

DEPARTMENT OF LABOR**Occupational Safety and Health Administration****29 CFR Part 1926**

[Docket # S-018]

RIN 1218-AB88

Safety Standards for Signs, Signals, and Barricades**AGENCY:** Occupational Safety and Health Administration; Labor.**ACTION:** Direct final rule; request for comments.

SUMMARY: The Occupational Safety and Health Administration (OSHA) is issuing a direct final rule amending construction industry standards to require that traffic control signs, signals, barricades or devices protecting construction workers conform to Part VI of either the 1988 Edition of the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD), with 1993 revisions (Revision 3) or the Millennium Edition of the FHWA MUTCD (Millennium Edition), instead of the American National Standards Institute (ANSI) D6.1-1971, Manual on Uniform Traffic Control Devices for Streets and Highways (1971 MUTCD). This action is consistent with OSHA's June 16, 1999 interpretation letter stating that the agency would allow employers to comply with Revision 3 in lieu of the 1971 MUTCD. See also the companion document published in the Proposed Rules section of today's **Federal Register**.

DATES: This direct final rule will become effective August 13, 2002 unless significant adverse comments are received by June 14, 2002. If adverse comment is received, OSHA will publish a timely withdrawal of the rule in the **Federal Register**. The incorporation by reference of certain publications listed in the rule is approved by the Director of the Federal Register as of August 13, 2002.

ADDRESSES: You may submit three copies of written comments to OSHA Docket Office, Docket No. S-018, Docket Office, U.S. Department of Labor, 200 Constitution Avenue NW., Room N-2625, Washington, DC 20210; telephone (202-693-2350).

If written comments are 10 pages or fewer, you may fax them to the OSHA Docket Office telephone number (202) 693-1648.

You may submit comments electronically through OSHA's Homepage at ecomments.osha.gov.

Please note that you may not attach materials such as studies or journal articles to your electronic comments. If you wish to include such materials, you must submit three copies to the OSHA Docket Office at the address listed above. When submitting such materials to the OSHA Docket Office, you must clearly identify your electronic comments by name, date, and subject, so that we can attach the materials to your electronic comments.

How to obtain copies of the MUTCD: The Federal Highway Administration partnered with three organizations to print copies of the Millennium Edition Manual of Uniform Traffic Control Devices for sale. The organizations are: (1) American Traffic Safety Services Association, 15 Riverside Parkway, Suite 100, Fredericksburg, VA 22406-1022; Telephone: 1-800-231-3475; FAX: (540) 368-1722; www.atssa.com; (2) Institute of Transportation Engineers, 1099 14th Street, NW, Suite 300 West, Washington, DC 20005-3438; FAX: (202) 289-7722; ; www.ite.org; and (3) American Association of State Highway and Transportation Officials; www.aashto.org; Telephone: 1-800-231-3475; FAX: 1-800-525-5562.

On-line copies of the Millennium Edition are available for downloading from DOT's web site: <http://mutcd.fhwa.dot.gov/kno-millennium>. On-line copies of the 1988 Edition of the Manual on Uniform Traffic Control Devices (Revision 3, dated 9/93, with the November 1994 Errata No. 1) are available for downloading from OSHA's website: http://www.osha.gov/doc/highway_workzones. In addition, both documents are available for viewing and copying at each OSHA Area Office.

FOR FURTHER INFORMATION CONTACT: Nancy Ford, Office of Construction Standards and Construction Services, Occupational Safety and Health Administration, U.S. Department of Labor, Room N-3468, 200 Constitution Avenue, NW., Washington, DC 20210; telephone: (202) 693-2345.

SUPPLEMENTARY INFORMATION:**I. Introduction**

This direct final rule applies to employers involved in road construction and repair operations. It addresses the types of signs, signals, and barricades that must be used in areas where road-work is being performed. The vast majority of road construction projects undertaken in the United States are funded through Federal transportation grants. As a condition to receiving Federal funding, the U.S. Department of Transportation's (DOT's)

Federal Highway Administration requires compliance with its MUTCD.

In furtherance of OSHA's statutory mandate to protect the health and safety of employees, OSHA also requires employers that are within the scope of its authority to comply with the MUTCD. However, OSHA's standard incorporates the 1971 version of the MUTCD, which FHWA has since updated. The purpose of this direct final rule is to update OSHA's standard.

II. Direct Final Rulemaking

In direct final rulemaking, the agency publishes a final rule in the **Federal Register** with a statement that, unless a significant adverse comment is received within a specified period of time, the rule will become effective. An identical proposed rule is often published at the same time. If no significant adverse comments are submitted, the rule goes into effect. If any such comments are received, the agency will withdraw the direct final rule. The comments will then be treated as comments to the proposed rule. Direct final rulemaking is used where the agency anticipates that the rule will be noncontroversial. Examples include minor substantive changes to regulations; incorporation by reference of the latest edition of technical or industry consensus standards, and direct incorporations of mandates from new legislation.

For purposes of this direct final rulemaking, a significant adverse comment is one that explains why the rule would be inappropriate, including challenges to the rule's underlying premise or approach, or why it would be ineffective or unacceptable without a change. In determining whether a significant adverse comment necessitates withdrawal of this direct final rule, OSHA will consider whether the comment raises an issue serious enough to warrant a substantive response in a notice-and-comment process. A comment recommending an addition to the rule will not be considered a significant adverse comment unless the comment states why this rule would be ineffective without the addition. If timely significant adverse comments are received, the agency will publish a notice of significant adverse comment in the **Federal Register** withdrawing this direct final rule no later than July 15, 2002.

OSHA is also publishing a companion proposed rule, which is essentially identical to the direct final rule. In the event the direct final rule is withdrawn because of significant adverse comment, the agency can proceed with the rulemaking by addressing the comment

and again publishing a final rule. The comment period for the proposed rule runs concurrently with that of the direct final rule. Any comments received under the companion proposed rule will be treated as comments regarding the direct final rule. Likewise, significant adverse comments submitted to the direct final rule will be considered as comments to the companion proposed rule; the agency will consider such comments in developing a subsequent final rule.

