	13	25
Crushed between two vehicles	6	11
Struck or run over by vehicle	5	10
Struck by falling material	4	8
Fall from platform on forks	2	4
Accidental activation of controls	1	2

Source: *Industrial Forklift Truck Fatalities—A Summary*, Report from Office of Data Analysis, Office of Statistics, OSHA, Dated June 1990.

The single largest cause of accidents was vehicle tipovers (percentages attributed to specific causes may not track those in Table 3 because a single specific cause—tipover—may be classified under more than one accident type in that table). These tipovers were attributed to the following: (1) The vehicle was out of control (speeding, elevated loads, mechanical problems, etc.; 7 instances—13 percent); (2) the vehicle was run off/over the edge of the surface (4 instances—8 percent); (3) the operator attempted to make too sharp a turn (excessive speed, unbalanced load, etc.; 4 instances—8 percent); (4) an employee jumped from an overturning vehicle being pulled by another vehicle (2 instances—4 percent); (5) the vehicle skidded or slipped on a slippery surface (2 instances—4 percent); (6) the wheels on one side of the vehicle ran over a raised surface or object (2 instances—4 percent); and (7) the vehicle tipped over when struck by another vehicle (1 instance—2 percent).

The second highest number of fatalities reported in the ODA study resulted from accidents when employees were crushed between a vehicle and a surface. These accidents were attributed to the following: (1) The operator got off the vehicle while it was running (7 instances—13 percent); (2) a worker on a platform was crushed between the platform and an overhead surface (2 instances—4 percent); (3) an employee's leg was caught when a vehicle sideswiped a metal surface (1 instance—2 percent); (4) an employee attempted to prevent a vehicle tipover by holding up the overhead guard (1 instance—2 percent); (5) an employee changed a tire and the vehicle fell from the jack (1 instance—2 percent); and (6) an empty 55 gallon drum used to support the vehicle during maintenance collapsed (1 instance—2 percent).

Four of the six accidents where employees were crushed between two vehicles were caused by contact between two moving powered industrial trucks, and the other two involved contact between a powered industrial truck and a stationary vehicle.

Of the five accidents that were identified as being caused by an employee being struck or run over by a vehicle, four were accidents where employees other than the vehicle operator were struck by the vehicle. The remaining one involved an operator trying unsuccessfully to board a free rolling vehicle.

4. Selected Occupational Fatalities Related to Marine Cargo Handling as Found in Reports of OSHA Fatality/Catastrophe Investigations

In 1992, the OSHA Office of Data Analysis (ODA) published a study of fatalities and catastrophes that had occurred in the marine terminal industry (SIC 4491, Marine Cargo Handling) between the years 1975 and 1984. This report is entitled *Selected Occupational Fatalities Related to Marine Cargo Handling as Found in Reports of OSHA Fatalities/Catastrophe Investigations* (Ex. 27). This report contains an analysis of the causes of and other information about 141 accidents that resulted in 165 fatalities that occurred during the period of the report. Of those accidents, 19 (11.5 percent) were attributed to the unsafe use of powered industrial trucks.

5. The OSHA Fatality/Catastrophe Reports

OSHA records a summary of investigation results of accidents resulting in fatalities, catastrophes, amputations, and hospitalizations of two or more days, and those accidents that have received significant publicity or involved extensive property damage.

These summaries are recorded on an OSHA Form 170 and include an abstract describing the activities taking place at the time of each accident and the causes of the accident. These reports are stored in a computerized database system, and cover inspection data from 1984 to 1991. There were 4268 reports of accidents in the system that resulted in 3038 fatalities, 3244 serious injuries, and 1413 "non-serious" injuries (many of the accidents resulted in multiple fatalities and/or injuries).

OSHA queried the database for all reports that contained the keyword "industrial truck." This produced a printout of 208 accidents (Ex. 8-8). These 208 accidents resulted in 147 fatalities, 115 serious injuries, and 34 "non-serious" injuries.

By adding the number of fatalities, serious injuries, and "non-serious" injuries and dividing that sum by the number of accidents, OSHA determined that 1.4 injuries of some nature occurred per serious accident reported. OSHA also determined that 4.8 percent of the fatalities, 3.5 percent of the serious injuries, and 2.4 percent of the "non-serious" injuries were attributable to an accident that involved a powered industrial truck.

These percentages are derived by dividing truck-related fatalities, serious injuries, and other injuries by the corresponding total number of reported fatalities, serious injuries, and other injuries. For example, the 147 forklift fatalities were divided by the 3038 total fatalities to arrive at the 4.8 percent figure.

OSHA examined the OSHA Form 170s to determine the causes of the accidents that were attributable to the use of powered industrial trucks. Table 4 is a compilation of the causes of these accidents.

TABLE 4.—CAUSES OF ACCIDENTS¹: OSHA INVESTIGATION SUMMARIES (OSHA 170s)

Cause	Number of reports
No training ²	19
Improper equipment	10
Overturn	53
Unstable load	45
Overload, improper use	15
Obstructed view	10
Carrying excess passenger	8
Operator inattention	59
Falling from platform or curb	9
Falling from trailer	6
Elevated employees	26
Operator struck by load	37
Other employee struck by load	8
Accident during maintenance	14
Vehicle left in gear	6
Speeding	5
Not powered industrial truck accident	9

¹The causes of the accidents were determined by the narrative in the accident report. In most cases, the narrative emphasized the cause of the accident; however, in a few cases, reasonable and appropriate assumptions were made. In some cases, multiple accident causes were described in the narrative portion of the report, or were assumed to have caused the accident. (See Ex. 8-8.) Note that some of the accidents that were originally attributed to powered industrial truck operations were, on review, determined not to be caused by truck operations and are reflected in the final row of the table.

²Of the 19 instances when the report contained an indication that a lack of training was one of the causal factors of the accident, citations were issued for 6 serious violations, and 2 non-serious violations. In 11 instances, no violation was issued.

Source: Office of Electrical/Electronic and Mechanical Engineering Safety Standards, Directorate of Safety Standards Programs, OSHA.

It should be noted that many of the accidents could have been caused by improper training. For example, when a vehicle tipped over, an employee might have been transporting an unbalanced load because that employee had not been trained about load balance.

Using the OSHA Form 170 data, OSHA also compiled a listing of the industries in which these accidents occurred. Table 5 provides list of industries, and the number of accidents that occurred in those industries. (For a complete listing of the individual industries, see Ex. 3-9.)

TABLE 5—INDUSTRIES WHERE ACCIDENTS OCCURRED, OSHA INVESTIGATIVE SUMMARY REPORTS (OSHA FORM 170)

SIC division	Industry description	Times cited
B	Oil and Gas Extraction	4

TABLE 5—INDUSTRIES WHERE ACCIDENTS OCCURRED, OSHA INVESTIGATIVE SUMMARY REPORTS (OSHA FORM 170)—Continued

SIC division	Industry description	Times cited
C	Construction	25
D	Manufacturing	95
E	Transportation, Communication, and Utilities.	22
F	Wholesale Trades	25
G	Retail Trades	18
I	Services	7
J	Public Administration	4

Note: The breakdown of accidents does not include agricultural accidents because establishments of 10 or fewer employees in that industry are exempt from OSHA jurisdiction.

Source: Office of Electrical/Electronic and Mechanical Engineering Safety Standards, Directorate of Safety Standards Programs, OSHA.

6. OSHA Emergency Communications System Reports

OSHA has another internal system for collecting information about serious accidents. This system requires that serious and/or significant accidents be reported to the National Office over the telephone.

This telephone system is part of the OSHA emergency communications system. Regional Administrators are required to file a first report of fatalities, catastrophes, and other important events (such as those that receive significant publicity) with the National Office. The information contained in these reports is disseminated to responsible officials in OSHA. The National Office receives approximately 1200 reports yearly. (See Ex. 8-10.)

None of the reports is screened before the OSHA National Office receives them. Although these reports are not considered statistically significant for the purpose of calculating the total number of serious workplace accidents, OSHA believes that they represent a reasonable sampling of the most serious type of accidents and that the causes of the accidents closely parallel the distribution of the causes of all accidents.

OSHA has examined the First Report of Serious Injury reports for the years 1980-1991 and has identified 247 that involved powered industrial trucks. Table 6 lists the number of reports received each year, the number of those accidents that involved powered industrial trucks (PITs), and the corresponding percentages.

TABLE 6.—YEARLY SUMMARY OF FIRST REPORTS OF SERIOUS ACCIDENTS

Year	Total reports	PIT accidents	Percentage
1980	200	2	1
1981	125	2	1.6
1982	113	0	0
1983	115	3	2.6
1984	181	1	.6
1985	456	15	3.3
1986	1,147	44	3.8
1987	1,236	38	3.1
1988	1,330	47	3.5
1989	1,150	44	3.8
1990	1,105	41	3.7
1991	1,215	10	4.7
Totals ²	6,424	247	3.6

¹These are the number of reports received between the first of the year and March 31.

²The total number of reports, the number of accidents involving powered industrial trucks and the percentage were calculated using the figures from 1985 to 1990. The number of accidents reported during the period 1980 through 1984 and those reported during 1991 were too few to be representative.

Source: Office of Electrical/Electronic and Mechanical Engineering Safety Standards, Directorate of Safety Standards Programs, OSHA.

Each of the reports involving powered industrial trucks was examined to determine the causes of the accidents. In some instances, multiple causes were identified. Table 7 lists the number of the accidents that were attributable in whole or in part to each cause.

TABLE 7.—CAUSES OF ACCIDENTS (POWERED INDUSTRIAL TRUCKS) FIRST REPORTS OF SERIOUS ACCIDENT

Cause of the accident	Number of accidents
Tipover	58
Struck by powered industrial truck	43
Struck by falling load	33
Elevated employee on truck	28
Ran off loading dock or other surface	16
Improper maintenance procedures	14
Lost control of truck	10
Truck struck material	10
Employee overcome by carbon monoxide or propane fuel	10
Faulty powered industrial truck	7
Unloading unchoked trailer	7
Employee fell from vehicle	7
Improper use of vehicle	6
Electrocutions	2

Source: Office of Electrical/Electronic and Mechanical Engineering Safety Standards, Directorate of Safety Standards Programs, OSHA.

7. OSHA General Duty Clause Citation Analysis

OSHA's Office of Mechanical Engineering Safety Standards analyzed the citations that were issued between 1979 and 1984 for violations of the general duty clause [section 5(a)(1) of the OSH Act]. During that period, there were 3637 inspections that resulted in the issuance of at least one such citation. (See Ex. 8-11.)

Sixty-five general duty clause citations involved powered industrial truck operation. These citations were issued under the general duty clause because the dangerous condition did not appear to be covered by a specific requirement in Section 1910.178. Each was examined to determine the nature of the violation. Table 8 lists the type and number of violations that were cited.

TABLE 8.—SUMMARY OF GENERAL DUTY CLAUSE CITATIONS

Violation	Number of instances
Employee elevated on forks of vehicle	44
Improper operation of vehicle	13
Improper maintenance of vehicle	5
No vehicle operator training	2
Order picker without fall protection	1

Source: Office of Electrical/Electronic and Mechanical Engineering Safety Standards, Directorate of Safety Standards Programs, OSHA.

B. Studies Measuring the Effectiveness of Powered Industrial Truck Safety Training Programs

In 1984, H. Harvey Cohen and Roger C. Jensen, working under contract with the National Institute for Occupational Safety and Health (NIOSH), published an article in the Journal of Safety Research (Fall 1984, Vol. 15, No. 3, pp. 125-135) entitled *Measuring the Effectiveness of an Industrial Lift Truck Safety Training Program* (Ex. 3-5). The authors analyzed two studies undertaken to measure objectively the effects of safety training on powered industrial truck operators' driving performance and safety practices.

This article detailed the results of an experiment that was conducted to evaluate powered industrial truck operator training using a work sampling procedure to obtain objective data about work practices that correlate with injury risk. Two separate studies were conducted in this experiment, one at each of two similar warehouses. These studies were conducted to assess the value of training and the influence of post-training actions on workers' safety performance. These studies demonstrate that training powered industrial truck operators reduced the operators' error rates (number of unsuccessful operations divided by the total number of operations) and that training combined with feedback further reduced error rates.

The studies were conducted at different warehouses using similar training techniques. The training emphasized those operator driving behaviors that were measurable, frequently observed, capable of being reliably observed, related to frequent accident occurrence, and amenable to corrective action through training. Fourteen driving behaviors were evaluated in these studies. Positive reinforcement during the training (use of praise rather than criticism) was used with some trainees to measure its effectiveness. The experiment was conducted in four phases:

- (1) The pre-training phase, during which none of the operators had been trained;
- (2) The post-training 1 phase, during which the control group remained untrained, the training group (called the treatment group in the study) had been trained, and the training-plus-feedback group had been trained and had also received performance feedback;
- (3) The post-training 2 phase, during which all three groups had been trained but only the training-plus-feedback group had received performance feedback; and
- (4) The retention phase, which started three months after the end of the post-training 2 phase (and the end of the feedback program).

TABLE 9.—SUMMARY OF MEAN ERROR RATES¹
[Warehouse 1]

Group	Pre-training	Post-training 1	Post-training 2	Retention
Control .....	.34	.32	.23	.....
Training .....	.33	.27	.26	.....
Training + Feedback .....	.35	.27	.25	.....
All Operators After Training .....	.34	.27	.25	.19

¹ The mean error rate is defined in the study as the number of incorrect behaviors observed divided by the total number of behaviors observed.

Note: The mean error rate for all operators began at .34, that is, for 34 percent of the observed behaviors, the tasks observed and evaluated were performed improperly.

Source: Measuring the Effectiveness of Industrial Lift Truck Safety Training Program, Journal of Safety Research, Vol. 15, No. 3, Fall 1984, pp. 125-135.

Following the initial training (post-training 1), all three groups showed a decrease in their mean error rates, with the training-plus-feedback group showing the largest decrease (from .35 to .27, a 23 percent decrease), followed by the training-only group (from .33 to .27, an 18 percent decrease), and the control group (from .34 to .32, a 6 percent decrease). The control group's reduction in error rate from the pre-training to the post-training 1 phase of

the study was attributed to the influence of peer modeling, i.e., the untrained control group operators were copying the behavior of their trained counterparts. Toward the end of the post-training 1 phase, the error rates of the three groups converged, suggesting that the effects of the training program had begun to wear off. Observers also noted that some behaviors were being compromised when employees with different knowledge levels were

required to interact, particularly in conflict-avoidance situations such as signaling and yielding at blind intersections.

During the post-training 2 phase of the study, all groups' performance improved. The control group's performance improved by 28 percent (from a mean error rate of .32 to .23), while the training group experienced a four percent improvement (from a mean error rate of .27 to .26) and the training-

plus-feedback group had a seven percent improvement (from .27 to .25). There was further evidence of a peer modeling effect because all three groups' performance continued to improve although no additional instruction was given.

The retention phase was conducted three months after the completion of the post-training 2 phase of the study to determine the longer term effects of the training. During this phase of the study, mean error rates were checked, as they were during the other phases of the study. The results of this phase of the study indicate a further improvement in the operators' performance, with the mean error rate decreasing from .25 to .19, a 24 percent improvement in performance. The total performance gain achieved during this study was a 44 percent improvement from the pre-training (baseline) phase through the retention phase (from a mean error rate of .34 to a final error rate of .19). These data indicate that there were significantly fewer errors at each successive phase of the study.

The second study was conducted to verify and extend the findings of the first study. A modified experimental design was used to eliminate the mitigating influence of the untrained control group. In the second study, all operators were trained at the same time and all received performance feedback. Comparisons were made only before and after training. The study was divided into three phases: pre-training; post-training; and retention. The retention phase of the study was again conducted three months after the conclusion of the prior phase.

TABLE 10.—SUMMARY OF MEAN ERROR RATES—WAREHOUSE 2

Pre-training	Post-training	Retention
.23	.09	.07

Source: Measuring the Effectiveness of Industrial Lift Truck Safety Training Program, Journal of Safety Research, Vol. 15, No. 3, Fall 1984, pp. 125-135.

After the vehicle operators were trained, they experienced a 61 percent improvement in performance scores (from an error rate of .23 to .09). During the retention phase of the study, there was a further reduction of 22 percent in mean error rates (from .09 to .07 mean error rate). The overall improvement in mean error rates between the pre-training error rate (.23) and that achieved during the retention phase (.07) was a reduction of 70 percent.

Not all errors cause accidents; however, most accidents are caused by one or more errors. The final rule is

intended to minimize operator errors. The studies show that better training reduces operator errors. OSHA, the authors of the studies described in the preamble, and other experts believe that accidents will be reduced by about the same percentage as the reduction in the error rate. The studies that OSHA has used are among the best available for cause and effect.

V. Basis for Agency Action

OSHA concludes that, as the above discussion indicates, there are sufficient data and information on which to base a revision of the existing standard for powered industrial truck operator training. The data indicate that a substantial number of fatalities and injuries result from industrial truck accidents in all industries. Studies indicate that better training would substantially reduce the number of accidents that result in fatalities and serious injuries.

OSHA concludes that adherence to these new powered industrial truck operator training requirements will prevent 11 fatalities and 9422 injuries annually that result from accidents involving powered industrial trucks. (See also the analysis of benefits in the Final Economic Analysis section and the analysis of substantial reduction of significant risk in the Statutory Considerations section, below.)

OSHA further concludes that this improved operator training standard is needed to reduce powered industrial truck injuries and fatalities in maritime (including shipyards, marine terminals, and longshoring), construction, and general industry. As noted above, OSHA's Office of Data Analysis found that about 11.5 percent of the fatalities that occurred in marine terminals between 1975 and 1984 were attributable to the use of powered industrial trucks. Additionally, an OSHA-sponsored contractor study found that 28.1 percent of the fatalities that occurred in the marine cargo handling industries were forklift-related. This is much higher than the percentage of such fatalities occurring in general industry. Clearly, these numbers indicate the need to ensure better powered industrial truck operator training in the marine cargo handling industries covered by this final standard. OSHA has not specifically analyzed truck-related fatalities in the shipyard industry, but believes that the accident experience in shipyards is likely to be similar to that in manufacturing.

In the study of the OSHA Fatality/Catastrophe reports that was previously discussed, 25 of the 208 accidents

(about 12 percent) that were reported on the OSHA Form 170 occurred in the construction industry. OSHA has determined that there are approximately 46,456 powered industrial trucks in use in construction. This is less than 5 percent of the total 998,671 powered industrial trucks in use. Although the number of powered industrial trucks in use in the construction industry is less than 5 percent of the total number of such vehicles, accidents involving them account for about 12 percent of the total number of construction accidents reported on the OSHA Form 170.

In addition, OSHA's Final Economic Analysis estimates that there were, on average, 16 powered industrial truck related fatalities and 2,380 injuries per year in the construction industry. This also indicates that fatality and injury rates are higher per truck user in the construction industry than in general industry. Accordingly, OSHA concludes that these high accident rates justify covering the construction industry with a better training standard. (See also the discussion of scope, below.)

Many actions taken by other organizations also point to the need to address the hazards posed by unsafe operation of powered industrial trucks: the voluntary consensus standard on this subject has been updated several times since OSHA adopted 29 CFR 1910.178 in 1971; OSHA has been petitioned to improve the requirements for industrial truck training; the Advisory Committee on Construction Safety and Health has recommended improving the standard; and resolutions have been introduced in the Senate and House urging OSHA to revise its outdated powered industrial truck operator training standards.

VI. Training

Training provides a person with the necessary specialized instruction and practice to become proficient at a particular task. Training is the means by which an employer ensures that employees have the knowledge and skills they need to do their jobs correctly and safely. The alternative to formal training is learning by trial and error, an approach that results in an inadequate knowledge base and relies on mistakes (which often involve accidents, injuries, and near-miss incidents) for learning to occur. Reliance on this approach would create a greater chance of injuries and fatalities.

After employees have received initial training, acquired the basic knowledge, and perfected their operating skills, the employer may rely on refresher training to reinforce or improve the employee's

knowledge of the basic training material; to impart new information; to teach material in a new manner; or simply to maintain an acceptable level of awareness of workplace conditions, operating hazards, and truck-related characteristics.

There are several approaches to assembling the necessary materials and methods for an effective training program. One approach is to make use of existing literature and model programs already developed. Another approach is to look at problems that occur during ongoing operations and identify what an operator must know to avoid or otherwise minimize the potential for an accident due to those problems.

A third approach to developing a training program is to analyze the accidents that have occurred and develop a training program that will minimize the potential for a recurrence of the conditions that caused the accident. A problem with this third method of program development is that it is reactive rather than proactive, i.e., tends to emphasize the problems that have caused an accident (the training is in reaction to an accident). By contrast, proactive training teaches employees to prevent accidents rather than waiting for accidents to occur before recognizing the need for the training and determining what the scope and content of the training should be.

According to one hearing participant, a professional trainer (Tr. p. 129):

In principle we are in support of the proposed training rule. The key issue as we see it is that any prescribed training has to be both effective and efficient. Our viewpoint is that the need for prevention of accidents among lift truck operators is not arguable but we also believe that the current rule is ineffective. Additionally, our view is that the final rule must use what is at this time, common knowledge among the professional training community in the United States regarding effective and efficient training strategies. For the purpose of clarifying our testimony, we're defining operator training as instructional or other influence strategies used to help operators learn to change their on-truck behavior. We believe that effective training of operators is that which results in fewer injuries and fatalities. In that regard, the most important issue for the training rule to address in our viewpoint, is not to just require traditionally accepted training strategies but to require operator training strategies that actually transfer to the operating environment.

Another benefit of proactive training is that the person observing the worksite and the work being conducted to develop a training program for powered industrial truck operators may identify other problems in the workplace and

offer solutions to those problems. Identifying and resolving these other problems can reduce the total number and/or severity of accidents in the workplace, not only those related to powered industrial truck use but also those associated with other workplace activities. According to another hearing participant (Tr. p. 425):

Our processes include an evaluation of the facility and recommendations for improvement. We do not pass a problem within a company without trying to correct that problem before the training is implemented.

The training requirements in the final rule reflect all three approaches discussed above. They require training in specific topics unless a particular topic is not relevant to the types of vehicles or the employer's workplace. They require the training to address topics specific to the employer's workplace and to cover information learned from accidents or near-misses that have occurred in the employer's workplace. As discussed below, OSHA believes that this approach will result in operator training that is most effective in reducing truck-related deaths and injuries.

The topics OSHA requires to be covered in the training mandated by this standard can also be used to evaluate the effectiveness of a powered industrial truck operator's training. For example, an employer can use the list of required topics to determine what should be taught and then compare that with what is being taught. In this manner, employers can ensure that the training is appropriate for the types of trucks being used and the conditions in the workplace that affect the safe operation of those trucks.

Training comes in many forms. It may be as simple and informal as a supervisor discussing the correct way to operate a vehicle, correcting an error in the way an employee is doing a job, or showing an employee how to perform a particular task properly. Alternatively, training may consist of detailed, structured instruction using formal training methods (e.g., lectures, formal demonstrations, practical exercises, examinations, etc.). Formal training is usually used to provide trainees with a large amount of information. OSHA believes, and the record confirms, that a combination of training methods is most effective in training powered industrial truck operators.

For the most part, employees do not start out with the knowledge and skills they need to operate a powered industrial truck safely. Although many employees selected or assigned to

operate powered industrial trucks are licensed to drive automobiles, there are enough differences between these two types of vehicles and their operation to require additional knowledge and skills to operate a powered industrial truck safely. For example, industrial trucks, compared with cars, have limited forward visibility when carrying a large load, have rear wheel steering and front wheel drive, have different centers of gravity and balance, have different control configurations, and can carry heavy loads with the weight concentrated at one end of the vehicle. Employees need formal training and practice to gain the knowledge and to master the skills they need to safely operate powered industrial trucks with these characteristics.

Effective employee training and supervision also can lessen the frequency with which employees perform unsafe acts such as speeding, failing to look in the direction of travel, and failing to slow down or stop and sound the vehicle's horn at blind intersections and other areas where pedestrian traffic may not be observable. This, in turn, reduces the frequency and severity of accidents.

Another case where training can prevent accidents or lessen their severity is when powered industrial trucks travel with an elevated load. Effective operator training must emphasize that the operator moves the vehicle only when the load is at its lowest practical point. In addition, even if a sit-down rider truck operator fails to follow this practice and the vehicle tips over, both the chance and severity of injury are reduced if the operator is trained to stay with the vehicle and lean away from the direction of fall. When a sit-down rider truck tips over and the operator attempts to jump off the vehicle while it is tipping over, the operator is often crushed when struck by the overhead guard. In these cases, since the normal tendency is for a person to jump downward, the operator lands on the floor or ground in the path of the overhead guard, and receives a crushing injury to the head, neck, or back. Training an employee to stay with this type of vehicle and lean away from the direction of fall will reduce the severity of or eliminate these injuries.

On the other hand, when a stand-up rider truck tips over laterally, the operator must be trained to step off the vehicle toward the rear of the vehicle. The operator can safely do this because he/she is not moving in the direction in which the truck is falling, but rather is moving perpendicular to the direction of the vehicle's fall.

The studies conducted by Cohen and Jensen, discussed under *Studies of Accident and Injury Data and of Training Effectiveness* earlier in this preamble, found that training reduced operator error rates by as much as 70 percent. Although a 70 percent error rate reduction does not necessarily correspond with an equivalent reduction in the number of accidents that a given group of operators will experience, improper or unsafe operation of powered industrial trucks is clearly the major cause of accidents and their resultant fatalities and injuries. Therefore, reducing the number of unsafe acts that are committed when operating these trucks will reduce the number of accidents, fatalities, and injuries.

Proper employee training must take into account different operating conditions (including the type and size of the load, the type and condition of the surface on which the vehicle is being operated, and other factors that can adversely affect vehicle operation). Operator training must emphasize two points regarding potential accidents: (1) the employee must not engage in activities that will increase the potential for an accident to occur; and (2) the employee must take appropriate action to minimize the potential for injury to himself/herself or to other employees if an accident occurs.

OSHA's current powered industrial truck training standard (codified at 1910.178(l)), has a very general training requirement. It states:

Only trained and authorized operators shall be permitted to operate a powered industrial truck. Methods shall be devised to train operators in the safe operation of powered industrial trucks.

As discussed above, this provision has not been adequate to reduce the large number of fatalities, accidents, and injuries caused by untrained or poorly trained operators. Consequently, OSHA proposed more extensive training requirements to improve operator training (60 FR 13782, March 14, 1995, and 61 FR 3094, January 30, 1996).

There were 64 commenters who discussed the need for training powered industrial truck operators (Exs. 7-1, 7-5, 7-8, 7-10, 7-19, 7-22, 7-28, 7-29, 7-31, 7-32, 7-34, 7-36, 7-38, 7-39, 7-40, 7-43, 7-45, 7-46, 7-47, 7-48, 7-49, 7-50, 7-51, 7-59, 7-66, 7-67, 7-69, 7-71, 11-1, 11-2, 11-6, 11-12, 11-13, 11-15, 11-17, 11-18, 11-19, 11-22, 11-25, 11-27, 11-29, 11-31, 11-35, 11-36, 11-40, 11-41, 11-44, and 11-46; Tr. Pp. 22-24, 27-29, 35 and 44, 49, 62, 75, 94, 129 and 143, 172, 196, 306, 331, 340, 383, 398, 416, 443). The great majority of

these commenters agreed on the need to train powered industrial truck operators.

For example, one commenter (Ex. 7-66) stated:

The WGMA [West Gulf Maritime Association] supports operator skill and safety training for powered industrial truck operations. We have for years had operator training and certification requirements for certain equipment. These requirements are part of our collective bargaining agreement between management and labor.

A second commenter (Ex. 11-2) stated:

AGC [Associated General Contractors] believes that worker training is the key to worker protection and AGC commends OSHA for its recent emphasis on powered industrial truck operator training.

A third commenter (Ex. 7-34) said:

In general, Dow agrees with OSHA that there are risks associated with the operation of powered industrial trucks and that those persons operating them must be knowledgeable and skilled prior to being authorized to operate the vehicle. Dow believes that the training its people receive on these vehicles has been adequate. As a result, comments will focus on retaining the performance language in this training so that we can continue the success we have had thus far.

One commenter (Ex. 7-48), however, expressly disagreed that there is a need for OSHA to issue a standard for training powered industrial truck operators. It stated:

Overall, UPS [United Parcel Service] questions the need for a standard regulating the training of powered industrial truck operators. UPS has never experienced a noteworthy amount of workplace accidents involving powered industrial trucks. We do not expect that implementation of this type of standard will reduce the already low number of accidents in this category. This proposed standard would substantially increase costs to employers without a corresponding reduction in injuries, providing little justification for its implementation. As such, UPS cannot support the promulgation of this standard.

Many commenters generally supported OSHA's proposal to make the training requirements more explicit. For example, one commenter (Ex. 7-29) stated:

UTC [United Technologies Corporation] agrees with OSHA's stated purpose "to amend the current powered industrial truck operator training requirements for general industry and to adopt the same requirements for the maritime industries", which will eliminate redundant standards for separate industries. In addition, UTC approves of OSHA's approach in mandating "the development of a training program that would base the amount, type, degree and sufficiency of training on the knowledge and the skills and abilities that are necessary to

safely operate the truck" rather than mandating specific universal training requirements that would not take into consideration the variety of truck, necessary operator knowledge and training levels, and operating situations.

Overall, OSHA's proposed changes to the original 1971 powered industrial truck standard are reasonable and provide a sound basis for enhancing the safe operation of powered industrial trucks in the workplace while allowing a maximum of flexibility in the methods employers may select for implementation.

A second commenter (Ex. 7-31) stated:

As an association, we [American Warehouse Association] have urged our members to adopt training programs. One member reports that although one-third of the accidents in the warehouse were lift truck-related, one-half of the costs associated with accidents were lift truck related. Although this example is just a snapshot of the industry, this anecdotal information confirms that proper training is in the best interests of our industry.

It is appropriate to consider revising the existing OSHA regulations. A more defined standard will be of benefit to both employers and employees. However, as our comments will suggest, the revised standard need not be overwhelming or unnecessarily complex to achieve the desired result.

A third commenter (Ex. 7-36) stated:

API [American Petroleum Institute] generally supports the standard proposed by OSHA, with minor revisions, to replace the existing requirements under 29 CFR 1910.178(l) and to be added as new requirements under 29 CFR 1915.120, 1917.43, and 1918.77, provided the proposed standard remains performance oriented. Powered industrial trucks vary greatly in configuration and application, making operator training requirements very site specific. Accordingly, API supports OSHA's development of a flexible, performance based standard that will allow each facility to best address the specific training needs of operators at that location.

Finally, one commenter (Ex. 7-28) said:

NAWGA/IFDA appreciates the concerns that have led OSHA to propose this rule, and believes that benefits can flow to companies and their workers through the dissemination of guidance on appropriate training for employees who operate powered industrial trucks. While we have comments and suggestions regarding certain aspects of the proposal's requirements, our organization believes that many of the training elements noted in the rule are appropriate topics to be covered in the instruction provided to powered industrial truck operators.

Some commenters opposed changing OSHA's existing training requirement (Exs. 7-1, 7-5, 7-6, 7-8, 7-19, 7-20, 7-22, 7-27, 7-28, 7-33, 7-34, 7-38, 7-40, 7-69, 11-7, 11-15, 11-16, 11-20, 11-23, 11-35, 11-42, Tr. pp. 121, 151, 246).

One reason given for not changing the existing requirement is that it is written in general language and therefore allows employers complete freedom to tailor their powered industrial truck operator training program. These commenters generally stated that they already conduct the appropriate operator training. For example, one commenter (Ex. 7-8) stated:

The proposed training requirements that would mandate the development of a training program that would base the amount, type, degree and sufficiency of training on the knowledge of the trainee and the ability of the vehicle operator to acquire, retain and use the knowledge and skills and abilities that are necessary to safely operate the truck would require quite a bit of additional time and categories of paperwork and would be, in many instances very subjective and difficult to document. The basic requirements that presently exist are quite sufficient and any safety professional worth their salt is going to look at the things you are proposing anyway.

Some of these commenters also suggested that the proposed standard, if adopted, would create too structured a program and would be overly burdensome to the employer. For example, one commenter (Ex. 7-19) stated:

Current regulations, 29 CFR 1910.178, have provided Mobil and other companies like Mobil sufficient direction and discretion to develop and implement effective training processes for its powered industrial truck operators. Mobil is concerned that the more detailed nature of these proposed regulations will require costly changes to currently effective training processes.

Other commenters stated that OSHA's proposed training requirements were appropriate and not overly burdensome. For example, one commenter (Tr. p. 418) stated:

I * * * commend your efforts and give you my profound support. Your proposed rules were well researched and, if passed into law, will assist industry leaders by providing the needed guidelines to develop, implement and follow up their operator training programs * * *

From our company's conception in 1987, it was apparent that our present occupational safety at 1910.178 Code of Regulations for material handling and storage did, in fact, supply some foundation for training materials content, but did not supply enough direction to allow the meeting of the minds within a single company.

Although there was a starting point, technical advances have caused tremendous pressures on our industries, manufacturers, as well as the end user.

New problems were identified as a result of these advances that never had to be addressed in the past. Professionally, I believe that the proposed rules are on target and will prove to be a sufficient step forward

in providing guidelines and benchmarks for industries.

Another commenter (Ex. 7-17) stated:

I also believe that inadequate operator training and supervision are the cause of the great majority of industrial truck accidents. Your proposed rule change therefore not only has the potential to substantially reduce the number of fatalities and serious accidents that occur each year; it also has the potential to reduce the large number of unreported accidents and near-misses that occur every day. It is a step in the right direction that should be applauded.

Several representatives of the longshoring and marine terminals industries, however, opposed the proposed rule (Exs. 7-43, 7-46, 7-63, 11-7, 11-20, 11-42, Tr. p. 246). These commenters contended that they already have regulations that cover powered industrial truck operator training (§§ 1917.27(a) and 1918.98(a) respectively) and that those regulations have served their industry well. Indeed, one commenter claimed that there were few powered industrial truck injuries or fatalities in the industry. (See Tr. p. 248.) According to this commenter:

Again, there is no proof of a significant risk to injury to employees to warrant this additional training regulation in our industry. We've heard some raw data quoted yesterday. This is all dependent on the number of truck hours and the amount of exposure the employees have, personal injury and property damage. Our people are exposed to this every day and our record is not that bad.

Another commenter from this industry stated (Tr. p. 248):

The PMA [Pacific Maritime Association] conducts forklift training based on ASME B56.1 to provide skilled operators for employers to meet the requirements of § 1917.27(a) and § 1917.97(a). This program has served the industry well. Also, on-the-job training is a tradition on the waterfront and qualification by experience and training have proved to be effective.

On the other hand, several witnesses at the hearing testified about powered industrial truck accidents that resulted in deaths and serious injuries in the marine cargo-handling industry. They supported OSHA's proposal to improve training for operators in this sector.

For example, one commenter (Tr. p. 437) stated:

One of the port authorities in the U.S. contracted [with] me to conduct training for the stevedoring and the ILA on the east coast.

We conducted a three-day training program and we had a 54 percent failure factor on basic knowledge.

Another hearing participant (Tr. p. 393) reported:

In fact, last year I investigated a death on a stevedoring area where a supervisor was

driving a lift truck with no training that ran over an employee on a shipping dock.

It is clear to OSHA that powered industrial truck accidents are a major cause of injuries and deaths in the marine cargo handling industry. An OSHA contractor that studied fatality reports for the period 1991-1993 collected by the National Institute for Occupational Safety and Health for the Census of Fatal Occupational Injuries Program determined the number of fatal and serious injury accidents reported during the period of study (Ex. 38). According to this study the longshoring and marine terminal industries experienced a percentage of powered industrial truck accidents that was 10 times greater than the second highest industry (28.1 percent of all fatal accidents in the maritime industries compared with 2.8 percent in the second-ranked industry). An OSHA study of fatalities in the marine cargo handling industry indicated that 19 of 165 fatalities that occurred between 1975 and 1984 were attributable to the improper operation of powered industrial trucks. (See section IV. A. 4 above.)

Based on this information and other evidence discussed elsewhere in this preamble, OSHA concludes that powered industrial truck accidents are a major cause of serious injuries and deaths in the marine cargo handling industry. OSHA further concludes that the Agency's current training requirements do not sufficiently protect employees in that industry from death and serious injury from powered industrial truck accidents, and that it is necessary to issue these training requirements to protect those employees from a significant risk of injury and death.

There are a number of additional responses to those commenters in all industries who recommended that OSHA retain the present, very general, training requirements. First, the statistics demonstrate a high level of accidents, injuries, and deaths resulting from improper powered industrial truck operation in all industries. (See the discussion at part IV.A. above.) The Agency's existing training requirements have not worked well enough to reduce those injury rates.

However, without the existing requirements, rates would likely have been much higher. The studies demonstrate that trained operators make fewer errors. The FEA points out that a percentage of current operators are trained. Therefore, it is reasonable to conclude that the existing general training requirement has resulted in the

training of a percentage of the operators and without this existing training there would be more errors and, therefore, more accidents. The new standard will increase the number of trained operators and the quality of the training, further reducing accidents.

Second, the existing requirement is so general that employers may believe that they have fulfilled their obligation by providing very little effective training. Third, the existing provisions provide very little guidance on what training is necessary and effective. Fourth, as discussed above, studies are available that show that effective training will reduce accidents (Ex. 38). Finally, many commenters told OSHA that their experience demonstrates that better training will reduce fatalities and injuries, and some provided examples of how their training programs (similar to the program required by the final rule) had reduced accidents.

The revised training provisions require the employer to develop a training program based on the general principles of safe truck operation, on the type of vehicle(s) being used in the workplace, the hazards of the workplace created by the use of the vehicle(s), and the general safety requirements of the OSHA standard. OSHA is not specifying the time that must be spent on the training or the exact methods that must be used to train operators. OSHA is, however, requiring that trained operators know how to do the job properly and do it safely, as demonstrated by workplace evaluations at the time of initial and refresher training and at periodic intervals (at least once every three years). This approach gives employers the flexibility to develop training programs appropriate to their workplace and avoids unnecessary specification. Thus, this final standard will be both performance-oriented and effective.

VII. The Issues

In the January 30, 1996, **Federal Register** notices, 61 FR 3092 and 3094, OSHA asked for comment on four specific issues as well as any other relevant issues. These four issues were developed by OSHA after input from the Advisory Committee on Construction Safety and Health (ACCSH). The following is a restatement of each issue, a summary of the comments and hearing testimony received, and the Agency's decision on each issue.