OSHA has determined that the subject of this rulemaking is suitable for a direct final rule on several grounds. First, in most instances, employers have already been required to comply with Revision 3 under the DOT rule. Under Title 23 of the U.S. Code, §§ 109(d) and 402(a), the Secretary of Transportation is authorized to promulgate and require compliance with uniform guidelines to reduce injuries and fatalities from road accidents. Specifically, § 109(d) authorizes DOT to require (through its approval of State highway department requirements) all highway projects in which Federal funds are involved to comply with these types of uniform rules. Highways are broadly defined under § 101(a)(11) of the DOT statute, and include roads, streets and parkways. Under § 402(a), DOT is authorized to require each State to have a highway safety program, including uniform standards for traffic safety, approved by DOT. In accordance with this authority, DOT promulgated 23 CFR Part 655, subpart F (Traffic Control Devices on Federal-Aid and Other Streets and Highways). In § 655.603(a), DOT established its MUTCD as “the national standard for all traffic control devices installed on any street, highway, or bicycle trail open to public travel * * *” Under subpart F, the States were required to adopt Revision 3 for federally funded highways within two years of its issuance. The effective date of the final rule that adopted Revision 3 was January 10, 1994 [Federal Register/Volume 58, Number 236/ Friday, December 10, 1993]. A two-year period for transition to full compliance with Revision 3 expired January 10, 1996. Transition to full compliance with the Millennium edition must be completed by 2003.

Consequently, employers have already been required to comply with Revision 3 for all construction work on all federal-aid highways. In addition, all States have required compliance with Revision 3 for most other roads (there is some variation among the States regarding the extent to which compliance is required on municipal, county and private roads).

Second, Revision 3 and the Millennium editions are updated versions of the 1971 ANSI standard and reflect current practice, expertise and technology in the industry. Finally, some industry stakeholders have asked OSHA to conform its rule with Revision 3 and the Millennium Edition.

III. Background

Currently, under 29 CFR 1926 Subpart G—Signs, Signals, and Barricades, OSHA requires that employers comply with the 1971 MUTCD. Specifically, employers must ensure that the following conform to the 1971 MUTCD: traffic control signs or devices used to protect construction workers (29 CFR § 1926.200(g)(2)); signaling directions by flagmen (29 CFR § 1926.201); and barricades for the protection of workers (29 CFR § 1926.202).

In contrast, a DOT rule, 23 CFR Part 655.601 through 655.603, requires that such traffic control signs or devices conform to a more recent version of the MUTCD. DOT regulations provide that the MUTCD is the national standard for all traffic control devices on streets, highways and bicycle trails. DOT “s rule requires that traffic control devices on roads in which federal funds were involved be in substantial conformance with its MUTCD. In effect, the MUTCD has become a national benchmark for all roads.

In the early 1970s, the FHWA assumed from ANSI responsibility for publishing the MUTCD. The FHWA substantially rewrites the MUTCD every 10 to 20 years, and amends it every two to three years. Until the Millennium Edition was published in December 2000, the most recent edition was the 1988 edition. The 1988 edition consisted of 10 parts, including Part VI, “Standards and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility, and Incident Management Operations.” The FHWA substantially revised and reissued Part VI in 1993 (Revision 3). There are substantial differences both in substance and format between Revision 3 and the 1971 MUTCD. The most recent edition of the MUTCD, the Millennium Edition published in December 2000, contains some substantive changes and a new, easier to use format. States are required to adopt the Millennium Edition or its equivalent by January 2003.

Several stakeholders asked OSHA to update subpart G, because they had to meet the outdated OSHA requirements in addition to the DOT rule. They pointed out that Revision 3 and the Millennium Edition reflect updated standards and technical advances based

on 22 years of experience in work zone traffic control design and implementation, as well as human behavior research and experience. The National Committee on Uniform Traffic Control Devices (“NCUTCD”), consisting of various national associations and organizations interested in highway construction or highway safety, including the American Road and Transportation Builders Association, the Association of American Railroads, the American Automobile Association, the National Association of Governor’s Highway Safety Representatives, and the National Safety Council, unanimously resolved in January 1999 to request that OSHA adopt Revision 3 in place of the 1971 MUTCD. In May 2000, OSHA’s Advisory Committee on Construction Occupational Safety and Health (“ACCSH”) also expressed support for adopting a more recent edition of the MUTCD as the OSHA standard for the construction industry.

OSHA reviewed the differences between the 1971 version, Revision 3 and the Millennium Edition and concluded that compliance with the more recently published manuals would provide all the safety benefits (and more) of the 1971 version. The differences between OSHA’s regulations that reference the 1971 MUTCD and DOT’s modern regulations create potential industry confusion and inefficiency, without in any respect advancing worker safety. Accordingly, in an interpretation letter dated June 16, 1999, to Cummins Construction Company, Inc., we stated that OSHA will accept compliance with Revision 3 in lieu of compliance with the 1971 MUTCD referenced in § 1926.200(g) through its *de minimis* policy.

The numerous and various changes to the 1971 MUTCD reflected in Revision 3 and the Millennium Edition stem from over 20 additional years of experience in temporary traffic control zone design, technological changes, and contemporary human behavior research and experience. Revision 3 and the Millennium Edition provide highway work zone planners more comprehensive guidance and greater flexibility in establishing effective temporary traffic control plans based on type of highway, traffic conditions, duration of project, physical constraints and the nature of the construction activity. Revision 3 and the Millennium Edition, accordingly, better reflect current practices and techniques to best ensure highway construction worker safety and health.