1. Should an employer be allowed to accept the certification of training by a third party such as a union, training institute, manufacturer, consultant, or other private or public organization? Since OSHA does not accredit certifiers,

what criteria should be used to establish their credibility?

OSHA specified in the proposals that all training must be conducted by a designated person. In those proposals, OSHA defined a designated person as one who has the requisite knowledge, training, and experience to train powered industrial truck operators and judge their competency. (See proposed § 1910.178(l)(2)(iii) and the corresponding provisions of the other proposed standards.)⁴ OSHA did not, however, specify that the training must be conducted by the employer, a supervisor, or any other particular person, but only that the training be conducted by a person who is qualified to do so.

There were 50 commenters who addressed this issue. (See Exs. 7-11, 7-15, 7-29, 7-38, 7-39, 7-48, 7-50, 7-51, 7-56, 7-64, 7-65, 7-70, 11-1, 11-3, 11-5, 11-6, 11-8, 11-9, 11-10, 11-15, 11-16, 11-18, 11-19, 11-24, 11-25, 11-28, 11-29, 11-31, 11-33, 11-34, 11-36, 11-37, 11-39, 11-40, 11-43, 11-46, Tr. pp. 20, 25-27, 52, 83, 92, 94, 104, 137, 153, 324, 333, 340-341, 384-386, 422.) These participants all agreed that trainers must have basic knowledge of training methods and/or powered industrial truck operations that enables them to conduct the training of these vehicle operators. There was, however, one comment (Ex. 7-11) that suggested specific requirements for a qualified trainer. This commenter stated:

* * * A competency standard for the "designated person" [should] be incorporated in the proposed rule change. Such a competency standard * * * could include, but would not be limited to:

1. Experienced and skilled in the safe and efficient operation of a powered industrial truck(s).
2. Is familiar with, comprehends, understands and employs applicable OSHA codes and all consensus standards as they apply to worker safety and economic impact on the employer.
3. Is skilled and practiced in the training of adults or has the ability, knowledge and desire to attain such skills.

Some commenters recommended that trainers be accredited by OSHA or have some other professional certification (see Exs. 7-29, 7-56, 7-64, 7-73, 11-5, 11-40, Tr. p. 326). One of these commenters (Ex. 11-5) stated:

The ASSE believes it is appropriate for OSHA and the ACCSH to create general qualification guidelines when establishing

⁴Throughout this preamble, OSHA uses the reference to the general industry standard, § 1910.178, when discussing this final rule. Because the provisions of the final rule also apply to construction, shipyards, marine terminals, and longshoring, the discussion applies equally to these other sections.

the criteria for lift truck trainers. However, we strongly recommend that OSHA not get into the business of "certifying" these trainers. The society believes that OSHA does not have the resources to undertake such an endeavor, and the private sector professional safety and health organizations have been certifying qualified safety and health professionals for decades. To have OSHA take on this responsibility would be equivalent to a "reinventing the wheel". Certified Safety Professionals (CSPs), as an example, could be recognized as a level of expertise appropriate to develop/implement this type of training.

OSHA has decided not to include trainer accreditation requirements in the final rule for several reasons. First, OSHA believes that the training criteria are sufficiently detailed so that employers and professional trainers who follow the criteria will provide adequate training. Second, a large number of trainers and individual employers (potentially in the tens of thousands) would need to be accredited, which would overwhelm OSHA's resources. Finally, many small businesses choose to conduct their own training, and requiring them to become accredited to do so would be unnecessarily burdensome.

Since the proposal, OSHA has changed the language of the final rule to clarify that the employer does not need to administer the training but may have it provided by an outside training provider. The employer may need to provide additional training on site-specific or truck-specific matters. OSHA believes that this clarification of the language of the final rule responds to the suggestions of ACCSH and the needs of the construction industry. In addition, as a style change the term "designated" has been omitted. Instead "person" is used followed by the same qualifications that had been required of "designated person."

2. What type of testing should be conducted during initial training to judge the trainee's competency (performance testing and oral and/or written tests)?

A. If tests are administered, what subjects should be tested, and what methods, if any, should be used to judge that the tests are reliable and address the subject matter adequately?

B. What, if any, should be the acceptable pass/fail requirement for the tests?

OSHA proposed that operators must successfully complete their training and be evaluated. OSHA believes that evaluation is an essential element of any training program. Evaluation provides a measure not only of the effectiveness of the training but also the trainees' ability to understand the need for and the

important elements of the training. Evaluation also allows the trainer to reemphasize the most important points of the training.

Most of the 32 participants who commented on this issue agreed that some evaluation is necessary when training is conducted. (See Exs. 11-1, 11-3, 11-5, 11-8, 11-10, 11-18, 11-19, 11-24, 11-25, 11-28, 11-30, 11-33, 11-34, 11-36, 11-37, 11-39, 11-40, 11-41, 11-46, Tr. pp. 21, 35, 53, 77, 99, 130, 202, 254, 309, 326, 342, 385, 400.) There was general agreement on the need to conduct written as well as practical testing during the training.

One commenter (Ex. 11-10), in response to the question about written and performance testing, stated:

API [American Petroleum Institute] feels that the current proposed language in paragraph (5)(i) of the general industry standard adequately addresses any concerns of testing during initial training. Specific requirements for how to test operators would take away the flexibility allowed by the currently proposed language, convert the rule to a specification standard, and greatly increase the information collection burden without necessarily improving the safety performance of operators.

The Advisory Committee on Construction Safety and Health (ACCSH) recommended that OSHA establish a pass/fail requirement for written tests. Some commenters stated that OSHA should specify a passing percentage (such as 70 to 85 percent correct answers)(see Exs. 7-52, 11-19). On the other hand, six commenters generally supported the need for the trainee to perform all the necessary procedures correctly during practical tests. (See Exs. 11-8 and 11-19, Tr. pp. 78, 132, 427, 434.) Their concerns were that if the trainee cannot operate the vehicle safely when that trainee knows that an evaluation is being conducted, there is no guarantee that the trainee will perform the operation correctly under less controlled circumstances. Other commenters stated that OSHA should leave the evaluation of the trainees' grasp of the classroom instruction to the trainer (Exs. 11-34, 11-36).

OSHA has concluded, as proposed, that the evaluation of the classroom part of the training should be left to the trainer. There are many ways to evaluate whether material has been learned, and this evaluation can be accomplished in a number of ways.

Consequently, OSHA has retained a performance-oriented approach that allows the employer to determine that the employee has successfully completed the training, including the classroom and practical training/

demonstration elements. The employer may demonstrate this for the classroom element based on evidence that the employee has successfully completed a written or oral test, or by other appropriate means, such as an evaluation by the instructor. OSHA agrees with these comments that successful completion of the practical training requires the trainee to perform all required operations safely.

OSHA concurs with those commenters who recognize the need for both more formal and practical testing and evaluation. If training is conducted without the means to evaluate its effectiveness, there is no way to ensure that the material was adequately presented, that the trainee understood the material, and that the trainee will use the training when operating the vehicle.

OSHA does not believe, however, that it is possible, given the variety of powered industrial trucks, workplace conditions, employee backgrounds, and types of effective training, to specify standardized tests or methods, or to specify passing grades. Although ACCSH did recommend that OSHA specify passing grades, OSHA believes that, by listing topics and requiring demonstrations of proficiency and triennial evaluations, the rule will achieve the goal envisioned by ACCSH for effective training.

3. Are some of the training areas listed not needed?

In developing this final rule, OSHA took its lead from the national consensus standard, ASME B56.1-1993, which contains a listing of those subject areas that the consensus committee felt were important for the trainee to know to successfully operate a powered industrial truck. These subjects were written in general terms so that the training program could be tailored to fit the employer's particular circumstances. The OSHA rule relies on ASME B56.1 and covers essentially the same subject areas.

There were 43 comments (Exs. 7-14, 7-16, 7-21, 7-22, 7-25, 7-28, 7-34, 7-39, 7-40, 7-47, 7-51, 7-53, 7-63, 7-64, 11-3, 11-5, 11-10, 11-11, 11-13, 11-15, 11-19, 11-25, 11-28, 11-29, 11-32, 11-33, 11-34, 11-36, 11-37, 11-38, 11-39, 11-43, 11-45, 11-46, 28, 29, 31, Tr. pp. 27, 40, 43, 79, 198, 255, 400) on the various subjects that were proposed and some additional subjects recommended by some commenters. These commenters, for the most part, supported the topics contained in OSHA's proposal.

For example, one commenter (Ex. 7-28) stated:

NAWGA/IFDA appreciates the concerns that have led OSHA to propose this rule, and believes that benefits can flow to companies and their workers through the dissemination of guidance on appropriate training for employees who operate powered industrial trucks. While we have comments and suggestions regarding certain aspects of the proposal's requirements, our organization believes that many of the training elements noted in the rule are appropriate topics to be covered in the instruction provided to powered industrial truck operators.

There were several suggestions for improving the language of the listed items. ACCSH suggested that most of the topics OSHA included were appropriate but urged OSHA to improve the wording that addresses the similarities to and differences from the automobile. In the final rule, OSHA has done so. (See discussion below.) OSHA has reviewed each comment and suggested change and has used those changes to improve the final rule, as discussed below.

4. Should an employee receive refresher or remedial training only if operating a vehicle unsafely or if involved in an accident? Is a one-year interval too frequent for retraining or recertification?

In the proposals that OSHA published in the **Federal Register** on March 14, 1995 and January 30, 1996, the Agency proposed that the employer conduct an evaluation of each powered industrial truck operator's performance at least annually to ensure the operator's continued safe operation of the vehicle(s) in the workplace. However, OSHA did not specify a fixed period for refresher training and evaluation but instead proposed that refresher training be provided when there is reason to believe that there has been unsafe operation, when an accident or near miss occurs, when an evaluation indicates that the operator is not capable of performing the assigned duties, or when a new type of truck has been introduced into the workplace.

Some commenters opposed the requirement for refresher training and evaluation unless there was documented evidence of employee misconduct or the training/evaluation was provided at a set interval. (See Exs. 7-13, 7-16, 7-20, 7-45, and 7-58.) Other commenters suggested that OSHA require refresher training on a regular basis, for example at three year intervals. For example, one commenter (Ex. 7-16) stated:

Refresher training should have an established time frame to ensure operators will be given up-to-date information on safe powered industrial truck operation. This supports the goal of OSHA to prevent the first accident and not serve as the source of

consolation for the first victim. Refresher training should be required at least every three years, and sooner if there is just cause, as set forth by the proposed revision.

ACCSH commented that yearly retraining and evaluation are not as useful in the construction industry as other industries because relatively few employees remain with the same employer for an entire year. This also is the case for the longshoring industry.

OSHA has structured the final rule to address these commenters' concerns. First, the rule stipulates no fixed period for refresher training and evaluation; instead, such training is triggered when the triennial evaluation or an incident or workplace change indicates that it is necessary. OSHA concludes that this performance approach will ensure that the necessary refresher training occurs but does so in a way that is not overly burdensome.

Second, by requiring formal evaluations of operators' proficiency only at three year intervals, OSHA is addressing ACCSH's concerns and the concerns of employers in other industries with high turnover rates. If an employee stays less than three years with the same employer, no periodic evaluation is required (although the evaluation associated with initial training and any refresher training would be required). In addition, when an employee changes jobs, the final rule allows the employer to evaluate the employee's previous training adequacy and appropriateness to determine that the employee can do the job safely. As discussed below, duplicative training would not be required in this situation.

VIII. Summary and Explanation of the Final Standard

A. General

In this final rule, OSHA requires that operators of powered industrial trucks be trained in the operation of such vehicles before they are allowed to operate them independently. The training must consist of instruction (both classroom-type and practical training) in proper vehicle operation, the hazards of operating the vehicle in the workplace, and the requirements of the OSHA standard for powered industrial trucks. Operators who have completed training must then be evaluated while they operate the vehicle in the workplace. Operators must also be periodically evaluated (at least once every three years) to ensure that their skills remain at a high level and must receive refresher training whenever there is a demonstrated need for it. The new standard replaces very general training provisions that have had only a

modest impact in reducing truck-related accidents, injuries, and fatalities.

To accomplish the goal of improved powered industrial truck operator training, OSHA is revising its existing general industry standard at § 1910.178(l), and is adding for shipyards a new § 1915.120 with a cross reference to § 1910.178 (l). For construction, a new § 1926.602(d), with a cross reference to 1910.178(l), has been added. The new § 1926.602(d) supplements the current cross-reference to the 1969 ANSI standard, to the extent that the ANSI standard specifies that only trained operators be permitted to operate powered industrial trucks (the same language as was contained at § 1910.178(l)). The standards in parts 1917 and 1918 provide safety and health coverage for longshoring and marine terminal employment. The specific standards in these parts are supplemented by a limited number of general industry standards to provide a comprehensive package of standards for each industry. These general industry standards are listed in §§ 1910.16, 1917.1, and 1918.1. To assure that new paragraph (1) of § 1910.178 covers longshoring and marine terminal employees, OSHA is adding it to the list of applicable general industry standards.

In developing this final standard, OSHA has relied on the training requirements in the latest national consensus standard for powered industrial trucks, ASME B56.1-1993, as well as the training requirements from other standards (both industry and government). In this final rule, the language of these standards has been modified, as appropriate, where the consensus standard uses non-enforceable language (such as in paragraphs 4.19.1 and 4.19.2 of the ASME standard), or for other reasons, as discussed below.

B. Scope

The scope of OSHA's existing training provisions for operators of powered industrial trucks for general industry, construction and shipyards is set forth at 29 CFR 1910.178(a)(1). That paragraph states:

This section contains safety requirements relating to fire protection, design, maintenance, and use of fork trucks, tractors, platform lift trucks, motorized hand trucks, and other specialized industrial trucks powered by electric motor or internal combustion engines. This section does not apply to compressed air or nonflammable compressed gas-operated industrial trucks, nor to farm vehicles, nor to vehicles intended primarily for earth moving or over-the-road hauling.

Because § 1910.178 adopted the ANSI B56.1-1969 provisions under section 6(a) of the Act, the scope of that standard covering both general industry and shipyards employment is the same as the scope of the ANSI B56.1-1969 standard. The construction standard for powered industrial trucks incorporates ANSI B56.1-1969 by reference and, therefore, also has the same scope as the ANSI standard. The requirement for powered industrial truck use in the marine terminal industry is at § 1917.43. Paragraph (a) states:

This section applies to every type of powered industrial truck used for material or equipment handling within a marine terminal. It does not apply to over-the-road vehicles.

The standard that applies to powered industrial truck training in the longshoring industry is codified at § 1918.97. That standard does not use the term "powered industrial truck" but provides that any employee driving "any power operated vehicle" shall be competent by reason of training and experience.

In the preamble of the powered industrial truck operator training proposal published on March 14, 1995, OSHA did not propose to revise the scope of the existing rules. However, OSHA solicited comment on whether the scope of the training requirements should be expanded to cover operators of a broader classification of vehicles than is covered by 29 CFR 1910.178(a).

There were eight commenters who generally discussed the scope of these final rules. (See Exs. 7-43, 11-7, 11-9, 11-17, 11-20, 11-31, 11-42, 11-44, Tr. pp. 99, 240.) Most of these commenters suggested limiting the scope to those vehicles covered by the ASME B56.1-1993 standard, which has a narrower scope than the ANSI B56.1-1969 standard because it does not cover certain types of vehicles that have their own specialized ASME volumes. These commenters believed that operators of specialized types of vehicles needed more specialized training.

Additionally, commenters from the marine terminals and longshoring industries pointed out that they have specialized equipment and/or use different names for some of the types of vehicles that are used in other industries. Some vehicles that are unique to the marine cargo handling industry, or are differently named, are: container top handlers; container reach stackers; straddle carriers; semi-tractors/utility vehicles; sidehandlers; combination vacuum lifts; and yard tractors.

OSHA has considered the comments received on the issue of scope and has decided not to change the scope provisions of § 1910.178(a). This means that the final rule's training requirements in paragraph (l) will apply to any truck covered by the specific industry standard. Thus, these training requirements would apply, e.g., to container top handlers in longshoring and marine terminals.

OSHA concludes that the new standard will improve operator training and reduce fatalities and injuries among those vehicle operators covered by § 1910.178(a)(1). The accident statistics discussed above indicate that there is a high incidence of job-related deaths and injury for operators of all vehicle types. Therefore, narrowing the scope of the final rule would decrease employee protections and increase the risk confronting operators, and would thus be contrary to the goals of the OSH Act. In response to the commenters who recommended a narrower scope, OSHA notes that the new standard is flexible enough to allow training to be tailored to the special characteristics of the workplace and the vehicles used.

Accordingly, the scope of the final standard is broader than that of the ASME B56.1-1993 standard, which covers only some types of powered industrial trucks. The final OSHA standard covers all the types of powered industrial trucks specified at § 1910.178(a)(1), which is equivalent to the broader scope of the ANSI B56.1-1969 standard. Therefore, this final rule applies to the vehicles covered by the following volumes of the consensus standard: Low Lift and High Lift Trucks, ASME B56.1; Guided Industrial Vehicles, ASME B56.5; Rough Terrain Forklift Trucks, ASME B56.6; Industrial Crane Trucks, ASME B56.7; as well as other vehicles that fall within the definition of a powered industrial truck in § 1910.178(a).

As discussed above, OSHA's existing operator training requirements for the marine terminal and longshoring industries essentially cover all powered industrial trucks used in those sectors no matter what specialized name they are given. OSHA concludes that it is important to retain this coverage in these sectors, for the same reasons stated above. There are high accident rates for operators of powered industrial trucks in these sectors, and the new training provisions are flexible enough to tailor the training to address the needs of the operators of specialized vehicles.

Therefore, the final rule applies to all powered industrial trucks defined as such in ASME B56.1-1969, as well as to

other specialized equipment found in marine cargo handling operations, including but not limited to straddle carriers, hustlers, toploaders, container reach stackers, and other vehicles that carry, push, pull, lift, or tier loads. Training requirements for other material handling equipment, such as container gantry cranes or derricks, will continue to be covered by §§ 1917.27 and 1918.98.

The final rule does not, however, apply to earth moving equipment or vehicles used for over-the-road hauling. Three commenters suggested that OSHA clarify the scope of these training requirements (Exs. 7-25, 7-37, and 11-2). These commenters stated that the discussion of the scope issue in the proposal's preamble could mislead employers into thinking that earth moving equipment and over-the-road vehicles were included in the scope because these vehicles can lift and move material. OSHA agrees that these vehicles are not powered industrial trucks for the purposes of this rule. Therefore, equipment that was designed to move earth but has been modified to accept forks is not covered by this final rule.

C. Paragraph (l)(1)—Safe Operation

At paragraph (l)(1), OSHA requires the employer to ensure that each powered industrial truck operator is competent to operate such trucks safely, as demonstrated by the completion of the training and evaluation required by the final rule. The language of this paragraph has been changed from that proposed to emphasize the desired result, i.e., the operator's ability to operate a truck safely.

Twenty one commenters (Exs. 7-3, 7-12, 7-14, 7-25, 7-26, 7-29, 7-34, 7-39, 7-47, 7-58, 7-59, 7-64, 7-65, 7-69, 11-4, 11-9, 11-15, 11-32, 11-35, 11-38, Tr. p. 153) discussed this proposed requirement. Their principal concern was that, although all employees can be considered "potential" truck operators, this paragraph should apply only to those employees who actually are, or are being trained to be, powered industrial truck operators. For example, one commenter (Ex. 7-25) stated:

Section 1910.178(l)(i)—We recommend the statements * * * "ensure that each potential operator" * * * be changed to * * * "ensure that each candidate for operator qualification" * * * This will avoid any confusion about who needs to be evaluated. Every employee can be considered a potential operator, but only select employees will be candidates for certification as qualified and authorized operators by the employer.

OSHA agrees with these commenters and has revised the language of the final rule to make clear that only powered industrial truck operators and trainees, and not all "potential" operators, as proposed, are covered. However, an employee who has other duties, but sometimes operates a powered industrial truck, is covered by this paragraph.

Paragraph (l)(1)(ii) requires the employer to ensure that before an employee is permitted to operate a powered industrial truck, except for training purposes, the employee has successfully completed the required training, including an evaluation of the efficacy of that training, except as permitted by paragraph (l)(5) of this section. The language of this paragraph has been changed from that of the corresponding proposed paragraph. The requirement that the operator "successfully complete" the training and evaluation required by the new standard has been retained, and the paragraph has been simplified for clarity.

Proposed paragraph (l)(1)(ii) had three elements; however, the final rule focuses only on one major point because the other two are addressed elsewhere in the final rule. In the proposal, the employer was required to have each operator trained, evaluated by a designated person, and determined by that person to be "performing the required duties safely." As now written, the employer must ensure that each operator has successfully completed the required training and evaluation except as permitted by paragraph (l)(5). There are a number of ways the employer can do this. Outside qualified training organizations can provide evidence that the employee has successfully completed the relevant training topics, both classroom and practical. The employer may also have an employee perform the training, which would allow the employer to certify that the employee has successfully completed the training. In the final rule, paragraph (l)(1)(ii) does not stipulate that a designated person conduct the training and evaluation of each operator and make a determination that the operator is performing safely. This is because paragraph (l)(2)(iii) specifically sets out the capabilities of persons performing the training, and paragraph (l)(2)(ii) stipulates that the training is to include both a demonstration and evaluation component ("Training shall consist of a combination of formal instruction * * *, practical training (demonstrations * * * by the trainee), and evaluation of the operator's performance in the workplace."). There

is no reason to identify a person with the required capabilities as a "designated" person, as proposed.

During this rulemaking, there was some comment about training resources available to the employer. (See Exs. 7-15, 7-16, 7-27, 7-51, 7-60, 11-1, 11-8, 11-41, 11-46, 28, Tr. pp. 37, 49, 76, 94.) For example, one commenter (Ex. 11-1) stated:

As North America's largest Powered Industrial Truck training organization (established in 1981), we welcome the opportunity to provide input into these long overdue regulations. To date, our organization's mobile equipment training programs have trained over 125,000 operators and 3500 trainers.

It is clear to OSHA from the comments and testimony of training organizations that there are adequate resources if employers choose to hire outside training providers. Additionally, truck manufacturers and dealers can provide information and assistance in developing a training program.

OSHA concludes that an evaluation component must be an integral part of the training process if accidents, injuries, and deaths resulting from unsafe powered industrial truck operation are to be reduced. As discussed above (see especially the discussion of the Jensen and Cohen studies in section IV of this preamble), the training and reinforcement that will be done in part through the formal training, demonstration, and evaluation process is a highly effective way of reducing unsafe practices. The practical exercises, demonstrations, and evaluations required as part of each operator's training also will determine whether the employee can competently perform an operator's duties safely.

Finally, paragraph (l)(1)(ii) does not permit an employee to operate a powered industrial truck without supervision until the required training has been completed (see the exception discussed below in connection with paragraph (l)(2)(i)). This requirement is included in the final rule to minimize driving by untrained operators.

D. Training Program Implementation—Paragraph (l)(2)

Paragraph (l)(2) permits trainees to receive practical training in truck operation only in areas where it is safe to do so, sets forth the types of training that are to be given to all powered industrial truck operators, and establishes the qualifications of trainers and evaluators. This paragraph has been revised slightly from the corresponding provisions in the proposal.

Paragraph (l)(2)(i) allows trainees to operate powered industrial trucks

provided that the operation is under the direct supervision of a person with the requisite knowledge, training, or experience and the training is conducted in areas where there is minimum danger to the trainee and other employees. This is a change from the proposal, which included the further restriction that no other employee be present while practical training is being conducted. OSHA has revised this requirement based on comments that stated that the proposed restriction might not be possible at some businesses. For example, one commenter (Ex. 7-34) stated:

Paragraph (l)(2)(i) requires that trainees, under the supervision of the designated person, be allowed to operate a powered industrial truck "provided the operation of the vehicle is conducted in an area where other employees are not near and the operation of the truck is under controlled conditions." Dow believes that this provision needs to be modified. The requirement that other employees may not be near the training area implies that a segregated area must be established. Not only would this add a significant cost to training (especially for low frequency training and space-limited work areas), but also ignores the fact that without great expense to recreate the work environment, the training then would not reflect real work scenarios. The trainee must learn how to maneuver appropriately around the facility including around obstacles such as other employees, etc. It is more appropriate that those working in or around the training area be made aware of the training activities. Instead of segregating the area, the area should be controlled. The presence of the "designated person" conducting the training can assist in this regard. As a result, Dow recommends that this provision be modified to read,

Trainees under the direct supervision of the designated person may be allowed to operate a vehicle in a controlled area. Employees in the surrounding area should be alerted to the training activities which are occurring in their area.

The above language allows the employer the flexibility to determine how best to comply with this requirement. It allows those employers who have the resources and the inclination to create a segregated area to do so while preserving the flexibility of other employers to select another adequate method.

Another commenter (Ex. 7-71) stated:

While the flexibility provided by allowing trainees to operate a powered industrial truck under direct supervision is appropriate and necessary, the restriction that operation be conducted "*in an area where other employees are not near and the operation of the truck is under controlled conditions*" [1910.178(l)(2)(i)(sic)] is vague and [potentially] impractical or unreasonable. Because of space limitations and training program requirements, training may need to be conducted in work areas. Since it is stipulated that training be under the direct

supervision of a qualified trainer, we believe that additional restriction is unnecessary and perhaps redundant.

OSHA agrees with these commenters, and is making the final provision more flexible than the proposed requirement. The final rule allows practical (hands-on) training in truck operation even if other employees are present, providing that the training is done in a safe manner.

Proposed paragraph (l)(2)(i) included provisions that were duplicative of other proposed provisions. OSHA has removed the duplicative provisions from the final rule. The proposed language stating that employers must "implement training" has been dropped, to eliminate the implication that the employer could not contract out the training to an outside trainer or training organization. However, the employer's responsibility for training remains clearly stated at paragraph (l)(1)(ii) to ensure that employees successfully complete the required training and evaluation, no matter who provides it.

OSHA requires at paragraph (l)(2)(ii) that the training consist of a combination of classroom type instruction, demonstrations by the trainer, practical training, and evaluation of the operator's ability to apply the training in the workplace. The Agency believes that only a combination of training methods will ensure effective employee training. Classroom type training is necessary to teach some of the principles of vehicle operation and provide the basis for practical training. Hands-on (practical) training provides the trainee with the necessary physical skills and enhances the employee's ability to operate a powered industrial truck safely. Demonstrations by the trainer will impart important information to the trainee. In addition, evaluation of the trainee's ability to operate the truck safely in the workplace will ensure that the trainee has successfully transferred the skills learned to the work environment.

No commenters opposed the need for practical training. There was some comment about the need for classroom training, however.

One commenter (Tr. p. 212), in response to a question about whether classroom or practical training was preferable, responded:

We think both are necessary. Number one, we need the reinforcement of the hands-on plus the classroom training, however.

The other issue, there are several issues that need to be covered in a classroom for them to be understood when they're on the truck. Let me give you one example.

Lift trucks, as you know, are three point suspension. You can have an operator sitting on a lift truck and you try to explain that. But unless he's seen it, he or she has seen it and unless it has been explained to them and illustrated to them, it's very difficult for them to grasp the concept of three point suspension on a four wheel truck. That can be explained in a classroom and then, hopefully, it won't have to be demonstrated because demonstrated would mean a tipped over truck.

But there are certain things that cannot be demonstrated as adequately as they can be shown in graphs, slides and explained and tested in the book and there are certain things that cannot be covered in the operation. But those things that can, it simply reinforced them.

I think most of us, in our education, understand that any reinforcement we can get all the way from demonstration to illustration, in print and in slides or videos is just reinforcement and helps the learning process to take effect much more deeply.

Another commenter (Ex. 7-31) stated:

The proposal requires that training consist of a combination of classroom instruction and practical training. In small workplaces with few employees classroom instruction, per se, may not be practicable. Training needs to include a combination of methods and be flexible enough to work in different work environments and applications. Classroom instruction is but one way that preliminary instruction can be provided as a prelude to practical training exercises. The method of providing face-to-face instruction should be at the instructor's discretion.

We suggest that subparagraph (ii) be modified to read: Training shall consist of a combination of instruction (classroom, lecture, audiovisual aids, and/or conference) and practical training (demonstrations and practical exercises by the trainee).

Several commenters (Exs. 7-31, 7-35, 7-36, 7-47, 7-49, 11-15, Tr. pp. 24, 153) suggested that classroom training was impractical, particularly when a small business employer has one trainee being trained by a supervisor. Both the proposed and final standard make clear that the "classroom" part of the training need not take place in a classroom, but can consist of other methods such as discussions, review of printed material, or viewing of video tapes. Discussions can consist of the trainer talking to the trainee and explaining the training material, either in the workplace or in another location. The Agency's intent was not to limit the flexibility of the employer by requiring that any phase of the training be conducted in a classroom. Rather, the rule requires that the training include an explanatory element as well as a practical element. To make this clearer, the word "classroom" has been changed to the word "formal," and examples of different kinds of formal training have been listed in parentheses.

Some of the topics that OSHA lists at paragraph (l)(3) lend themselves to being taught in a formal way. For example, teaching a trainee about vehicle stability by having the trainee tip over a powered industrial truck does not make sense and is not an effective way to learn about that principle. Stability is best learned initially by having the trainer explain the concept of stability, the causes of instability, and the ways to avoid instability. Practical training then may reinforce how to avoid creating an unsafe condition. On the other hand, telling someone what it is like to drive a powered industrial truck with front wheel drive and rear wheel steering is not sufficient to teach the trainee how to operate the vehicle safely, and considerable practical training is also necessary to teach the necessary skills.

The training also includes an evaluation of the operator's performance in the workplace. This is necessary to determine that the operator can effectively utilize all the training to drive safely in the workplace. This is similar to the requirement that was part of paragraph (l)(2)(ii) of the proposal. There was no opposition to the requirement.

OSHA concludes that powered industrial truck operators need to be trained using a combination of classroom type and practical training. Some elements are better taught using one or the other type of training, and often both methods of training are needed. As one hearing participant (Tr. p. 35) stated:

The first point that I would like to comment on is I believe that initial certification training should include both classroom and operational training. This belief is based on the fact that in many cases what I have seen is without giving the correct instruction prior to individuals getting onto equipment, is they tend to develop some very bad habits quickly. I believe giving them the appropriate information initially and then reinforcing that while on the truck is the most effective way to train that. I also believe that with the initial certification, both evaluation of the classroom and the operational performance should be required. Again, this is to identify that they do have the correct knowledge of the equipment and that they have the skills to operate the equipment effectively.

At paragraph (l)(2)(iii), OSHA requires that all training and evaluation required by this standard be conducted by persons with the requisite knowledge, training, or experience to train operators. As discussed elsewhere in this preamble, the employer may have the necessary prerequisites to qualify as a trainer and evaluator, or he or she may assign the responsibility for training and

evaluation to one or more employees or an outside trainer and evaluator having those prerequisites. There were several comments on this provision.

One commenter (Ex. 7-34) stated:

Paragraph (l)(2)(iii) provides that training and evaluations must be conducted by a "designated person." Dow is concerned as to what OSHA means by the term "designated person." Hopefully, OSHA does not envision that one person must be hired to specifically conduct the training and evaluations. Dow recommends that the term "designated person" be broadly defined to include employees who have been through the training (or possibly an instructor from the training course) and have demonstrated sufficient knowledge and skill to fulfill this role.

Moreover, Dow believes paragraph (l)(2)(iii) must be modified to reflect that training may be handled by a variety of instructors, not merely one "designated person." For large facilities with multiple departments it may be more appropriate that there be multiple trainers with each focusing on specific elements of the training program. For example, one person would discuss the technical characteristics of the vehicle while another person would discuss the specific loading types for their particular department. Therefore, Dow recommends OSHA modify this section to allow facilities the flexibility to have multiple "designated persons."

OSHA has concluded that the final rule should adopt a performance-oriented approach to the qualifications of trainers and evaluators. As discussed above under issue 1, OSHA does not have the resources to evaluate and certify trainers and does not consider it necessary to do so. Trainers and evaluators with different backgrounds can achieve the level of ability necessary to teach and evaluate trainees. To meet these commenters' concerns, OSHA has eliminated the term "designated person" from the final rule and has instead described the knowledge, skills, or experience any trainer or evaluator must have under the standard.

The Agency finds that this approach will eliminate problems, especially in the construction industry, where terms such as "designated person," "authorized person," "competent person," "qualified person," and others, have distinct meanings and definitions. As written in the final rule, an employee with the requisite knowledge, training, and experience could himself or herself conduct the required training (both initial and refresher) and evaluations. An employer could also employ one or more such persons, or could contract with an outside training organization to conduct the required training and evaluation activities.

This change responds to comments (see, e.g., Exs. 11-10A, 11-29, 11-5, 11-

6A) submitted to the record. For example, a comment submitted by Constangy, Brooks & Smith, LLC, on behalf of a client, the Miller Brewing Company, explains that, in today's environment, which is characterized by "declining levels of supervision and increasing employee participation and empowerment," the person conducting the training and evaluation would in all likelihood be an employee (Ex. 11-29). Another comment from the American Society of Safety Engineers (ASSE) urged OSHA to use language in the final rule that would clearly recognize training given by "qualified third parties when a company does not have a qualified staff instructor" (Ex. 11-5). The Mobil Oil Company (Ex. 11-6A) expressed the view that a designated person was not needed succinctly: "the requirement for operator certification by a "designated person" is not practical and would hinder the quality and timeliness of operator training."

E. Training Program Content—Paragraph (l)(3)

To ensure that the training provided to powered industrial truck operators contains the appropriate information for the operator, the final rule includes a list of subjects that must be mastered in order to operate a truck safely. Paragraph (l)(3) states that all of the topics must be covered in operator training unless the employer can demonstrate that one or more of these topics is not necessary for safe operation in a particular workplace. It is the employer's responsibility to ensure that operators successfully complete all needed training and that the appropriate subjects are taught, including those that are pertinent to the type(s) of truck the operator will be allowed to operate and the work environment in which the vehicle(s) will be operated. Paragraph (l)(3) permits the employer to exclude those topics that are not relevant to safe operation at the employee's work location. However, the employer has the responsibility of demonstrating that these topics are not needed.

For example, if the operator will be operating an order picker, that employee must be trained in, e.g., the location and function of the controls; the location and operation of the engine or motor; steering and maneuvering; visibility; inspection and maintenance that the operator will be expected to perform; and the other general operating functions of the vehicle listed in paragraphs (l)(3)(i)(A) through (M) as well as the workplace-related topics covered in paragraph (l)(3)(ii)(A) through (I). The employee also must be taught and understand, for example,

that he or she must be restrained from falling when the platform of the truck is in an elevated position and that he/she must never drive the truck when the platform is elevated (except as specified in the operator's manual). Under paragraph (l)(3), it is the employer's responsibility to ensure that the necessary elements of the training for the type(s) of vehicle to be used and the workplace in which that vehicle(s) will be operated are included in the training.

Some of the elements may be omitted if the employer can demonstrate that they are not relevant to safe powered industrial truck operation in the employer's workplace. In such cases, the employer must be able to demonstrate that a particular topic on the list is not relevant to the training program because that element does not apply to the type of vehicle(s) in use, or because the workplace condition addressed by the element does not exist. For example, if a powered industrial truck is not used in a hazardous environment (gases, vapors, combustibles—see paragraph 1910.178(c)), no training in this element is needed. Similarly, if the truck will be operated on smooth concrete floors, no training needs to be given on operating on rough terrain.

There were several comments (Exs. 7-7, 7-12, 7-13, 7-14, 7-16, 7-34, 7-36, 7-39, 7-65, 7-67, 7-69, 7-70, 11-5, 11-10, 11-11, 11-12, 11-14, 11-15, 11-18, 11-24, 11-29, 11-30, 11-31, 11-32, 11-37, 11-44, 11-45, 29, Tr. pp. 49, 54, 71, 336) that discussed one or more of the topics included in the training program. Some commenters and ACCSH (Exs. 11-5, 7-13, 11-18) suggested that describing the similarities of powered industrial trucks and automobiles could lead a trainee to believe that being able to drive a car automatically means being able to safely operate a powered industrial truck. On the other hand, according to these commenters, emphasizing the differences between driving a car and operating a powered industrial truck would help to clarify important differences, e.g., in steering, stability, and other characteristics.

For example one commenter (Ex. 7-13) stated:

In section (3)(i)(B), delete * * * "Similarities to and differences from the automobile * * *" What does this have to do with operating industrial trucks and why does it have to be included in training? It should be noted that experience with automobiles on the country's highways is far worse than the experience of industry with the use of industrial trucks. Section (3)(iii) should be deleted or reworded. As stated, an employer could be cited for violations if they have not covered the OSHA Standard as a

mandatory part of training. However, it is not agreed that this would significantly improve the overall safety of industrial truck operations.

Another commenter (Ex. 11-5) disagreed:

ASSE believes it is appropriate to differentiate between operating a powered industrial truck and a car. The different steering techniques and the hazards unique to industrial truck operations, we believe, makes such training necessary.

The language of paragraph (l)(3) has been changed slightly in the final rule to emphasize the need to explain the differences between industrial trucks and automobiles.

There also was comment about whether operators must learn all about servicing and maintaining a powered industrial truck if they will not have to perform that servicing and maintenance. For example, one commenter (Ex. 7-39) stated:

Subparagraph (i)(D) should be deleted in its entirety. The phrase "and maintenance" should be deleted from subparagraph (i)(J).

These topics have no bearing on the operator's ability to operate a forklift in a safe manner. The operator does not require knowledge in how an internal combustion power plant or an electrical battery works or is maintained in order to safely operate a forklift. Unless the operator is going to perform this specialized work, there is no need to train the operator in such topics.

OSHA agrees with these commenters' contentions and has changed the final rule accordingly. Paragraph (l)(3)(i)(J) is now written to clarify that if an operator has no servicing responsibilities, that operator need not be trained in how to conduct that servicing activity. On the other hand, if the operator is required to perform any servicing or maintenance on a vehicle, that operator should know how to perform that servicing or maintenance.

The training topics included in this final rule were developed from those contained in the ASME B56.1-1993 standard. Much professional expertise has gone into their development. Many commenters (see, e.g., Exs. 11-10A, 11-18, 11-19, 11-25) generally supported the topics listed. For example, one hearing participant (Tr. p. 54) stated:

In my opinion, there are a vast number of industries, many largely diversified within themselves, using a multitude of various classifications of lift trucks. Within these classifications there may be multiple attachment applications. Thus, I support the position of OSHA giving the employer the option to eliminate a topic from the list of required subjects provided the employer can demonstrate that the topic is unrelated to the work environment. There are certain topics which are necessary for operators to thoroughly understand and appreciate.