Accordingly, OSHA is amending the safety and health regulations for

construction to adopt and incorporate Revision 3 (and the option to comply with the Millennium Edition), instead of the 1971 MUTCD, and to make certain editorial changes. The amendment deletes the references in 29 CFR §§ 1926.200(g)(2) and 1926.202 to the 1971 MUTCD and inserts references to Revision 3 (and the option to comply with the Millennium Edition). The amendment clarifies and abbreviates 29 CFR § 1926.201(a), by simply adopting the requirements of Revision 3 (and the option to comply with the Millennium Edition) with regard to the use of flaggers. The amendment also makes certain editorial corrections, replacing the term workers for the term workmen and the term flaggers for the term flagmen in 29 CFR 1926.200(g)(2) and 1926.201(a).

By issuing this direct final rule, OSHA is responding to the requirements of the Regulatory Flexibility Act and Executive Order 12866 that agencies review their regulations to determine their effectiveness and to implement any changes indicated by the review that will make the regulation more flexible and efficient for stakeholders and small businesses while maintaining needed protections for workers.

Updating OSHA's rule will eliminate the technical anomaly of having to meet both OSHA's outdated requirement to comply with the 1971 version and DOT's more modern requirements. Instead, OSHA's rule will require compliance with Revision 3 (or, at the option of the employer, the Millennium edition). In addition to harmonizing OSHA's requirements with those of DOT, the new rule's additional safety measures (described below) will be enforceable as OSHA requirements. With the current emphasis on rebuilding the Nation's highways and improving safety in work zone areas, OSHA's update is particularly appropriate.

IV. Discussion of Changes

Format and Style

Both the 1971 MUTCD and Revision 3 were written in narrative form with "must/shall," "should," and "may" sentences indicating mandatory requirements, guidance, and options, respectively. These verbs were often intermixed within a single paragraph, leading to some confusion. In the Millennium Edition, each subsection is organized by "standard," "guidance," and "options" categories. An additional category, titled "support," is also included. This format clarifies what is expected of employers and the basis for those requirements. Pursuant to the

requirements of 29 CFR 1926.31, only the mandatory language of standards that are incorporated through reference are adopted as OSHA standards. Therefore, the summary of changes below will focus primarily on the revisions that impose new requirements, or modify already existing requirements. The summary does contain short discussions on traffic control plans and tapers which, while not required by MUTCD, reflect industry practice.

The 1988 edition of the MUTCD eliminated the term "flagmen" and "workmen" and replaced them with the more inclusive "flaggers" and "workers." The direct final rule would amend 29 CFR 1926.200(g)(2), 1926.201(a) and 1926.203 to be consistent with these changes.

In the Millennium Edition, the FHWA also changed the title of Part 6 from "Standards and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility, and Incident Management Operations" to "Temporary Traffic Control." The new title is more succinct and more accurately describes the contents of the section.

Sections 6A through 6B (Introduction and Fundamental Principles)

Revision 3 and the Millennium Edition describe an overall "guiding philosophy" of "fundamental principles" for good temporary traffic control, which is not explicitly set out in Part VI of the 1971 MUTCD. Although these principles do not formally establish new requirements, they provide a framework for understanding requirements set out in the remainder of Part VI. In the corresponding section, the 1971 ANSI standard required that all temporary traffic control devices be removed as soon as practical when they are no longer needed. Revision 3 downgraded this requirement to a recommendation. This issue was revisited during the drafting of the Millennium Edition, which once again requires the removal of signs when they are no longer needed. The Millennium Edition requires that employers remove temporary traffic control devices that are no longer appropriate, even when the work is only suspended for a short period of time.

Section 6C (Temporary Traffic Control Elements)

The 1971 MUTCD does not discuss traffic control plans (TCPs), which are used by industry to describe traffic controls that are to be implemented in moving vehicle and pedestrian traffic through a temporary traffic control zone.

Revision 3 emphasizes the importance of TCPs in facilitating safe and efficient traffic flow. Revision 3 recognizes that different TCPs are suitable for different projects and does not detail specific requirements. The Millennium Edition offers expanded guidance and options for TCPs, but it adds no requirements. In both Revision 3 and the Millennium Edition, a TCP is recommended but not required. Revision 3 and the Millennium Edition also discuss the "temporary traffic control zone," comprised of several areas known as the "advance warning area," "transition area," "activity area," and "termination area." In addition, Revision 3 and the Millennium Edition explain the need for differing traffic control measures in each control zone area.

The 1971 MUTCD only briefly describes "tapers" and provides a formula for calculating the appropriate taper length. However, Revision 3 defines and discusses five specific types of tapers used to move traffic in or out of the normal path of travel. It illustrates each of them, and sets out specific formulae for calculating their appropriate length. In all three editions, information relating to tapers is limited to guidance and contains no mandatory requirements.

All versions of the MUTCD require the coordination of traffic movement, when traffic from both directions must share a single lane. Revision 3 and the Millennium Edition describe five means of "alternate one-way traffic control," adding the "Stop or Yield Control Method" to the methods described in the 1971 MUTCD. The "Stop or Yield Control Method" is appropriate for a low-volume two-lane road where one side is closed and the other side must serve both directions. It calls for a stop or yield sign to be installed on the side that is closed. The approach to the side that is not closed must be visible to the driver who must yield or stop.

Section 6D (Pedestrian and Worker Safety)

Revision 3 adds a lengthy section, not found in the 1971 MUTCD, that provides guidance and options on pedestrian and worker safety. Under Revision 3, the key elements of traffic control management that should be considered in any procedure for assuring worker safety are training, worker clothing, barriers, speed reduction, use of police, lighting, special devices, public information, and road closure. Revision 3 recommends that these traffic control techniques be applied by qualified persons exercising good engineering judgment. The Millennium Edition makes this

recommendation a requirement. The Millennium Edition also requires advance notification of sidewalk closures.