Another commenter (Ex. 11-18) stated:

The International Brotherhood of Teamsters feels that the current list of topics is comprehensive and should not be substantially altered.

OSHA concludes that the topics proposed, as modified in the final rule based on public input, are appropriate as the basis of effective powered industrial truck operator training programs.

In developing training programs for different types of vehicles, there are certain elements that are common to each program. When training operators of different types of vehicles, employers can take advantage of these similarities by only training employees once on these common subjects. This principle reflects the Agency's desire to allow employers to conduct the training as efficiently and inexpensively as possible while ensuring that the training is adequate.

F. Refresher Training and Evaluation—Paragraph (l)(4)

Paragraph (l)(4)(i) requires employers to provide refresher training as required by paragraph (l)(4)(ii) to ensure that the operator continues to have the knowledge and skills to operate the powered industrial truck safely. Refresher training, which is triggered by the occurrence of the events listed in paragraph (l)(4)(ii), complements the initial training required by paragraph (l)(3) and serves to reinforce that initial training. The refresher training also includes an informal evaluation component that might involve, for example, observing the operator to ensure that he or she has mastered the skills necessary to address any performance deficiency or has developed the skills to operate a new type of truck safely.

An instance of unsafe operation, or an accident, or a near-miss incident, triggers refresher training as specified in paragraph (l)(4)(ii). Such refresher training also is needed if evaluation reveals that an operator is not operating the truck safely, or if an operator is assigned to drive another type of powered industrial truck or to work in substantially different or changed conditions. The type and amount of training needed in the refresher training depend on several factors, including: the different characteristics of the new type of truck or terrain; the practice or practices that the evaluation indicated needed improvement; the nature of the unsafe act; and the potential for an accident to occur. OSHA's decision not to specify the frequency of refresher

training but to require it to be provided on an as-needed basis is discussed elsewhere in this preamble. The final rule provides a performance-oriented and cost-effective approach to refresher training. It also requires, at paragraph (l)(4)(i), evaluation of the effectiveness of the refresher training, to ensure that safe practices have been reinforced. This evaluation can be brief and informal. Many comments addressed this provision (Exs. 7-13, 7-16, 7-20, 7-21, 7-23, 7-25, 7-26, 7-28, 7-29, 7-31, 7-34, 7-35, 7-38, 7-39, 7-43, 7-44, 7-45, 7-46, 7-47, 7-48, 7-49, 7-52, 7-56, 7-58, 7-59, 7-61, 7-65, 7-67, 7-69, 7-70, 113, 11-4, 11-5, 11-10, 11-12, 11-15, 11-19, 11-20, 11-27, 11-29, 11-31, 11-32, 11-36, 11-38, 11-44, 28, 29, Tr. pp. 27, 36-39, 55, 63-65, 78, 82, 101, 179, 210, 319, 345, 395, 421-422). Some commenters supported the proposed rule's approach of relying on certain events, operator practices or workplace conditions to trigger refresher training. For example, one commenter (Ex. 11-3) stated:

Ball Atlantic believes unsafe operation, accidents or near-misses are important criteria for determining if refresher/remedial training is required; however, it is also appropriate for employers to evaluate employees to ensure the employee retains and uses the skills, knowledge, and ability needed to operate the powered industrial truck safely. This evaluation can be accomplished by the employer conducting periodic work observations of the employee's operation of the vehicle to identify areas where remedial training may be needed. The timing of these evaluations should be left to the discretion of the employer.

Another commenter (Ex. 7-46) stated:

The NAM agrees that employees should be retrained when they are shown to have operated equipment in an unsafe manner * * *

The final rule, at paragraph (l)(4)(ii), contains the triggers for refresher training that were proposed, but adds two others: when a different type of truck or different conditions are introduced or occur in the workplace. This could include a different type of paving, reconfiguration of storage racks, new construction leading to narrower aisles or restricted visibility, etc. These triggers have been added to the final rule because they are specified in the current ASME standard (B56.1-1993, section 4.19.5) and because some commenters (see e.g., Ex. 11-5) recommended that OSHA "follow the requirements of * * * [that standard] as a guide for refresher/remedial training."

Some commenters (see, e.g., Exs. 11-3, 11-4, 11-5, 11-10, 11-14, 11-15, 11-25, 11-27, 11-32, 7-13, 7-25, 7-36, 7-

45, 7-58) recommended that periodic evaluations be conducted at less frequent intervals, rather than annually, as proposed. These commenters suggested that more frequent evaluations were unnecessary, would interrupt the production process, and would be burdensome for employers.

OSHA believes that the triennial evaluations required by the final rule need not take excessive time, be unduly burdensome, or interrupt the production process. In most cases, the person conducting the evaluation would do two things: first, observe the powered industrial truck operator during normal operations to determine if the operator is performing safely, and second, ask pertinent questions to ensure that the operator has the knowledge or experience needed to operate a truck safely. In some cases, because of the danger or complexity of the operation, the extent of the change in conditions, or the operator's need for additional skills, the evaluation will need to be lengthier and more detailed.

The proposed rule would have required employers to evaluate the driving performance of powered industrial truck operators on an annual basis. Commenters from general industry, construction, and the maritime industries (shipyards, marine terminals, and longshoring operations) objected to the frequency of the proposed evaluations (see e.g., Exs. 7-13, 7-25, 7-28, 7-34, 7-36, 7-45, 7-58, 7-59, 7-69, 7-70, 11-5, 11-10, 11-14, 11-15, 11-25, 11-27, 11-29, 11-32, 11-36, 11-46). For example, the American Petroleum Institute (API) (Ex. 11-10) stated:

API * * * emphasizes our position that * * * it would be unnecessary to evaluate operators annually. Rather, API suggests that operators be evaluated every three years. This would substantially reduce the information collection burden, while still attending to those operators who may require additional training or who are operating in an unsafe manner.

Arguing along similar lines, the National Association of Home Builders (NAHB) (Ex. 11-14), stated:

NAHB finds it an unreasonable burden on small employers for OSHA to require an annual evaluation of each operator * * * This will just be an unnecessary requirement and expense to small employers with no clear benefit.

The West Gulf Maritime Association (Ex. 7-66) held the same view, stating:

Refresher and/or evaluation training shall be provided [only] when determined necessary by performance.

The Office of Advocacy of the U.S. Small Business Administration (SBA) also questioned the need for annual

evaluations. Jere W. Glover, Chief Counsel for Advocacy, stated (Ex. 7-41):

* * * I question whether * * * it is necessary to perform official evaluations annually. Particularly in a small workplace, evaluations—albeit informal—may be ongoing. Furthermore, coupled with the need for written certification and the requirement for maintaining records, I am concerned about the paper trail that this provision would generate as well.

A few commenters (Exs. 7-29, 7-52) favored a biennial evaluation period rather than the proposed annual interval, but did not present data to support biennial, rather than triennial, evaluation.

In response to these concerns, the final rule requires that periodic evaluations of operator performance be conducted only once every three years. OSHA has revised this provision of the proposal because the Agency concludes that the final rule's comprehensive training requirements—initial training and evaluation for all powered industrial truck operators needing such training; refresher training and evaluation for any operator observed to be operating unsafely, involved in an accident or near-miss, determined by evaluation to need retraining, or called upon to operate a different kind of truck or to operate under changed workplace conditions; and triennial evaluation to ensure that the necessary knowledge and skills have been retained—provide a complete and systematic approach to powered industrial truck operator training. Given this three-tiered approach to training—initial training and evaluation, refresher training and evaluation as needed, and periodic evaluations—annual evaluations are unnecessary. The final rule, at paragraph (l)(4), reflects this finding.

Paragraph (l)(4)(iii) requires employers to conduct an evaluation of each powered industrial truck operator's performance once every three years to ensure that the employee has retained and continues to use the knowledge and skills necessary for safe operation of the vehicle. The required evaluation does not have to be a formal, structured exercise. For example, an evaluation could be as simple as having a person with the requisite skills, knowledge, and experience observe the operator performing several typical operations to ensure that the powered industrial truck is being operated safely and asking the operator a few questions related to the safe operation of the vehicle.

G. Avoidance of Duplicative Training—Paragraph (l)(5)

In paragraph (l)(5), the final rule allows employers to forego those

portions of the required training that operators have previously received. OSHA proposed two similar provisions, one pertaining to new hires and one to current operators. The final rule combines these two provisions into one paragraph. The provision at paragraph (l)(5) is intended to prevent unnecessary or duplicative training both for newly hired operators and those already on the payroll. For example, if an operator is already trained in certain aspects of powered industrial truck operation, knows the necessary information, has been evaluated, and has proven to be competent to perform the duties of an operator, there is no reason to require an employer to repeat that operator's training.

There was a general consensus of opinion supporting the utility of this provision. (See Exs. 7-25, 7-31, 7-34, 7-39, 7-67, 7-68, 7-69, 11-12, 11-15, 11-17, 11-18, 11-20, 11-27, 11-28, 11-29, 11-30, 11-37, 11-42, Tr. pp. 283.) These commenters pointed out that unnecessary and repetitive training does not use the employer's or the operator's time productively. If an operator already knows how to operate a powered industrial truck safely and can demonstrate that ability, there is no need to further train that operator. OSHA agrees with these commenters, and the final rule reflects this conclusion.

Paragraph (l)(5) of the final rule provides that an employer need not provide further training to any operator (whether currently on the payroll or a new hire) in any training topic in which the operator has previously received training, if the operator, after evaluation, is found to be competent to perform the operator's duties safely. The operator would need additional training in any element(s) for which the evaluation indicates the need for further training, and for any new type of equipment or changes in workplace conditions.

In evaluating the applicability and adequacy of an operator's prior training, the employer may wish to consider these factors: the type of equipment the operator has operated; how much experience the operator has had on that equipment; how recently this experience was gained; and the type of environment in which the operator worked. The employer may, but is not required to, use written documentation of the earlier training to determine whether an operator has been properly trained. The operator's competency may also simply be evaluated by the employer or another person with the requisite knowledge, skills, and experience to perform evaluations. The employer can determine from this

information whether the experience is recent and thorough enough, and whether the operator has demonstrated sufficient competence in operating the powered industrial truck to forego any or some of the initial training. Some training on the site-specific factors of the new operator's workplace is likely always to be necessary.

H. Certification—Paragraph (l)(6)

OSHA proposed to require that employers certify that the required training and evaluation had been conducted and that the operator was competent to perform the duties of an operator safely by keeping a record with the name of the trainee, the dates of the training, and the signature of the person performing the training or evaluation. OSHA also proposed that the employer retain the training materials and course outline and, if the training was conducted by an outside trainer, the name and address of the trainer.

OSHA has, in this final standard, switched the order of the paragraphs on Certification and Avoidance of Duplicative Training. It is more logical to complete all elements of the training program before reaching the requirement to certify that training has been provided. Accordingly, the Certification paragraph in the final rule is in paragraph (l)(6) and the Avoidance of Duplicative Training is at paragraph (l)(5).

There was considerable comment on the proposed certification requirements. (See Exs. 7-13, 7-14, 7-16, 7-19, 7-21, 7-25, 7-26, 7-27, 7-34, 7-39, 7-40, 7-44, 7-47, 7-57, 7-58, 7-59, 7-62, 7-67, 7-69, 7-71, 11-3, 11-5, 11-6, 11-10, 11-12, 11-14, 11-15, 11-18, 11-24, 11-27, 11-28, 11-29, 11-30, 11-31, 11-32, 11-36, 11-37, 11-44, 28, 29, Tr. pp. 25, 51, 56, 102, 122, 155, 178, 203, 308, 321, 335, 341-344, 385, 408, 423.)

Some commenters pointed out that maintaining written certification records, particularly of training, provides a good means of measuring compliance with a standard. They pointed out that many conscientious employers already maintain records of employee training. For example, one commenter (Ex. 7-39) stated:

Subparagraph (l)(5) requires employers to certify that each operator has been trained or evaluated. Since training for training's sake should never be the focus of a training standard, and since keeping such documentation will not make some a safer driver, CMA believes that OSHA should require the employer to document the verification of the knowledge and skill of the forklift operator. Consistent with the above, CMA recommends that the documentation include: (1) the authorized operator's name and personal identifier; (2) the date of

verification; (3) a reference to the verification method; and (4) the name of the verifier and personal identifier. The verifier should not be required to be signed because this prevents the use of electronic filing.

A second commenter (Ex. 11-3) stated:

In addition, OSHA requested specific comments on the collection of information requirement proposed in 1910.178(l)(5) which requires employers to prepare and maintain a record to certify that employees have been trained and evaluated as required by the proposed standard. Bell Atlantic provides a four (4) hour training program to approximately 300 employees who operate powered industrial trucks, at a cost of \$224 per trainee, total training costs = \$67,200. This training is documented on the employee's training record and maintained in their personnel file. Bell Atlantic fully supports the use of electronic collection and submission of information wherever possible.

One hearing participant (Tr. p. 423) stated:

Training records are an important tool for industries. It has been proven time and time again that analyzing prior training records before conducting refresher training will enable companies to identify employee conceptions of existing safety rules and standard operating procedures.

Some commenters agreed with the need to maintain records, but suggested that the requirement for a signature be deleted so it would be easier to computerize the records. (See Exs. 7-13, 7-21, 7-26, 7-27, 7-39, 7-40, 7-47, 7-59, 7-69.) OSHA agrees with these commenters and, accordingly, has changed the wording of this provision of the final rule to indicate that the identity of the person performing the training and evaluation is sufficient; a signature is not required. In addition, the final rule has substantially streamlined the proposed certification requirements, reducing the number of items needing to be certified, and eliminating the requirement to maintain training materials, course outlines, and other information when outside trainers are relied on.

Some commenters questioned the need for the employer to retain written records of the training on the grounds that the purpose of training is to prepare the trainee to operate a powered industrial truck in a safe manner and that observing that the operator is driving safely should be sufficient. For example, one commenter (Ex. 11-14) said:

These requirements will be a tremendous burden to builders, especially small builders, who are already overwhelmed by onerous existing recordkeeping requirements. This new request for information from the employer seems inappropriate considering the recent inquiries by OSHA about ways to

reduce the paperwork burden on employers. Why mandate these requests for information now when they will most likely be identified at a later date as a source of unnecessary paperwork?

OSHA has been responsive to this comment. The Agency believes that the final rule's certification requirements will provide the assurance necessary that the operator has been trained and evaluated, as required by the standard. However, in response to those who felt that some of the recordkeeping was unnecessary, OSHA has eliminated the requirement for employers to maintain training materials and information from outside trainers. OSHA believes that the certification required by the final rule is sufficient written evidence that the training and evaluation required by the standard has occurred.

I. Dates—Paragraph (l)(7)

The proposal did not include start-up dates. There are approximately 1.5 million powered industrial truck operators, and there is substantial turnover among these operators. Consequently, employers will need a reasonable period of time to implement the training and evaluation required by this final rule. There were a few comments on start-up dates ranging from immediately to three years. The period OSHA has chosen is based on its experience in implementing other safety standards.

The table in the final rule sets out the operator's employment status, and when the initial training and evaluation of operators must be completed. OSHA finds that the use of a table, rather than several written requirements, increases clarity and avoids confusion.

J. Appendix

OSHA has included a non-mandatory appendix in the final rule. Appendix A provides guidance to employers and employees on understanding the basic principles of truck stability. The information contained in this appendix is not intended to provide an exhaustive explanation; rather, it is intended to introduce basic concepts that the employer may use in developing and implementing a training program. The material in the appendix does not add to or reduce any of the mandatory requirements of these standards.

OSHA proposed a non-mandatory Appendix A that contained lists of training topics and other guidance and was primarily based on the current consensus standard, ASME B56.1-1993. Because most of the information in proposed Appendix A is included in the final rule itself at paragraph (l)(3),

OSHA has not included proposed Appendix A in the final rule.

The appendix proposed as Appendix B is retained, and has been designated Appendix A in the final rule.

K. Statement of Reasons for Publishing This Standard in Lieu of the National Consensus Standard

In accordance with section 6(b)(8) of the OSH Act, the National Technology Transfer and Advancement (NTTAA) and OMB circular A-119, which implements the NTTAA, OSHA has reviewed the voluntary consensus standard, Safety Standard for Low Lift and High Lift Trucks (ASME B56.1-1993), and has made extensive use of it in developing its final rule. Where there are differences between OSHA's standard and the consensus standard, they are based on several considerations. First, the Agency bases its standards on the rulemaking record. Second, voluntary consensus standards are not always written with enforcement in mind. Third, the consensus standard contains more detail than is necessary in an OSHA standard. OSHA has developed a final rule that is flexible and protective, as well as performance-based. For these reasons, the Agency finds that the final rule better effectuates the purposes of the Act than the consensus standard.

IX. Statutory Considerations

Section 2(b)(3) of the Occupational Safety and Health (OSH) Act authorizes "the Secretary of Labor to set mandatory *occupational safety and health standards* applicable to businesses affecting interstate commerce," and section 5(a)(2) provides that "each employer shall comply with *occupational safety and health standards* promulgated under this Act" (emphasis added). Section 3(8) of the OSH Act (29 U.S.C. 652(8)) provides that "the term 'occupational safety and health standard' means a standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment."

OSHA considers a standard to be "reasonably necessary or appropriate" within the meaning of section 3(8) if it meets the following criteria: (1) The standard will substantially reduce a significant risk of material harm; (2) compliance is technologically feasible in the sense that the protective measures being required already exist, can be brought into existence with available technology, or can be created with

technology that can reasonably be developed; (3) compliance is economically feasible in the sense that industry can absorb or pass on the costs without major dislocation or threat of instability; and (4) the standard is cost effective in that it employs the least expensive of equally protective measures capable of reducing or eliminating significant risk.

Additionally, safety standards that differ from national consensus standards must better effectuate the Act's protective purpose than the corresponding national consensus standards, must be compatible with prior agency action, must be responsive to significant comment in the record, and, to the extent allowed by statute, must be consistent with applicable Executive Orders. OSHA believes that applying these criteria results in standards that provide a high degree of worker protection without imposing an undue burden on employers. (See the discussion of 60 FR 13796-13799, March 14, 1995, for a detailed analysis of the case law.)

As discussed in various places in this preamble, OSHA has determined that the operation of powered industrial trucks by untrained or inadequately trained operators poses significant risks to employees. There have been, on average, 101 fatalities and 94,570 injuries annually due to unsafe powered industrial truck operation. OSHA estimates that compliance with these revised training requirements for powered industrial truck operators will prevent approximately 11 fatalities and 9,422 injuries annually. This constitutes a substantial reduction in the significant risk of material harm currently posed to these employees.

There are no technological obstacles to compliance with the final rule. There are currently training requirements for powered industrial truck operators in general industry (§ 1910.178(l)), in construction (§ 1926.602(c)(1)(vi)) (adopted by reference), and in the marine cargo handling industries (§§ 1917.27(a) and 1918.98(a) (requirements for all vehicle operators)). Shipyard employment is covered by the general industry standard. The final rule merely specifies in more detail what is to be taught to powered industrial truck operators and requires the employer to retrain operators when workplace conditions, other changes, or accidents or near-misses indicate that such retraining is necessary, and to institute effective evaluation measures to ensure continued safe vehicle operation. In many companies, the vehicle operator's training and periodic evaluations

required by the standard have already been implemented.

OSHA also concludes that compliance is economically feasible because, as documented in the Final Economic Analysis, all regulated sectors can readily absorb or pass on compliance costs. OSHA estimates total annualized costs of \$16.9 million, a cost that imposes only a negligible impact of 0.0002 percent of sales and less than 0.01 percent of pretax profits on firms in the regulated industries.

No industry segment or subsegment will experience substantial economic impact. The largest impact for any two-digit SIC is 0.0014 percent of sales or 0.021 percent of pretax profits and for the small business component of affected SICs, the largest impact is 0.001 percent of sales or 0.024 percent of pretax profits. Because of the large amount of data supplied by the Industrial Truck Association, OSHA has been able to prepare an analysis at the three-digit SIC level. No significant impacts were found at any level. Consequently, the new standard is determined to be economically feasible for firms in affected industries.

The standard's costs and compliance requirements are reasonable, amounting to approximately \$16.9 million per year. An estimated 11 fatalities and 9422 injuries will be averted per year by compliance with the standard.

As discussed above, many of the provisions of the final standard are based on the training provisions of the current ASME consensus standard (ASME B56.1-1993). Pursuant to section 6(b)(8) of the OSH Act, OSHA has explained why the provisions of the final rule that differ from the ASME standard better effectuate the purpose of the Act.

Conclusion

This final powered industrial truck standard, like other safety standards, is subject to the constraints of section 3(8) of the OSH Act, and must be "reasonably necessary or appropriate to provide safe or healthful employment and places of employment."

The Agency concludes that allowing an untrained or poorly trained employee to use a powered industrial truck poses significant risks, both to the operator and to other workers in the vicinity of the truck. To protect employees from those risks, it is necessary to require that only properly trained employees operate these vehicles. OSHA has determined that compliance with this operator training standard is technologically feasible because many companies currently offer the type of training that this standard requires. OSHA also

concludes that compliance is economically feasible, because, as documented by the Final Economic Analysis (Ex. 38), all regulated sectors can readily absorb or pass on initial compliance costs while realizing substantial benefits. In addition to reducing fatalities and injuries, the Agency believes that compliance with the powered industrial truck training requirements will result in substantial cost savings and productivity gains at facilities that use powered industrial trucks, as discussed below.

As detailed in OSHA's March 14, 1995 notice (60 FR 13799), in the January 30, 1996 notice (61 FR 3092 and 3094), in this preamble, and in the Final Economic Analysis, the standard's costs, benefits, and compliance requirements are consistent with those of other OSHA safety standards.

X. Summary of the Final Economic Analysis, including the Regulatory Flexibility Analysis

Introduction

The OSH Act requires OSHA to demonstrate the technical and economic feasibility of its rules. Executive Order 12866 and the Regulatory Flexibility Act require Federal agencies to analyze the costs, benefits, and other consequences and impacts, including small business impacts, of their rules. Consistent with these requirements, OSHA has prepared a Final Economic Analysis (FEA) to accompany the final standard being published today. The final powered industrial truck operator training requirements will supplement and expand on the minimal training requirements previously found in OSHA's general industry standard (29 CFR 1910.178(l)) and will also apply to powered industrial truck operators in the marine cargo handling and construction industries.

It has been determined that this is an economically significant regulatory action under E.O. 12866, and a major rule under the Congressional Review provisions of the Small Business Regulatory Enforcement Fairness Act. Accordingly, OSHA has provided OIRA with an assessment of the costs, benefits and alternatives, as required by section 6(a)(3)(C) of E.O. 12866, which is summarized below.

This economic analysis includes a description of the industries affected by the standard, an assessment of the benefits attributable to adoption of the final standard, a determination of the technological feasibility of the standard's provisions, an estimate of the costs of compliance, a determination of the economic feasibility of compliance

with the final provisions, and an analysis of the economic and other impacts of the final rule on establishments, including small establishments, in the affected industries. For a full discussion of the data, analysis, and results presented in this summary, see the Final Economic Analysis in this rulemaking docket [Ex. 38].

Affected Industries

Using powered industrial truck sales data provided by the Industrial Truck Association (ITA), OSHA estimates that there are 998,671 industrial trucks in use in industries covered by the final standard. These industries include the agricultural services segment (SIC 07) of the agricultural industry, the oil and gas extraction segment of the mining industry (which are covered by OSHA's general industry standards), the construction sector (SICs 15-17), manufacturing (SICs 20-39), the transportation and utilities sectors (SICs 41-49), the wholesale and retail sectors (SICs 50-59), the finance, insurance, and real estate sectors (SICs 60-67), and the services sectors (SICs 70-89).

Industries with the largest number of powered industrial trucks include wholesale trade-non-durable goods (SIC 51), with an estimated 127,259 powered industrial trucks, and food and kindred products (SIC 20), with an estimated 82,144 such trucks. The construction and marine cargo handling (SIC 4491) sectors are estimated to have about 46,456 and 3,243 powered industrial trucks, respectively.

This final OSHA standard covers workers who operate powered industrial trucks. This includes operators using these vehicles in the general industry, construction, and maritime sectors (including shipyards, marine terminals, and longshoring operations). The population-at-risk in powered industrial truck accidents consists primarily of the

operators of these trucks. Operators of powered industrial trucks include workers employed as designated truck operators as well as those who might operate powered industrial trucks as part of another job. These alternate users of powered industrial trucks include shipping and receiving clerks, order pickers, maintenance personnel, and general temporary workers. Non-driving workers such as warehouse personnel, material handlers, laborers, and pedestrians who work on or are present in the vicinity of powered industrial trucks are also injured and killed in powered industrial truck accidents.

OSHA estimates that approximately 1.5 million workers are employed as industrial truck operators in the industries covered by this rule. Industries with the largest number of operators include wholesale trade (SIC 51), with 190,889 operators, and food and kindred products (SIC 20), with 123,215 operators. OSHA estimates that there are 69,684 and 12,973 powered industrial truck operators in the construction and marine cargo handling sectors, respectively.

Technological Feasibility

OSHA could not identify any requirement in the final standard that raises technological feasibility problems for establishments that use industrial trucks. On the contrary, there is substantial evidence that establishments can achieve compliance with all of the final rule's requirements using existing methods and equipment. In addition, the standard introduces no technological requirements of any type. Therefore, OSHA has concluded that the standard is technologically feasible for firms in all affected sectors.

Costs of Compliance

This final industrial truck operator training standard expands the training of truck operators already required by OSHA's existing standards (29 CFR

1910.178(l), 1917.27(a), 1918.98(a), and 1926.602(c)) to include information on operating trucks safely and on warnings appropriate to the type of truck used, the specific hazards found in the workplace where the truck will be operated, and the requirements of this standard. Additionally, the final standard requires employers to monitor the performance of industrial truck operators through a triennial evaluation and to provide refresher training when this evaluation, or other events, suggest that such training is needed.

OSHA estimates the annual cost of compliance with the final standard to be about \$16.9 million for all affected establishments in all covered industries. Table 11 outlines the annual costs by each sector affected by the final standard. Industry sectors with the highest estimated annualized compliance costs are manufacturing, with annual costs of \$8.3 million, and wholesale and retail trade, with annual costs of \$4.5 million. The annual costs of compliance for the construction and marine cargo handling sectors are estimated to be \$1.0 and \$0.2 million, respectively. Existing industry practice was taken into consideration when calculating costs, i.e., where employers have already voluntarily implemented practices that would be required by the final standard, no cost for these practices is attributed to the standard.

These estimates of the costs of compliance are lower than was the case for the proposed standard. The lower costs principally result from a change to the final rule that permits evaluations of operators to be performed once every three years rather than once every year, as proposed. Other minor changes to the standard also will result in lower costs and improved compliance, such as simplified certification, and these are discussed above in this Preamble as well as in the full FEA.

TABLE 11.—ESTIMATED ANNUALIZED COMPLIANCE COSTS FOR THE FINAL INDUSTRIAL TRUCK OPERATOR TRAINING STANDARD, BY PROVISION AND INDUSTRY

Industry sector	Initial training	Triennial evaluation	Refresher training	Total annual cost
Agriculture	\$13,023	\$3,788	\$940	\$17,751
Mining—Oil and Gas Extraction (SIC 13)	21,667	6,302	1,564	29,533
Construction	706,888	205,607	51,031	963,527
Manufacturing	6,061,548	1,763,078	437,594	8,262,220
Transportation and Utilities except SIC 4491	1,454,997	423,204	105,039	1,983,241
Longshoring and Marine Terminals (SIC 4491)	157,261	58,810	11,353	227,424
Wholesale and Retail Trade	3,282,343	954,711	236,958	4,474,012
Finance, Insurance, & Real Estate	47,594	13,843	3,436	64,873
Services	626,186	182,134	45,205	853,525
Total	12,371,506	3,611,478	893,121	16,876,105

Source: US Department of Labor, OSHA, Office of Regulatory Analysis, 1997.
Costs are annualized over 10 years at a 7 percent discount rate (annualization factor 0.1424).

Note: totals may not add due to rounding.

Many commenters (see, e.g., Exs. 11-3, 11-21, 7-60) to the record stated that the Agency had underestimated the costs of the standard. In most cases, these commenters failed to note that about 75 percent of affected establishments currently provide training that is equivalent, or nearly equivalent, to that required by the final standard. The Agency's estimate of 5.5 hours for initial training was within ranges provided by several commenters (4 hours, Bell Atlantic, Ex. 11-3; 8 hours, Tennessee Valley Authority, Ex. 11-21 and Monaco Group, Inc., Ex. 7-60).

Many commenters also questioned the utility of the annual evaluations proposed by OSHA, and several suggested that triennial evaluations of operator competence would be sufficient (see, e.g., American Society of Safety Engineers, Ex. 11-5; U.S. Small Business Administration, Ex. 7-41; and International Brotherhood of Teamsters, Ex. 11-18). The Agency has required triennial evaluations in the final

standard. Similarly, many commenters stated that the proposed certification requirements were unduly burdensome (see, e.g., National Association for Home Builders, Ex. 11-14; Storax, Ex. 7-9; and Air Transport Association, Ex. 7-40). Several commenters objected to the requirement for a signature on the certification, noting that requiring a signature would mean that the form could not be handled electronically (Union Electric, Ex. 11-18; Edison Electric Institute, Ex. 7-44, for example). In response to these comments, the final standard does not require a signature for training certification and contains a much simpler certification than the one proposed, including only the operator's name, date of evaluation or training, and name of trainer.

Benefits

An estimated 101 fatalities and 94,570 injuries are caused annually by industrial truck-related accidents. As presented in Table 12, OSHA estimates that compliance with the final standard

by establishments in all covered industries will avert 11 of these fatalities and 9,422 injuries per year. These fatalities and injuries are in addition to the lives saved and injuries prevented by OSHA's existing powered industrial truck operator training requirements, i.e., they represent only the incremental benefits of the new requirements. Estimates of benefits from the Final Economic Analysis are based on both general industry (including shipyards) and construction data, which were analyzed separately in the respective published proposals. In addition, the data sources for the Final Economic Analysis were expanded to include far more data than were available for the preliminary regulatory analysis published with the proposed standard. For example, estimates of the injuries potentially avoided as a result of the final rule are based on a national source (Bureau of Labor Statistics' "Survey of Occupational Injuries and Illnesses") rather than on data from only one state (California).

TABLE 12.—NUMBER OF FATALITIES AND INJURIES JUDGED TO BE POTENTIALLY AVERTED ANNUALLY BY COMPLIANCE WITH THE FINAL POWERED INDUSTRIAL TRUCK TRAINING STANDARD

Sector	Total number of powered industrial truck fatalities	Estimated number of fatalities potentially averted by compliance with the final standard	Total number of powered industrial truck injuries	Estimated number of injuries potentially averted by compliance with the final standard
Agriculture—Agricultural Services	0	0	47	5
Mining—Oil and Gas Extraction	1	0	0	0
Construction	16	2	2,380	237
Manufacturing	35	4	44,976	4,481
Transportation, Communications, and Utilities except Longshoring and Marine Terminals	16	2	10,698	1,066
Longshoring and Marine Terminals	3	0	275	27
Wholesale and Retail Trade	23	2	31,649	3,153
Finance, Insurance, and Real Estate	0	0	79	8
Services	7	1	4,466	445
All Covered Industries	101	11	94,570	9,422

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis, 1997.

OSHA has also adopted a more conservative methodology for estimating the number of fatalities and injuries that could be prevented by the final standard. This approach explains why the estimates of lives saved and injuries averted are lower than those projected in the Preliminary Regulatory Impact Analysis. Based on published reports, the Agency had estimated in the proposal that 44 to 77 percent of accidents could be avoided by compliance with the Agency's proposed rule. OSHA has since decided that a more conservative estimate of 25

percent of accidents more accurately reflects the percentage of accidents that will be averted by compliance with the final standard. This 25 percent reduction in fatalities applies to the Agency's estimated 42 fatalities each year that are potentially preventable, which results in an estimated 11 fatalities avoided each year under the final standard.

The Agency has also included estimates of the direct cost savings, or economic benefits, that occur when accidents are avoided. These economic benefits include the savings in medical

costs, value of lost output, savings in administrative costs of workers' compensation claims, and indirect costs to employers associated with injuries to employees. OSHA estimates that the value of the direct cost savings associated with these final rules is \$83 million per year. This estimate of cost savings considers only those powered industrial truck-related injuries that involve lost workdays, and thus is a substantial underestimate of the standard's true benefits.

The final standard will also reduce accident-related property damage and litigation costs. OSHA finds that the improved training required by the final standard will reduce property damage by an estimated \$52 million annually.

No economic benefits or savings are calculated either for avoiding loss of life or for the pain and suffering of injured

workers. This means that the benefits presented here substantially underestimate the benefits of this rule.

Economic Impacts and Regulatory Flexibility Analysis

OSHA has assessed the potential economic impacts of compliance with the final standard and has determined

that the standard is economically feasible for firms in all covered industry groups. On average, the annualized compliance costs of the standard amount only to 0.0001 percent of the sales and less than 0.01 percent of estimated pre-tax income for affected firms (Table 13).

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Table 13
Economic Impact of the Final Powered Industrial Truck Operator Training Standard

SIC	Industry	Value of Industry Shipments, Receipts or Sales a (\$millions)	Annualized Compliance Costs	Compliance Costs as a Percent of Sales	Pre-tax Profit (\$millions)	Compliance Costs as a Percent of Pre-tax Profit
7	Agricultural Services	NA	\$17,751	-	-	-
13	Oil and gas extraction	\$70,832	\$29,533	negligible	-	-
15	General Building Contractors	\$216,936	\$180,646	0.0001%	-	-
16	Heavy Construction - other than building	\$79,373	\$430,300	0.0005%	-	-
17	Construction - specialty trades	\$203,096	\$352,581	0.0002%	-	-
20	Food and kindred products	\$430,994	\$1,397,532	0.0003%	\$36,817	0.004%
21	Tobacco products	\$30,021	\$35,018	0.0001%	[1]	[1]
22	Textile mill products	\$78,267	\$306,318	0.0004%	\$1,609	0.019%
23	Apparel and other textile products	\$76,898	\$87,368	0.0001%	\$2,932	0.003%
24	Lumber and wood products	\$103,643	\$396,048	0.0004%	\$3,063	0.013%
25	Furniture and fixtures	\$50,039	\$154,574	0.0003%	\$2,274	0.007%
26	Paper and allied products	\$143,761	\$604,501	0.0004%	\$17,659	0.003%
27	Printing, publishing, and allied industries	\$176,381	\$347,349	0.0002%	\$14,188	0.002%
28	Chemicals and allied products	\$333,259	\$740,328	0.0002%	\$49,776	0.001%
29	Petroleum refining and related industries	\$143,150	\$72,865	0.0001%	\$16,656	0.000%
30	Rubber and miscellaneous plastics products	\$134,533	\$415,970	0.0003%	\$5,779	0.007%
31	Leather and leather products	\$9,545	\$37,494	0.0004%	[2]	[2]
32	Stone, clay, glass, and concrete products	\$71,227	\$314,807	0.0004%	\$4,156	0.008%
33	Primary metal industries	\$160,771	\$452,049	0.0003%	\$11,052	0.004%
34	Fabricated metal products	\$190,172	\$568,422	0.0003%	\$8,290	0.007%
35	Industrial & commercial machinery & computer equip.	\$314,423	\$1,104,183	0.0004%	\$22,957	0.005%
36	Electric and electronic equipment	\$257,800	\$392,625	0.0002%	\$35,497	0.001%
37	Transportation equipment	\$452,363	\$548,260	0.0001%	\$28,339	0.002%
38	Instruments and related equipment	\$138,798	\$112,482	0.0001%	\$15,558	0.001%
39	Miscellaneous manufacturing industries	\$44,156	\$174,028	0.0004%	\$2,049	0.008%
41	Local, suburban, and interurban passenger transit	\$10,441	\$39,876	0.0004%	-	-
42	Trucking and warehousing	\$103,723	\$1,399,336	0.0013%	-	-
44	Water transportation	\$19,956	\$246,141	0.0012%	-	-
45	Transportation by air	\$96,263	\$146,892	0.0002%	-	-
46	Pipelines, except natural gas	\$2,008	\$3,255	0.0002%	-	-
47	Transportation services	\$64,356	\$120,850	0.0002%	-	-
48	Communications	\$280,098	\$47,201	negligible	-	-
49	Electric, gas, and sanitary services	\$345,852	\$207,113	0.0001%	-	-
50	Durable goods	\$1,088,903	\$1,061,474	0.0001%	\$8,364	0.013%
51	Nondurable goods	\$980,445	\$1,760,781	0.0002%	\$8,801	0.020%
52	Building materials and garden supplies	\$122,533	\$341,167	0.0003%	-	-
53	General merchandise stores	\$286,447	\$327,935	0.0001%	\$10,641	0.003%
54	Food stores	\$397,800	\$552,887	0.0001%	\$5,261	0.011%
55	Automotive dealers and service stations	\$668,512	\$53,505	negligible	-	-
56	Apparel and accessory stores	\$109,603	\$31,643	negligible	-	-
57	Furniture and home furnishings stores	\$119,626	\$109,312	0.0001%	-	-
58	Eating and drinking places	\$228,351	\$22,438	negligible	-	-
59	Miscellaneous retail [d]	\$266,358	\$212,870	0.0001%	-	-
60	Banking	\$503,386	\$12,693	negligible	-	-
61	Credit agencies other than banks	\$198,163	\$5,289	negligible	-	-
62	Security and commodity brokers and services	\$76,066	\$4,231	negligible	-	-
63	Insurance carriers	\$837,166	\$22,917	negligible	-	-
64	Insurance agents, brokers, and services	\$39,333	\$2,468	negligible	-	-
65	Real estate	\$116,629	\$11,282	negligible	-	-
67	Holding and other investment offices	\$129,685	\$5,994	negligible	-	-
70	Hotels and other lodging places	\$66,964	\$10,748	negligible	-	-
72	Personal services	\$60,348	\$10,748	negligible	-	-
73	Business services	\$335,807	\$452,271	0.0001%	-	-
75	Auto repair, services, and parking	\$85,494	\$120,506	0.0001%	-	-
76	Miscellaneous repair services	\$36,306	\$33,546	0.0001%	-	-
78	Motion pictures	\$48,130	\$13,679	negligible	-	-
79	Amusement and recreation services	\$59,382	\$19,867	negligible	-	-
80	Health services	\$304,135	\$57,973	negligible	-	-
81	Legal services	\$101,104	\$3,583	negligible	-	-
82	Educational services	\$4,764	\$51,460	0.0011%	-	-
83	Social services	\$16,502	\$17,587	0.0001%	-	-
84	Museums, art galleries, botanical & zoological gardens	\$101,104	\$977	negligible	-	-
86	Membership organizations	NA	\$6,188	-	-	-
87	Engineering, accounting, research & management svcs.	\$223,700	\$41,689	negligible	-	-
89	Miscellaneous services, n.e.c.	NA	\$12,702	-	-	-
		\$12,445,881	\$16,876,105	0.0001%		<0.01%

Source: US Department of Labor, OSHA, Office of Regulatory Analysis, 1997.