Section 6E (Hand Signaling or Flagger Control)

Revision 3 and the Millennium Edition require that a flagger wear an orange, yellow, or "strong yellow green" (called "yellow-green" in Millennium Edition) vest, shirt, or jacket, instead of an "orange vest and/or an orange cap," as directed in the 1971 ANSI standard. For nighttime work, Revision 3 requires that the outer garment be retro-reflective orange, yellow, white, silver, or strong yellow-green, or a fluorescent version of one of these colors. This clothing must be designed to identify clearly the wearer as a person, and the clothing must be visible through the full range of body motions. For nighttime work, the Millennium Edition requires that the colors noted above be retro-reflective, but does not mandate that the clothing be visible through the full range of body motions. Both Revision 3 and the Millennium Edition allow the employer more flexibility in selecting colors.

Under the 1971 ANSI standard, the flagger was required to be visible to approaching traffic at a distance that would allow a motorist to respond appropriately. Revision 3 and the Millennium Edition contain more specific requirements. Under both versions, flaggers must be visible at a minimum distance of 1,000 feet. In addition, Revision 3 and the Millennium Edition list training in "safe traffic control practices" as a minimum flagger qualification.

Revision 3 and the Millennium Edition depart significantly from the 1971 ANSI standard by requiring that "Stop/Slow" paddles, not flags, be the primary hand-signaling device. The paddles must have an octagonal shape on a rigid handle, and be at least 18 inches wide with letters at least six inches high. The 1971 ANSI standard recommended a 24-inch width. Revision 3 and the Millennium Edition require that paddles be retro-reflectorized when used at night. Flags would still be allowed in emergency situations or in low-speed and/or low-volume locations. Revision 3 and the Millennium Edition

differ in that Revision 3's recommendations for flag and paddle signaling practice are requirements in the Millennium Edition. In addition, the Millennium Edition applies several new requirements when flagging is used. The flagger's free arm must be held with the palm of the hand above shoulder level toward approaching traffic and the flagger must motion with the flagger's free hand for road users to proceed. These requirements were guidance in Revision 3, and options in the 1971 ANSI standard.

Section 6F (Devices)

Revision 3 and the Millennium Edition reflect numerous differences in the design and use of various traffic control devices, such as signs, signals, cones, barricades and markings, used in temporary traffic control zones. Several signs or devices are described that are not mentioned in Part VI of the 1971 ANSI standard. These signs and devices, along with their location in Revision 3 and the Millennium Edition, can be found in Table 1.

TABLE 1

New signs and devices	Revision 3	Millennium edition
Portable Changeable Message Signs	6F-2	6F.52.
Arrow Displays	6F-3	6F.53.
High-Level Warning Device or Flag Tree	6F-4	6F.54.
Temporary Raised Islands	6F-5h	6F.63.
Impact Attenuators	6F-8a	6F.76.
Portable Barriers	6F-5g and 8b	6F.75.
Temporary Traffic Signals	6F-8c	6F.74.
Rumble Strips	6F-8d	6F.78.
Screens	6F-8e	6F.79.
Opposing Traffic Lane Divider	6F-8f	6F.64.
Shoulder Drop Off	6F-1b(19)	6F.41.
Uneven Lanes	6F-1b(20)	6F.42.
No Center Stripe	6F-1b(21)	6F.43.
Be Prepared to Stop	VI-8c sign W20-7b	6F.15, W3-1a.
Detour Marker and End Detour	6F-1c(4)	6F.15.
Various Other Warning Signs	V1-8a, signs W1-4bR, W1-4cR, W1-8, W3-3, W4-1 and W4-3 and V1-8b, signs W5-2a and W8-3a.	

The dimensions, shape, legends or use of various signs have changed. Those changes are reflected in Table 2.

TABLE 2

New signs	Revision 3	Millennium edition
Turn Off 2-Way Radios and Cellular Telephones.	6F-1b(18a) and (18b)	6F.15, W22-2.
Stop Ahead and Yield Ahead	VI-8a, signs W3-1a and W3-2a	6F.15, W3-1a & W3-2a.
Road Narrows and Narrow Bridge	VI-8a, signs W5-1 and W5-2	6F.15, W5-1 & W5-2.
Right Lane Ends	VI-8c, sign W9-1	6F.15, W9-1.
Length of Work	6F-1c(2)	6F.15, G20-1.
End Road Work	6F-1c(3)	6F.15, G20-2a.

Also, Revision 3 and the Millennium Edition offer expanded options for the color of temporary traffic control signs. Signs that under the 1971 ANSI standard were required to have orange backgrounds may now have fluorescent red-orange or fluorescent yellow-orange backgrounds.

The 1971 ANSI standard required that signs in rural areas be posted at least five feet above the pavement; signs in urban areas were required to be at least seven feet above the pavement. Revision 3 eliminated the distinction between urban and rural areas, and downgraded the requirement to a recommendation. It recommended that signs in all areas have a minimum height of seven feet. In the Millennium Edition, the FHWA returned to the 1971 ANSI requirements. The Millennium Edition also introduced the requirement that signs and sign supports be crashworthy.

The Millennium Edition introduced and clarified mandatory requirements for the design of the following signs: Weight Limit, Detour, Road (Street) Closed, One Lane Road, Lane(s) Closed, Shoulder Work, Utility Work, signs for blasting areas, Shoulder Drop-Off, Road Work next XX KM (Miles), and Portable Changeable Message.

The dimensions, color or use of certain channelizing devices have also changed. "Channelizing devices" include cones, tubular markers, vertical panels, drums, barricades, temporary raised islands and barriers. The 1971 ANSI standard required that traffic cones and tubular markers be at least 18 inches in height and that the cones be predominantly orange. Revision 3 raised the minimum height for traffic cones and tubular markers to 28" "when they are used on freeways and other high speed highways, on all highways during nighttime, or whenever more conspicuous guidance is needed." (6F-5b(1), 5c(1)) Revision 3 also expanded the color options for cones to include fluorescent red-orange and fluorescent yellow-orange. The Millennium Edition maintained these requirements.

Revision 3 and the Millennium Edition require that vertical panels be 8 to 12 inches wide, rather than the 6 to 8 inches required by the 1971 ANSI standard. Under Revision 3 and the Millennium Edition, drums must be made of lightweight, flexible and deformable materials, at least 36 inches in height, and at least 18 inches in width. Steel drums may not be used. The Millennium Edition adds the requirement that each drum have a minimum of two orange and two white stripes with the top stripe being orange. Revision 3 and the Millennium Edition require that delineators only be used in combination with other devices, be white or yellow, depending on which side of the road they are on, and be mounted approximately four feet above the near roadway edge.

The 1971 ANSI standard required warning lights to be mounted at least 36 inches high. Revision 3 and the

Millennium Edition reduced the minimum height to 30 inches and introduced new requirements for warning lights. Type A low intensity flashing warning lights and Type C steady-burn warning lights must be maintained so as to allow a nighttime visibility of 3000 feet. Type B high intensity flashing warning lights must be visible on a sunny day from a distance of 1000 feet.

Revision 3 and the Millennium Edition contain an additional requirement, not found in the 1971 ANSI standard, that requires employers to remove channelizing devices that are damaged and have lost a significant amount of their retro-reflectivity and effectiveness. Revision 3 and the Millennium Edition also specifically prohibit placing ballast on the tops of drums or using heavy objects such as rocks or chunks of concrete as barricade ballast.

Revision 3 and the Millennium Edition address in greater detail the appearance and use of pavement markings and devices used to delineate vehicle and pedestrian paths. They require that after completion of the project, pavement markings be properly obliterated to ensure complete removal and a minimum of pavement scars. Whereas Revision 3 requires that all temporary broken-line pavement markings be at least four feet long, the Millennium Edition sets the minimum at two feet.

Section 6G (Temporary Traffic Control Zone Activities)

This section, not found in the 1971 ANSI standard, provides information on selecting the appropriate applications and modifications for a temporary traffic control zone. The selection depends on three primary factors: Work duration, work location, and highway type. Section 6G in both Revision 3 and the Millennium Edition emphasizes that the specific typical applications described do not include a layout for every conceivable work situation and that typical applications should, when necessary, be tailored to the conditions of a particular temporary traffic control zone.

Among the specific new requirements in Revision 3 and the Millennium Edition are the following: retro-reflective and/or illuminated devices in long term (more than three days) stationary temporary traffic control zones; warning devices on (or accompanying) mobile operations that move at speeds greater than 20 mph; warning sign in advance of certain closed paved shoulders; a transition area containing a merging taper in

advance of a lane closure on a multi-lane road; temporary traffic control devices accompanying traffic barriers that are placed immediately adjacent to the traveled way; and temporary traffic barriers or channelizing devices separating opposing traffic on a two-way roadway that is normally divided.

The Millennium Edition includes several additional requirements in Section 6G. It requires the use of retro-reflective and/or illuminated devices in intermediate-term stationary temporary traffic control zones. A zone is considered intermediate-term if it is occupying a location more than one daylight period up to three days, or if there is nighttime work in the zone lasting more than one hour. The Millennium Edition also requires a transition area containing a merging taper when one lane is closed on a multi-lane road. When only the left lane on undivided roads is closed, the merging taper must use channelizing devices and the temporary traffic barrier must be placed beyond the transition area channelizing devices along the centerline and the adjacent lane. In addition, when a directional roadway is closed, inapplicable WRONG WAY signs and markings, and other existing traffic control devices at intersections within the temporary two-lane two-way operations section, must be covered, removed, or obliterated.

Revision 3 Section 6H (Application of Devices)

Revision 3 and the Millennium Edition provide an extensive series of diagrams illustrating "typical applications" of the temporary traffic control requirements. These illustrations are intended as practical guides on how to apply all the factors discussed in other chapters and displayed on Figures and Tables throughout Part VI.

Regulatory Planning and Review

Executive Order 12866 (Regulatory Planning and Review)

Relationship to Existing DOT Regulations

Through this rule, OSHA is requiring that traffic control signs, signals, barricades or devices conform to Revision 3 or Part VI of the Millennium Edition, instead of the ANSI MUTCD. The ANSI MUTCD was issued in 1971. In 1988 the FHWA substantially revised and reissued the MUTCD. Since that time, FHWA has published several updates, including a 1993 revision to Part VI—Revision 3. In December 2000, FHWA published a Millennium Edition of the MUTCD that changed the format

and revised several requirements. Employers that receive Federal highway funds are currently required to comply with Revision 3 and have up until January 2003 to bring their programs into compliance with the Millennium Edition.

This is a significant regulatory action and has been reviewed by the Office of Management and Budget under Executive Order 12866. OSHA has determined that this action is not an economically significant regulatory action within the meaning of Executive Order 12866. Revision 3 of the MUTCD adds to the ANSI requirements some new, alternative traffic control devices and expanded provisions and guidance materials, including new typical application diagrams that incorporate technology advances in traffic control device application. Part VI of the Millennium Edition includes some alternative traffic control devices and only a very limited number of new or changed requirements. However, the activities required by compliance with either Revision 3 or the Millennium Edition would not be new or a departure from current practices for the vast majority of work sites. All of these requirements are now or have been part of DOT regulations that cover work-related activities on many public roadways.

According to DOT regulations, the MUTCD is the national standard for streets, highways and bicycle trails. While OSHA's de minimus policy is applied to situations in which there is failure to comply with the 1971 ANSI MUTCD when there is compliance with Revision 3, this action will reduce any confusion created by the current requirement for employers to comply both with the 1971 ANSI MUTCD and DOT's MUTCD.

Percentage of Roads Covered Under OSHA's Standard Versus the DOT Standard

The majority of U.S. roads are currently covered by DOT regulations and their related State MUTCDs. DOT regulations cover all federal-aid highways, which carry the majority of traffic. Moreover, many states extend MUTCD coverage to non-federal-aid and private roads. Thus, the requirements imposed by this OSHA direct final rule will be new only for the small percentage of the work that is not directly regulated by DOT or state transportation agencies.