NEC: Not elsewhere classified

Negligible denotes less than 0.0001 percent.

[1] included in SIC 20.

[2] included in SIC 23

These figures suggest that even under the worst-case assumption of no cost pass-through, prices would be little affected by the standard. The two-digit industry sectors with the highest costs of compliance, trucking and warehousing (SIC 42) and water transportation (SIC 44), have costs of compliance that are 0.0013 and 0.0012 percent of revenues respectively. The industry with the greatest reduction in profits, nondurable goods (SIC 51), has a reduction in profits of 0.02 percent. Clearly, such potential small increases in prices and reductions in profits are economically feasible, and the Agency therefore concludes that the final standard is economically feasible for all affected industries.

These potential economic impacts overestimate the likely economic impact of the standard because they do not include any consideration of the economic benefits of the standard that may accrue to employers, such as reduced worker compensation costs and reduced property damage. OSHA estimates that reduced property damage alone would be sufficient to more than offset the total costs of the standard. In the Preliminary Regulatory Impact Analysis developed in support of OSHA's 1995 proposal [Ex. 2], the Agency examined the impact of the proposed standard on different sizes of establishments. Based on that analysis, the Agency certified that the proposed

standard would not have a significant economic impact on a substantial number of small entities. Upon review of comments and other data submitted to the record of this rulemaking, the Agency has analyzed the final rule's impact on small entities, as defined by the Small Business Administration (SBA) and in accordance with the Regulatory Flexibility Act. In addition, in order to ensure that the smallest entities are not significantly impacted, the Agency also performed an analysis of impacts on the smallest establishments, i.e., those with fewer than 20 employees.

The impacts of the standard on sales and profits did not exceed 1 percent for small firms in any covered industry, whether the analysis used the SBA's definitions or the fewer-than-20-employee size class definition. In fact, the largest reduction in profit in any sector was 0.024% for small businesses in trucking and warehouses (SIC 42). Because the incremental costs of the final rule are primarily related to the number of powered industrial truck operators per establishment, the standard does not have a differential impact on small entities. If the costs of compliance were influenced by economies of scale, such effects would have been demonstrated by OSHA's analysis of the smallest firms, i.e., those with fewer than 20 employees. However, no such effects were seen,

even among firms in this smallest size-class. Therefore, the Agency has no reason to conclude that establishments or firms in intermediate size groupings, i.e., those in the range between 20 employees and the employment size cutoff for the applicable SIC-specific SBA definition, would experience larger impacts.

Based on this finding, the Agency certifies that the final Powered Industrial Truck Operator Training standard will not have a significant adverse economic impact on a substantial number of small entities. The results of OSHA's analysis of small business impacts on firms within the SBA's size classifications are shown in Table 14.

Unfunded Mandates

The final Powered Industrial Truck Operator Training standard has been reviewed in accordance with the Unfunded Mandates Reform Act of 1995 (UMRA) (U.S.C. 1501 et seq.) and Executive Order 12875. For purposes of the UMRA as well as the Executive Order, the Agency certifies that the final standard does not include any Federal mandate that may result in increased expenditures by State, local, or tribal governments, or increased expenditures by the private sector of more than \$100 million in any year.

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Table 14
Annual Cost of the Final Standards for Powered Industrial Truck Operator Training
as a Percent of Sales and Profit for Small Firms as Defined by the Small Business Administration

SIC Industry	Affected Firm Size Class	Number of Affected Firms	Value of Industry Shipments or Sales (\$millions)	Pre-Tax Profit (\$millions)	Annual Compliance Costs	Compliance Costs as a Percent of	
						Sales	Pre-tax Profits
078 Agricultural services	\$5 million*	41,072	\$9,538	NA	\$7,906	0.0001%	NA
08 Forestry	\$5 million*	1,602	\$951	\$37	\$2,753	0.0003%	0.007%
09 Fishing, hunting, and trapping	\$3 million*	1,315	\$425	\$14	\$1,349	0.0003%	0.010%
13 Oil and gas extraction	500 employees	14,366	\$31,887	\$1,682	\$12,699	0.0000%	0.001%
15 General contractors and operative builders	\$17 million*	144,497	\$164,776	\$6,653	\$130,607	0.0001%	0.002%
16 Heavy construction, except building	\$17 million*	28,080	\$51,202	\$2,467	\$208,265	0.0004%	0.008%
17 Special trade contractors	\$7 million*	317,306	\$180,459	\$9,152	\$290,174	0.0002%	0.003%
20 Food and kindred products	500 employees	14,190	\$110,387	\$5,205	\$394,104	0.0004%	0.008%
21 Tobacco products	500 employees	57	\$861	\$83	\$2,206	0.0003%	0.003%
22 Textile mill products	500 employees	4,804	\$21,281	\$1,184	\$90,670	0.0004%	0.008%
23 Apparel and other textile products	500 employees	19,069	\$37,597	\$1,619	\$49,800	0.0001%	0.003%
24 Lumber and wood products	500 employees	30,646	\$52,306	\$2,778	\$264,164	0.0005%	0.010%
25 Furniture and fixtures	500 employees	9,596	\$21,528	\$1,019	\$77,287	0.0004%	0.008%
26 Paper and allied products	500 employees	3,845	\$29,526	\$1,890	\$162,006	0.0005%	0.009%
27 Printing and publishing	500 employees	54,808	\$79,992	\$4,860	\$180,622	0.0002%	0.004%
28 Chemicals and allied products	500 employees	7,457	\$62,139	\$3,919	\$139,922	0.0002%	0.004%
29 Petroleum and coal products	500 employees	985	\$12,392	\$547	\$12,241	0.0001%	0.002%
30 Rubber and miscellaneous plastics products	500 employees	11,699	\$51,865	\$3,747	\$194,674	0.0004%	0.005%
31 Leather and leather products	500 employees	1,624	\$4,071	\$139	\$16,310	0.0004%	0.012%
32 Stone, clay, and glass products	500 employees	11,051	\$27,843	\$1,746	\$146,700	0.0005%	0.008%
33 Primary metal industries	500 employees	4,716	\$32,264	\$2,012	\$135,163	0.0004%	0.007%
34 Fabricated metal products	500 employees	30,097	\$89,152	\$6,157	\$321,158	0.0004%	0.005%
35 Industrial machinery and equipment	500 employees	46,961	\$100,346	\$7,637	\$526,695	0.0005%	0.007%
36 Electronic and other electronic equipment	500 employees	12,886	\$53,944	\$3,712	\$114,254	0.0002%	0.003%
37 Transportation equipment	500 employees	8,674	\$31,584	\$1,737	\$77,305	0.0002%	0.004%
38 Instruments and related products	500 employees	9,010	\$31,106	\$2,196	\$29,695	0.0001%	0.001%
39 Miscellaneous manufacturing industries	500 employees	14,791	\$25,232	\$1,450	\$117,295	0.0005%	0.008%
41 Local and interurban passenger transit	\$5 million*	13,455	\$6,450	\$212	\$18,343	0.0003%	0.009%
42 Trucking and warehousing	\$18.5 million*	83,667	\$64,742	\$2,575	\$590,520	0.0009%	0.023%
44 Water transportation	500 employees	5,875	\$12,523	\$603	\$114,948	0.0009%	0.019%
45 Transportation by air	1500 employee	4,582	\$10,599	\$441	\$14,542	0.0001%	0.003%
46 Pipelines, except natural gas	1500 employee	39	\$693	\$227	\$290	0.0000%	0.000%
47 Transportation services	\$5 million*	33,266	\$13,914	\$576	\$69,489	0.0005%	0.012%
48 Communication	1500 employee	12,509	\$30,662	\$4,674	\$9,204	0.0000%	0.000%
49 Electric, gas, and sanitary services	\$5 million*	7,354	\$6,926	\$523	\$7,456	0.0001%	0.001%
50 Wholesale trade - durable goods	100 employees	219,565	\$897,053	\$46,824	\$596,548	0.0001%	0.001%
51 Wholesale trade - nondurable goods	100 employees	127,029	\$773,401	\$30,654	\$820,524	0.0001%	0.003%
52 Building materials and garden supplies	\$5 million*	50,330	\$35,838	\$1,391	\$118,044	0.0003%	0.008%
53 General merchandise stores	\$5 million*	9,641	\$3,845	\$140	\$5,247	0.0001%	0.004%
54 Food stores	\$5 million*	128,388	\$97,965	\$2,420	\$165,866	0.0002%	0.007%
55 Automotive dealers and service stations	\$5 million*	120,653	\$135,133	\$3,498	\$15,302	0.0000%	0.000%
56 Apparel and accessory stores	\$5 million*	58,287	\$22,281	\$1,337	\$5,632	0.0000%	0.000%
57 Furniture and homefurnishings stores	\$5 million*	77,200	\$42,755	\$2,062	\$43,725	0.0001%	0.002%
58 Eating and drinking places	\$5 million*	285,736	\$112,289	\$4,756	\$11,802	0.0000%	0.000%
59 Miscellaneous retail	\$5 million*	220,388	\$99,082	\$5,012	\$82,168	0.0001%	0.002%
60 Depository institutions	\$5 million*	15,139	\$16,124	NA	\$597	0.0000%	NA
61 Nondepository institutions	\$5 million*	13,094	\$10,932	\$854	\$603	0.0000%	0.000%
62 Security and commodity brokers	\$5 million*	14,639	\$10,790	\$641	\$482	0.0000%	0.000%
63 Insurance carriers	\$5 million*	5,275	\$4,412	NA	\$252	0.0000%	NA
64 Insurance agents, brokers, and service	\$5 million*	101,772	\$36,821	NA	\$1,723	0.0000%	NA
65 Real estate	\$5 million*	183,938	\$109,143	\$15,272	\$7,774	0.0000%	0.000%
67 Holding and other investment offices	\$5 million*	16,665	\$16,609	\$1,608	\$1,271	0.0000%	0.000%
70 Hotels and other lodging places	\$5 million*	35,505	\$18,992	\$1,618	\$2,751	0.0000%	0.000%
72 Personal services	\$5 million*	150,783	\$31,608	\$2,096	\$7,352	0.0000%	0.000%
73 Business services	\$5 million*	223,314	\$124,891	\$7,686	\$143,822	0.0001%	0.002%
75 Auto repair, services, and parking	\$5 million*	134,281	\$50,584	\$2,866	\$89,657	0.0002%	0.003%
76 Miscellaneous repair services	\$5 million*	59,611	\$22,430	\$1,433	\$23,113	0.0001%	0.002%
78 Motion pictures	\$5 million*	24,072	\$8,836	\$654	\$2,968	0.0000%	0.000%
79 Amusement and recreation services	\$5 million*	62,496	\$35,211	\$1,382	\$10,808	0.0000%	0.001%
80 Health services	\$5 million*	383,120	\$210,585	\$10,804	\$14,899	0.0000%	0.000%
81 Legal services	\$5 million*	131,500	\$44,099	\$6,091	\$1,662	0.0000%	0.000%
82 Educational services	\$5 million*	31,060	\$22,279	\$902	\$12,968	0.0001%	0.001%
83 Social services	\$5 million*	93,940	\$36,264	\$1,565	\$9,022	0.0000%	0.001%
84 Museums, botanical, zoological gardens	\$5 million*	2,838	\$1,535	\$99	\$428	0.0000%	0.000%
86 Membership organizations	\$5 million*	220,674	\$68,120	\$3,082	\$4,771	0.0000%	0.000%
87 Engineering and management services	\$5 million*	192,434	\$100,639	\$6,220	\$19,635	0.0000%	0.000%
89 Services, n.e.c.	\$5 million*	10,585	\$5,317	\$354	\$8,498	0.0002%	0.002%

Source: US Department of Labor, Occupational Safety and Health Administration, Office of Regulatory Analysis, 1997.

* Annual Receipts.

[a] As per 61 FR 3289, January 31, 1996.

OSHA standards do not apply to State and local governments, except in States that have voluntarily elected to adopt an OSHA State Plan. Consequently, the Powered Industrial Truck Operators Training rule does not meet the definition of a "Federal intergovernmental mandate" (Section 421(5) of the UMRA (2 U.S.C. 658(5)). In addition, the Agency has concluded, based on review of the rulemaking record, that few, if any, of the affected employers are State, local, and tribal governments.

XI. Environmental Impact

The final rule has been reviewed in accordance with the requirements of the National Environmental Policy Act of 1969 (42 U.S.C. 4321, *et seq.*), the regulations of the Council on Environmental Quality (40 CFR Part 1500 through 1517), and the Department of Labor's NEPA procedures (29 CFR part 11). As a result of this review, OSHA has determined that the final standard will have no significant environmental impact.

XII. OMB Review Under the Paperwork Reduction Act

This final rule contains collection of information requirements. Under paragraph (l)(6), employers are required to prepare a certification record whenever an operator has received training or has been evaluated. The certification record includes the name of the operator, the date of the training or evaluation, and the identity of the person(s) who performed the training or evaluation. Paragraph (l)(3) requires initial training and evaluation; paragraph (l)(4) establishes conditions requiring refresher training and evaluation and periodic evaluations (once every three years); and paragraph (l)(5) requires the employer to evaluate the adequacy of previous training. A certification record must be prepared whenever one of these activities occurs.

OMB submitted comments on the proposed collections of information (paperwork) (Exs. L-39, L-40) for powered industrial truck operator training. OMB's concerns focused on the burden associated with some elements of operator training, the need for annual evaluations, and the need for comprehensive certification requirements contained in the proposed rules. The final rule addresses OMB's concerns and greatly reduces information collection burdens, as discussed below.

OSHA received 109 written comments on the proposed rule, along with testimony from 22 participants at the public hearings. There was significant

opposition to the paperwork burdens associated with the proposed standard. Some indicated that the proposed requirements were too extensive. Others believed that they were a necessary tool to make the training program effective. Based on its review of this information, OSHA has made several changes that substantially reduce both the amount and the frequency of information collection, but retain the minimum necessary for an effective training program. First, OSHA has determined that the proposed annual evaluation of operators should be changed to triennial evaluation. Second, the Agency has eliminated the initial evaluation of employees to determine their training needs, and added an evaluation of the employee's performance after receiving training. Third, OSHA has removed the proposed requirement for employers to sign training and evaluation records. Finally, OSHA has eliminated the proposed requirement for the employer to retain training materials. Section VIII of this Preamble discusses at length the record evidence on these provisions and other issues relating to information collection.

In summary, OSHA estimates that there are 1,540,315 operators of powered industrial trucks in the industries covered by this final rule. A total of 759,571 hours will be needed for employers to comply with the information collection requirements for training and evaluation of these employees in the first year, and 543,860 hours in each subsequent year. These estimates are based on information in OSHA's Final Economic Analysis for the final rule.

In accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. 3501-3520), OSHA requested OMB approval of the collection of information requirement described above. On November 18, 1998, the Office of Management and Budget granted approval of the information requirements under Office of Management and Budget Control Number 1218-0242.

XIII. State Plan Standards

The 25 States with their own OSHA-approved occupational safety and health plans must adopt comparable standards within six months of the publication date of this final standard. These States are: Alaska, Arizona, California, Connecticut (for State and local government employees only), Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, New York (for State and local government employees only), North Carolina, Oregon, Puerto Rico, South

Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington, and Wyoming. Until such time as a State standard is promulgated, Federal OSHA will provide interim enforcement assistance, as appropriate, in those States.

XIV. Federalism and Children's Executive Order

These regulations have been reviewed in accordance with Executive Order 12875 (52 FR 58093, Oct. 28, 1993) regarding Federalism. The orders require that agencies, to the extent possible, refrain from limiting state policy options, consult with states prior to taking any actions which would restrict state policy options, and take such actions only when there is clear constitutional authority and the presence of a problem of national scope. The Order provides for preemption of state law only if there is a clear Congressional intent for the Agency to do so. Any such preemption is to be limited to the extent possible.

In accordance with Executive Order 13045, OSHA has evaluated the environmental safety and health effects of the rule on children. The Agency has determined that the final rule will have no effect on children.

Section 18 of the Occupational Safety and Health Act (OSH Act) expresses Congress' intent to preempt State laws relating to issues on which Federal OSHA has promulgated occupational safety and health standards. Under the OSH Act, a State can avoid preemption on issues covered by Federal standards only if it submits, and obtains Federal approval of, a plan for the development of such standards and their enforcement. Occupational safety and health standards developed by such Plan States must, among other things, be at least as effective in providing safe and healthful employment and places of employment as the Federal standards. When such standards are applicable to products distributed or used in interstate commerce, they may not unduly burden commerce and must be justified by compelling local conditions.

The Federal standard on powered industrial truck operator training addresses hazards that are not unique to any one State or region of the country. Nonetheless, States with occupational safety and health plans approved under section 18 of the OSH Act will be able to develop their own State standards to deal with any special problems that might be encountered in a particular State. Moreover, because this standard is written in general, performance-oriented terms, there is considerable flexibility for State Plans to require, and

for affected employers to use, methods of compliance that are appropriate to the working conditions covered by these standards.

In brief, these rules address a clear national problem related to occupational safety and health in general industry, construction, shipyard, and the marine cargo-handling industries. Those states that have elected to participate under section 18 of the OSH Act are not preempted by these standards, and will be able to address any special conditions within the framework of the Federal Act while ensuring that the State standards are at least as effective as the Federal standard.

XV. List of Subjects

29 CFR part 1910

Motor vehicle safety, Occupational safety and health, Transportation.

29 CFR part 1915

Shipyards industry, Motor vehicle safety, Occupational safety and health, Transportation.

29 CFR part 1917

Marine terminals, Motor vehicle safety, Occupational safety and health, Vessels.

29 CFR part 1918

Longshoring, Motor vehicle safety, Occupational safety and health, Vessels.

29 CFR part 1926

Construction industry, Motor vehicle safety, Occupational safety and health, Transportation.

XVI. Authority

This document was prepared under the direction of Charles N. Jeffress, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Avenue, NW., Washington, DC 20210.

Accordingly, pursuant to sections 4, 6(b), 8(c), and 8(g) of the Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657), section 107 of the Construction Work Hours and Safety Act (Construction Safety Act) (40 U.S.C. 333), section 41 of the Longshore and Harbor Workers Compensation Act (33 U.S.C. 941), Secretary of Labor's Order 6-96 (62 FR 111), and 29 CFR part 1911, 29 CFR parts 1910, 1915, 1917, 1918, and 1926 are amended as set forth below.

Signed at Washington, DC, this 17th day of November, 1998.

Charles N. Jeffress,
Assistant Secretary of Labor.

PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS [AMENDED]

1. The authority citation for subpart B of part 1910 continues to read as follows:

Authority: Secs. 4, 6, and 8 of the Occupational Safety and Health Act, 29 U.S.C. 653, 655, 657; Walsh-Healey Act, 41 U.S.C. 35 et seq.; Service Contract Act of 1965, 41 U.S.C. 351 et seq.; Sec. 107, Contract Work Hours and Safety Standards Act (Construction Safety Act), 40 U.S.C. 333; Sec. 41, Longshore and Harbor Workers' Compensation Act, 33 U.S.C. 941; National Foundation of Arts and Humanities Act, 20 U.S.C. 951 et seq.; Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033), or 6-96 (62 FR 111), as applicable; and 29 CFR Part 1911.