Federal-Aid Highways

Employers must comply with the MUTCD for all construction work on all federal-aid highways. Although federal-

aid highways constitute a minority of all public highways as measured by length, these highways carry the great majority of traffic. According to OSHA's analysis, 84 percent of vehicle-miles are driven on federal-aid highways (see Table 1). Though not a perfect measure, vehicular use corresponds more directly than length of road to the need for construction, repair, and other work activities addressed by the MUTCD. This suggests that most construction and repair activities occur on federal-aid highways. Conforming to the standards of the MUTCD during these work activities is a clear requirement of receiving federal highway funds and is therefore regulated by DOT.

State, Local, County and Municipal Roads (Not Receiving Federal Aid)

The available data suggest that most non-federal-aid roads are required to comply with the MUTCD. Many states choose to regulate public roadways that are not federal-aid highways and thereby extend the coverage of the MUTCD. For example, OSHA reviewed the practices of nine states (Alabama, Arkansas, Colorado, Connecticut, Delaware, Kentucky, Michigan, North Carolina, and Texas), which include 23 percent of all U.S. public roads. In conducting this review, OSHA found that eight of the states require MUTCD standards on all state roads, while the ninth state requires MUTCD standards on state roads if the state contracts the work to be done. Five of these states also require that MUTCD standards be met on all county and municipal roads. For the sample of nine states, individual state coverage of public roads by state MUTCDs ranges from 12 percent to 100 percent (see Table 2). OSHA found that, on average, MUTCD coverage of all public roads in these nine states is 84 percent. (OSHA computed the average across the nine states by weighting by total highway miles.)

Private Roads

OSHA also examined MUTCD coverage of private roads. Although data on the extent of private roads is very limited, the best available information indicates that about 20 percent of the total mileage is accounted for by private roads (see Table 2). Some of these private roads are covered by State MUTCD standards. Of the nine states examined by OSHA, one state included private roads under the MUTCD standards if the state enforced traffic laws on these roads (e.g., roads in gated communities). Another state extended MUTCD standards to private roads if the state was involved in road design or approval. A third state deferred

coverage to municipal ordinances, which may require meeting MUTCD standards on private roads. Thus, although it is clear that some local governments extend coverage to private roads, no data are available to specify with precision the extent to which this is the case.

Additional Incentives To Comply With the MUTCD

The estimates of the percentage of roads and highways covered by the MUTCD presented above are conservative. States, localities and their contractors have additional incentives to comply with the MUTCD when it is not required. OSHA policy reinforces these incentives because OSHA does not enforce compliance with the ANSI MUTCD when there is compliance with Revision 3.

Under 23 USC § 402(a), states must have highway safety programs that are approved by the Secretary of Transportation. The Secretary is directed to promulgate guidelines for establishing these programs. Those guidelines state, inter alia, that programs "should" conform with the MUTCD. DOT does not have the authority to require compliance with the MUTCD on roads that do not receive federal aid, but recommends it. In light of this, and the statement that the MUTCD is "the national standard for all traffic control devices" (23 CFR § 655.603(a)), the MUTCD has become the standard of care for litigation purposes. Thus, when a state or local government engages in a road construction project, it should be exercising the reasonable standard of care (i.e. compliance with a recent edition of the MUTCD). If it is not, it could face substantial liability if the construction on its roads is a contributing factor in an accident. While compliance with the MUTCD does not insulate a state or locality from liability, it significantly reduces its exposure.

Moreover, many of the contractors who conduct work on covered roads are likely to conduct work on non-covered roads. In the interest of efficiency, these contractors are likely to consistently apply the current version of the MUTCD to all work, rather than switch back to the ANSI version for a small percentage of their overall business.

Finally, as is discussed below, signs and devices meeting 1993 specifications are often less expensive than signs meeting 1971 ANSI specifications. This has provided contractors involved in road construction and repair operations with a natural incentive to replace old

and worn signs with signs meeting the more up-to-date standard.

Costs Associated With the DOT Standard

DOT has consistently found that their revisions to the MUTCD as a whole and to its various parts have not given rise to new annual costs of compliance that are significant within the meaning of that term as used in Executive Order 12866. The **Federal Register** Notice (December 10, 1993) on the final amendment to the Manual on Uniform Traffic Control Devices (MUTCD); Work Zone Traffic Control states:

The FHWA has determined that this action is not a significant regulatory action within the meaning of Executive Order 12866 or significant within the meaning of Department of Transportation regulatory policies and procedures. As previously discussed in the above sections on "Changed Standards" and "New Devices," this revision of Part VI adds some new, alternative traffic control devices, and only a very limited number of new or changed requirements. Most of the changes included in this version of part VI are expanded guidance materials, including many new Typical Application Diagrams. The FHWA expects that application uniformity will improve at virtually no additional expense to public agencies or the motoring public. Therefore, based on this analysis a full regulatory evaluation is not required.

The **Federal Register** Notice (December 18, 2000) on the final amendment to the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) states:

The FHWA has determined that this action is not a significant regulatory action within the meaning of Executive Order 12866 or significant within the meaning of Department of Transportation regulatory policies and procedures. It is anticipated that the economic impact of this rulemaking will be minimal. Most of the changes in this final rule provide additional guidance, clarification, and optional applications for traffic control devices. The FHWA believes that the uniform application of traffic control devices will greatly improve the traffic operations efficiency and the safety of roadways at little additional expense to public agencies or the monitoring public. Therefore, a full regulatory evaluation is not required.

Moreover, OSHA has conducted detailed comparisons of the various versions of the MUTCD. The OSHA comparative analysis indicates that the majority of changes to the 1971 version offered increased flexibility, were

advisory in nature, or changed mandatory requirements to non-mandatory provisions. Table 3 summarizes the differences between the 1971 ANSI MUTCD and the 1993 Revision that either potentially increase costs or lead to increased flexibility. In cases of increased flexibility and changes to non-mandatory provisions, it is likely that the effect will be to decrease the costs of compliance.

In a few instances, however, the 1993 Revision mandated sign or device changes that could lead to cost increases because contractors would need to purchase new signs for some projects. Table 4 summarizes these cases, which include specifications for stop/slow paddles, no parking signs, "road narrows" and other warnings, and reflective traffic drums. The table lists the changes in specifications as well as presents prices for the 1971 versus the 1993 version of the sign or device. Excluded from Table 4 are "approach warning signs," which are additional signs required by the 1993 MUTCD in highly vulnerable areas.

For stop/slow paddles, the more recent MUTCD version of sign (18" by 18") is less expensive than the older, ANSI version (24" by 24"), with vendors reporting a price difference of \$31.50 per sign. No parking signs that include the international "no parking" symbol (as required in the 1993 MUTCD) but do not include a legend are only \$0.80 more than the older ANSI version of the signs containing only a legend (the 1993 MUTCD does not require a legend). For "road narrows" and other warning signs, the MUTCD version (36" by 36") is \$31 more than the ANSI-specification in the most direct comparison that OSHA identified (\$90, as compared to \$59). One vendor, however, sold a version of the new sign using an alternative metal for less than \$47. Regarding reflective traffic drums, one vendor reported that reflective 55-gallon metal drums (1971 ANSI standard) are no longer produced. When they were last available they sold for \$45 to \$60 each. A reflective traffic drum meeting the MUTCD standard is \$68.

To summarize, prices for signs meeting 1993 MUTCD specifications are not significantly higher than prices for signs meeting 1971 ANSI specifications; in fact, the prices are often lower. Moreover, for devices such as reflective traffic drums, it is not even possible to replace old and worn items with items meeting 1971 standards. This suggests that contractors involved in road construction and repair operations have had an incentive to update to 1993 specifications as their equipment has worn out. The primary effect of the

OSHA standard, will be to speed the process of switching to 1993 specifications for contractors who have not already chosen to switch.

To further gauge the potential burden of updating to 1993 MUTCD specifications, OSHA examined the forty-four colored illustrations of the different types of typical highway construction workzones presented in Sections 6G through 6H of the 1993 MUTCD. The majority of examples of workzones presented in the MUTCD represent situations that are currently covered by DOT regulations, and would not be affected by the OSHA standard. However, OSHA was able to identify three examples of situations that may not fall under DOT regulations, but would be included in the scope of the OSHA standard.

The first example examined was a "Lane closure on minor street," illustrated by Figure TA-18 (see page 142-3 of the MUTCD). In this example, compliance with the 1993 MUTCD would require no changes. Requirements would be met using signs and devices meeting the 1971 ANSI specifications. Consequently, no incremental costs would be attributable to compliance with the 1993 MUTCD.

The second example examined was a "Lane closure for one lane-two way traffic control," illustrated by Figure TA-10 (see page 126-7 of the MUTCD). In this setting, compliance with the 1993 MUTCD is achieved by adding two flagger signs and four advance warning signs (two "Right [Left] Lane Closed Ahead" and two "Road Construction XXX Ft") to the 1971 ANSI requirement. In addition, two flagger hand signaling devices (sign paddles) meeting the 1993 dimensions (24" by 24") are needed. A Flagger sign can be purchased for about \$34, while the "Right [Left] Lane Closed Ahead" and "Road Construction XXX Ft" signs can be purchased for about \$47 each. The two sign paddles are \$67.¹ Thus, compliance with the 1993 MUTCD would involve a one-time expenditure of \$323.

Finally, OSHA examined a third situation, "Lane closure on low-volume two-lane road, illustrated by Figure TA-11 (see page 128-9 of the MUTCD). It is important to note that this situation would likely apply to a county or state road, and most states already extend the coverage of the MUTCD in this setting (see OSHA review of 9 states presented below). Here, compliance with the 1993 MUTCD is achieved through the use of two "Right [Left] Lane Closed Ahead" and two "Road Construction XXX Ft")

¹ Prices are from Newman Signs (<http://www.newmansigns.com/>)

to the 1971 ANSI requirement, which can be purchased for about \$47 each.² In addition, one advance warning sign with the international symbol for “yield” is needed. These can be purchased for roughly \$100.³ Thus, compliance with the 1993 MUTCD would involve a one-time expenditure of \$288. If it is assumed that contractor chooses to use 20 drums instead of 20 cones, this would involve an one-time additional expenditure of \$1,360, increasing compliance costs to \$1,648.

In sum, DOT has consistently found that changes and revisions to the MUTCD do not lead to significant compliance costs. OSHA’s comparative assessment of the 1971 ANSI requirements and the 1993 MUTCD tends to support DOT’s findings. Because the OSHA regulation applies the MUTCD as developed by DOT, the costs of compliance with the OSHA regulation will be insignificant as well.

Costs Attributable to the OSHA Standard

The analysis discussed above indicates that the costs of compliance for OSHA’s proposed action will not be significant under Executive Order 12866. As DOT has estimated, the costs associated with the various versions of the MUTCD and its revisions are small. OSHA’s comparative analysis of the 1971 ANSI and 1993 MUTCD supports DOT’s estimates. In addition, the overwhelming majority of public roads are already covered by DOT regulations and their related State MUTCDs. As discussed above, OSHA estimated that more than 80 percent of work performed on U.S. roads is covered DOT regulations and their related State MUTCDs. Due to the extension of MUTCD requirements to non-federal-aid and private roads as well as additional incentives to comply with the MUTCD in situations where compliance is not mandatory, the percentage of work already covered is likely to be much higher than 80 percent. The costs of compliance for those directly regulated by OSHA will, therefore, be

substantially lower than those estimated for compliance with DOT regulations.