2. Section 1910.16 is amended by adding new paragraphs (a)(2)(x) and (b)(2)(xiv), by removing the word "and" from the end of paragraph (b)(2)(xii) and by removing the period at the end of paragraph (b)(2)(xiii)(D) and adding in its place a semicolon and the word "and" as follows:

§ 1910.16 Longshoring and marine terminals.

- (a) * * *
- (2) * * *
- (x) Powered industrial truck operator training, Subpart N, § 1910.178(l).
- (b) * * *
- (2) * * *
- (xiv) Powered industrial truck operator training, Subpart N, § 1910.178(l).

* * * * *

3. The authority citation for subpart N of part 1910 is revised to read as follows:

Authority: Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033) or 6-96 (62 FR 111), as applicable.

Sections 1910.176, 1910.177, 1910.178, 1910.179, 1910.180, 1910.181, and 1910.184 also issued under 29 CFR part 1911.

4. Section 1910.178 is amended by revising paragraph (l) and by adding Appendix A at the end of the section to read as follows:

§ 1910.178 Powered industrial trucks.

* * * * *

- (l) Operator training.
 - (1) *Safe operation.* (i) The employer shall ensure that each powered

industrial truck operator is competent to operate a powered industrial truck safely, as demonstrated by the successful completion of the training and evaluation specified in this paragraph (l).

(ii) Prior to permitting an employee to operate a powered industrial truck (except for training purposes), the employer shall ensure that each operator has successfully completed the training required by this paragraph (l), except as permitted by paragraph (l)(5).

(2) *Training program implementation.*
(i) Trainees may operate a powered industrial truck only:

(A) Under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence; and

(B) Where such operation does not endanger the trainee or other employees.

(ii) Training shall consist of a combination of formal instruction (e.g., lecture, discussion, interactive computer learning, video tape, written material), practical training (demonstrations performed by the trainer and practical exercises performed by the trainee), and evaluation of the operator's performance in the workplace.

(iii) All operator training and evaluation shall be conducted by persons who have the knowledge, training, and experience to train powered industrial truck operators and evaluate their competence.

(3) *Training program content.*
Powered industrial truck operators shall receive initial training in the following topics, except in topics which the employer can demonstrate are not applicable to safe operation of the truck in the employer's workplace.

- (i) Truck-related topics:
 - (A) Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate;
 - (B) Differences between the truck and the automobile;
 - (C) Truck controls and instrumentation: where they are located, what they do, and how they work;
 - (D) Engine or motor operation;
 - (E) Steering and maneuvering;
 - (F) Visibility (including restrictions due to loading);
 - (G) Fork and attachment adaptation, operation, and use limitations;
 - (H) Vehicle capacity;
 - (I) Vehicle stability;
 - (J) Any vehicle inspection and maintenance that the operator will be required to perform;
 - (K) Refueling and/or charging and recharging of batteries;

- (L) Operating limitations;
- (M) Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of vehicle that the employee is being trained to operate.
- (ii) Workplace-related topics:
 - (A) Surface conditions where the vehicle will be operated;
 - (B) Composition of loads to be carried and load stability;
 - (C) Load manipulation, stacking, and unstacking;
 - (D) Pedestrian traffic in areas where the vehicle will be operated;
 - (E) Narrow aisles and other restricted places where the vehicle will be operated;
 - (F) Hazardous (classified) locations where the vehicle will be operated;
 - (G) Ramps and other sloped surfaces that could affect the vehicle's stability;
 - (H) Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust;

- (I) Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.
 - (iii) The requirements of this section.
 - (4) *Refresher training and evaluation.*
 - (i) Refresher training, including an evaluation of the effectiveness of that training, shall be conducted as required by paragraph (I)(4)(ii) to ensure that the operator has the knowledge and skills needed to operate the powered industrial truck safely.
 - (ii) Refresher training in relevant topics shall be provided to the operator when:
 - (A) The operator has been observed to operate the vehicle in an unsafe manner;
 - (B) The operator has been involved in an accident or near-miss incident;
 - (C) The operator has received an evaluation that reveals that the operator is not operating the truck safely;
 - (D) The operator is assigned to drive a different type of truck; or
 - (E) A condition in the workplace changes in a manner that could affect safe operation of the truck.

- (iii) An evaluation of each powered industrial truck operator's performance shall be conducted at least once every three years.
- (5) *Avoidance of duplicative training.* If an operator has previously received training in a topic specified in paragraph (I)(3) of this section, and such training is appropriate to the truck and working conditions encountered, additional training in that topic is not required if the operator has been evaluated and found competent to operate the truck safely.
- (6) *Certification.* The employer shall certify that each operator has been trained and evaluated as required by this paragraph (I). The certification shall include the name of the operator, the date of the training, the date of the evaluation, and the identity of the person(s) performing the training or evaluation.
- (7) *Dates.* The employer shall ensure that operators of powered industrial trucks are trained, as appropriate, by the dates shown in the following table.

If the employee was hired:	The initial training and evaluation of that employee must be completed:
Before December 1, 1999	By December 1, 1999.
After December 1, 1999	Before the employee is assigned to operate a powered industrial truck.

(8) Appendix A to this section provides non-mandatory guidance to assist employers in implementing this paragraph (I). This appendix does not add to, alter, or reduce the requirements of this section.

* * * * *

Appendix A—Stability of Powered Industrial Trucks (Non-mandatory Appendix to Paragraph (I) of This Section)

A-1. Definitions.

The following definitions help to explain the principle of stability:

Center of gravity is the point on an object at which all of the object's weight is concentrated. For symmetrical loads, the center of gravity is at the middle of the load.

Counterweight is the weight that is built into the truck's basic structure and is used to offset the load's weight and to maximize the vehicle's resistance to tipping over.

Fulcrum is the truck's axis of rotation when it tips over.

Grade is the slope of a surface, which is usually measured as the number of feet of rise or fall over a hundred foot horizontal distance (the slope is expressed as a percent).

Lateral stability is a truck's resistance to overturning sideways.

Line of action is an imaginary vertical line through an object's center of gravity.

Load center is the horizontal distance from the load's edge (or the fork's or other attachment's vertical face) to the line of action through the load's center of gravity.

Longitudinal stability is the truck's resistance to overturning forward or rearward.

Moment is the product of the object's weight times the distance from a fixed point (usually the fulcrum). In the case of a powered industrial truck, the distance is measured from the point at which the truck will tip over to the object's line of action. The distance is always measured perpendicular to the line of action.

Track is the distance between the wheels on the same axle of the truck.

Wheelbase is the distance between the centerline of the vehicle's front and rear wheels.

A-2. General.

A-2.1. Determining the stability of a powered industrial truck is simple once a few basic principles are understood. There are many factors that contribute to a vehicle's stability: the vehicle's wheelbase, track, and height; the load's weight distribution; and the vehicle's counterweight location (if the vehicle is so equipped).

A-2.2. The "stability triangle," used in most stability discussions, demonstrates stability simply.

A-3. Basic Principles.

A-3.1. Whether an object is stable depends on the object's moment at one end of a system being greater than, equal to, or smaller than the object's moment at the system's other end. This principle can be seen in the way a see-saw or teeter-totter works: that is, if the product of the load and distance from the fulcrum (moment) is equal to the moment at the device's other end, the

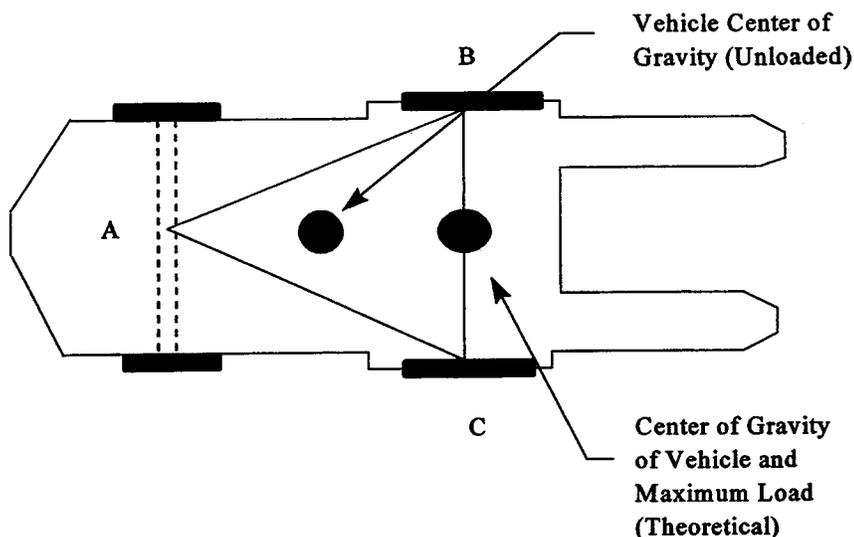
device is balanced and it will not move. However, if there is a greater moment at one end of the device, the device will try to move downward at the end with the greater moment.

A-3.2. The longitudinal stability of a counterbalanced powered industrial truck depends on the vehicle's moment and the load's moment. In other words, if the mathematic product of the load moment (the distance from the front wheels, the approximate point at which the vehicle would tip forward) to the load's center of gravity times the load's weight is less than the vehicle's moment, the system is balanced and will not tip forward. However, if the load's moment is greater than the vehicle's moment, the greater load-moment will force the truck to tip forward.

A-4. The Stability Triangle.

A-4.1. Almost all counterbalanced powered industrial trucks have a three-point suspension system, that is, the vehicle is supported at three points. This is true even if the vehicle has four wheels. The truck's steer axle is attached to the truck by a pivot pin in the axle's center. When the points are connected with imaginary lines, this three-point support forms a triangle called the stability triangle. Figure 1 depicts the stability triangle.

Figure 1.

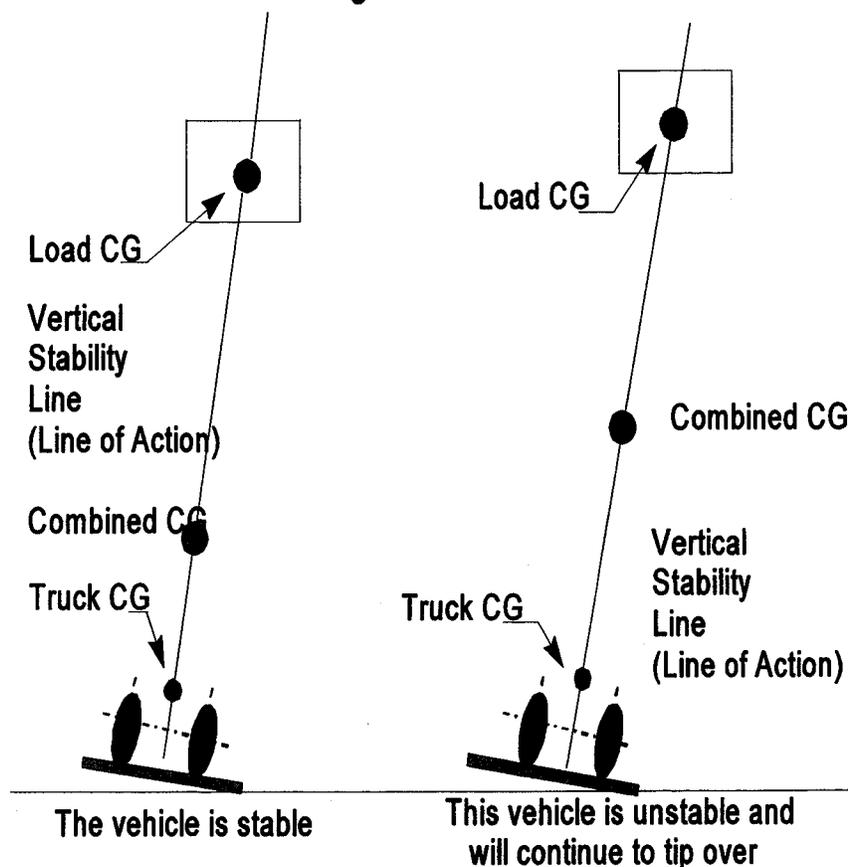


Notes:

- 1. When the vehicle is loaded, the combined center of gravity (CG) shifts toward line B-C. Theoretically the maximum load will result in the CG at the line B-C. In actual practice, the combined CG should never be at line B-C.**
- 2. The addition of additional counterweight will cause the truck CG to shift toward point A and result in a truck that is less stable laterally.**

A-4.2. When the vehicle's line of action, or load center, falls within the stability triangle, the vehicle is stable and will not tip over. However, when the vehicle's line of action or the vehicle/load combination falls outside the stability triangle, the vehicle is unstable and may tip over. (See Figure 2.)

Figure 2.



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A-5. Longitudinal Stability.

A-5.1. The axis of rotation when a truck tips forward is the front wheels' points of contact with the pavement. When a powered industrial truck tips forward, the truck will rotate about this line. When a truck is stable, the vehicle-moment must exceed the load-moment. As long as the vehicle-moment is equal to or exceeds the load-moment, the vehicle will not tip over. On the other hand, if the load moment slightly exceeds the vehicle-moment, the truck will begin to tip forward, thereby causing the rear to lose contact with the floor or ground and resulting in loss of steering control. If the load-moment greatly exceeds the vehicle moment, the truck will tip forward.

A-5.2. To determine the maximum safe load-moment, the truck manufacturer normally rates the truck at a maximum load at a given distance from the front face of the forks. The specified distance from the front face of the forks to the line of action of the load is commonly called the load center. Because larger trucks normally handle loads that are physically larger, these vehicles have greater load centers. Trucks with a capacity of 30,000 pounds or less are normally rated at a given load weight at a 24-inch load center. Trucks with a capacity greater than 30,000 pounds are normally rated at a given load weight at a 36- or 48-inch load center. To safely operate the vehicle, the operator should always check the data plate to

determine the maximum allowable weight at the rated load center.

A-5.3. Although the true load-moment distance is measured from the front wheels, this distance is greater than the distance from the front face of the forks. Calculating the maximum allowable load-moment using the load-center distance always provides a lower load-moment than the truck was designed to handle. When handling unusual loads, such as those that are larger than 48 inches long (the center of gravity is greater than 24 inches) or that have an offset center of gravity, etc., a maximum allowable load-moment should be calculated and used to determine whether a load can be safely handled. For example, if an operator is operating a 3000 pound capacity truck (with a 24-inch load center), the maximum allowable load-moment is 72,000 inch-pounds (3,000 times 24). If a load is 60 inches long (30-inch load center), then the maximum that this load can weigh is 2,400 pounds (72,000 divided by 30).

A-6. Lateral Stability.

A-6.1. The vehicle's lateral stability is determined by the line of action's position (a vertical line that passes through the combined vehicle's and load's center of gravity) relative to the stability triangle. When the vehicle is not loaded, the truck's center of gravity location is the only factor to be considered in determining the truck's stability. As long as the line of action of the

combined vehicle's and load's center of gravity falls within the stability triangle, the truck is stable and will not tip over.

However, if the line of action falls outside the stability triangle, the truck is not stable and may tip over. Refer to Figure 2.

A-6.2. Factors that affect the vehicle's lateral stability include the load's placement on the truck, the height of the load above the surface on which the vehicle is operating, and the vehicle's degree of lean.

A-7. Dynamic Stability.

A-7.1. Up to this point, the stability of a powered industrial truck has been discussed without considering the dynamic forces that result when the vehicle and load are put into motion. The weight's transfer and the resultant shift in the center of gravity due to the dynamic forces created when the machine is moving, braking, cornering, lifting, tilting, and lowering loads, etc., are important stability considerations.

A-7.2. When determining whether a load can be safely handled, the operator should exercise extra caution when handling loads that cause the vehicle to approach its maximum design characteristics. For example, if an operator must handle a maximum load, the load should be carried at the lowest position possible, the truck should be accelerated slowly and evenly, and the forks should be tilted forward cautiously. However, no precise rules can be formulated to cover all of these eventualities.

PART 1915—OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR SHIPYARD EMPLOYMENT [AMENDED]

1. The authority citation for part 1915 is revised to read as follows:

Authority: Section 41, Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941); secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033), or 6-96 (62 FR 111), as applicable.

Sections 1915.120 and 1915.152 also issued under 29 CFR 1911.

2. A new § 1915.120 is added to subpart G to read as follows:

§ 1915.120 Powered Industrial Truck Operator Training

Note: The requirements applicable to shipyard employment under this section are identical to those set forth at § 1910.178(l) of this chapter.

PART 1917—MARINE TERMINALS [AMENDED]

1. The authority citation for part 1917 continues to read as follows:

Authority: Section 41, Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941); Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), or 6-96 (62 FR 111), as applicable; and 29 CFR Part 1911.

Section 1917.28 also issued under 5 USC 553.

Subpart A—Scope and Definitions

2. Section 1917.1 is amended by adding a new paragraph (a)(2)(xiv), by removing the word "and" from the end of paragraph (a)(2)(xii) and by removing the period at the end of paragraph (a)(2)(xiii)(D), and adding in its place a semicolon and the word "and" as follows:

§ 1917.1 Scope and applicability.

(a) * * *

(2) * * *

(xiv) Powered industrial truck operator training, Subpart N, § 1910.178(l).

* * * * *

PART 1918—SAFETY AND HEALTH REGULATIONS FOR LONGSHORING [AMENDED]

1. The authority citation for part 1918 is revised to read as follows:

Authority: Section 4, 6, and 8 of the Occupational Safety and Health Act of 1970, 29 U.S.C. 653, 655, 657; Walsh-Healey Act, 41 U.S.C. 35 et seq.; Service Contract Act of 1965, 41 U.S.C. 351 et seq.; Sec. 107, Contract Work Hours and Safety Standards Act (Construction Safety Act), 40 U.S.C. 333; Sec. 41 of the Longshore and Harbor Workers' Compensation Act, 33 U.S.C. 941; National Foundation of Arts and Humanities Act, 20 U.S.C. 951 et seq.; Secretary of Labor's Order No. 6-96 (62 FR 111); and 29 CFR part 1911.

Subpart A—Scope and Definitions

2. Section 1918.1 is amended by adding a new paragraph (b)(10), by removing the word "and" from the end of paragraph (b)(8) and by removing the period from the end of paragraph

(b)(9)(iv) and adding in its place a semicolon and the word "and" as follows:

§ 1918.1 Scope and application

* * * * *

(b) * * *

(10) Powered industrial truck operator training, Subpart N, § 1910.178(l).

PART 1926—OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR CONSTRUCTION [AMENDED]

1. The authority citation for subpart O of part 1926 is revised to read as follows:

Authority: Section 107, Construction Work Hours and Safety Standards Act (Construction Safety Act) (40 U.S.C. 333); Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033), or 6-96 (62 FR 111), as applicable. Section 1926.602 also issued under 29 CFR part 1911.

2. Section 1926.602 is amended by adding a new paragraph (d) to read as follows:

§ 1926.602 Material Handling Equipment [Amended]

* * * * *

(d) *Powered industrial truck operator training.*

Note: The requirements applicable to construction work under this paragraph are identical to those set forth at § 1910.178(l) of this chapter.

* * * * *

[FR Doc. 98-31283 Filed 11-30-98; 8:45 am]

BILLING CODE 4510-26-P