The differences between OSHA’s current regulations that reference the ANSI MUTCD and DOT’s regulations create potential industry confusion and inefficiency. OSHA’s comparative analysis of the 1971 ANSI and 1993 MUTCD indicated that the majority of changes offered increased flexibility, were advisory in nature, or changed mandatory requirements to non-mandatory provisions. Since the costs of the proposed action are so minimal, it is possible that they will be completely offset by eliminating the inefficiency associated with inconsistent OSHA and DOT regulations as well the direct cost savings from enhanced flexibility and changes to non-mandatory provisions embodied in the 1993 MUTCD.

Technological and Economic Feasibility

The MUTCD is a standard that has been routinely updated for decades by DOT and in fact predates the federal highway program. The process used to update this standard is for DOT to work with state highway officials, who provide federal officials with information on the evolving nature of traffic control devices and industry practices. The federal role consists primarily of compiling this evolving set of practices and devices into a national manual—the MUTCD—that includes standards, guidance, and options. As noted by a DOT official,⁴ the MUTCD essentially codifies current industry practice. Thus, most potentially affected parties—local governments, highway and utility contractors, and others—already apply the MUTCD, which clearly demonstrates that doing so is both technologically and economically feasible.

Regulatory Flexibility Screening Analysis

In order to determine whether a regulatory flexibility analysis is required under the Regulatory Flexibility Act, OSHA has evaluated the potential economic impacts of this action on

small entities. Table 5 presents the data used in this analysis to determine whether this regulation would have a significant impact on a substantial number of small entities. For purposes of this analysis, OSHA used the Small Business Administration (SBA) Small Business Size Standard and defined a small firm as a firm with \$27.5 million or less in annual receipts.

OSHA guidelines for determining the need for regulatory flexibility analysis require determining the regulatory costs as a percentage of the revenues and profits of small entities. The analysis presented here is in most respects a worst case analysis. OSHA examined the situation of a small firm with less than 20 employees all of whose employees work on projects not previously covered by Revision 3 or the Millenium Edition. OSHA further assumed that the firm previously complied only with the existing OSHA rule (1971 ANSI MUTCD). OSHA derived estimates of the profits and revenues per firm for establishments with fewer than 20 employees for “Highway and Street Construction” (SIC 1611) using data from Census and Dun and Bradstreet. Compliance costs were estimated using the third situation examined under Costs Associated with the DOT Standard (“Lane closure on low-volume two-lane road”) and assuming the worst-case scenario, where compliance costs were \$1,648. This value served as OSHA’s estimate for upper-bound compliance costs per construction crew. OSHA assumed that a highway construction crew consists of four employees and computed an estimate of average total cost of the regulation per establishment of \$2,161. Annualized compliance costs were \$308 per establishments for small entities, amounting to 0.03 percent of revenue and 0.85 percent of profit. Based on this worst-case evaluation, OSHA certifies that this regulation will not have a significant economic impact on a substantial number of small entities.

TABLE 1.—FEDERAL AID HIGHWAY LENGTH, LANE-MILES AND VEHICLE-MILES

System	Length of roadway (Miles) ¹	Lane-Miles ²	Annual Vehicle-Miles ³
Interstate Highways	46,564	208,649	648,124
Other National Highways	113,995	333,355	546,028
Total National Highways	160,559	542,004	1,194,152
Other Federal-Aid	797,783	1,719,703	1,093,975

²Prices are from Newman Signs (<http://www.newmansigns.com/>)

³Prices are from Newman Signs (<http://www.newmansigns.com/>)

⁴Personal communication between Rudolph Umbs, Federal Highway Administration, and John Duberg, TechLaw, December 12, 2000.

TABLE 1.—FEDERAL AID HIGHWAY LENGTH, LANE-MILES AND VEHICLE-MILES—Continued

System	Length of roadway (Miles) ¹	Lane-Miles ²	Annual Vehicle- Miles ³
Total Federal-Aid Highways	958,342	2,261,707	2,288,127
Non Federal-Highways	2,973,673	5,947,348	420,201
Total Highways	3,932,015	8,209,055	2,708,328
Federal-Aid as a Percent of Total	24%	28%	84%

¹ FHWA, Highway Statistics: 1999, Section V, Table HM-16

² FHWA, Highway Statistics: 1999, Section V, Table HM-48

³ FHWA, Highway Statistics: 1999, Section V, Table VM-3

BILLING CODE 4510-26-P

Table 2: Highway Miles Covered by Federal or State MUTCDs: Selected States

State	Federal Agency 1/	State Agency	County	Town, Township, Municipal	Other 2/	Total Miles Covered	Total Miles	Total Covered Miles as a Share of Total
Alabama 3/	733	10,869				11,602	94,246	12%
Arkansas 4/	2,135	16,366	65,347	13,710	1	97,559	97,559	100%
Colorado 4/	6,969	9,071	55,447	12,363	1,299	85,149	85,149	100%
Connecticut 4/	4	3,717		16,807	260	20,788	20,788	100%
Delaware 5/	7	5,065				5,072	5,748	88%
Kentucky 6/	1,013	27,477				28,490	74,120	38%
Michigan 4/	2,083	9,725	89,344	20,570		121,722	121,722	100%
North Carolina 7/	2,361	78,103				80,464	99,301	81%
Texas 4/	454	79,164	142,285	78,488	116	300,507	300,507	100%
9 State Total	15,759	239,557	352,423	141,938	1,676	751,353	899,140	84%
U.S. Total	118,391	773,904	1,766,396	1,206,925	66,401	3,932,017		
9 States as a % of U.S. Total	13%	31%	20%	12%	3%	23%		

Source: FHWA, Highway Statistics: 1999, Section V, Table HM-10

1/ Roadways in Federal parks, forests, and reservations that are not part of the State and local highway systems. 2/ Includes State park, State toll, other State agency, other local agency, and other roadways not identified by ownership. 3/ County, other local public, and private roads are covered if the state was part of design work or road approval. 4/ All state, county, and municipal roads are covered. 5/ Municipal and private roads are not covered. 6/ All state, county, and municipal roads are covered if the state contracts the work. 7/ NC has no county road; municipalities "should" use the MUTCD. 8/ States for which OSHA reviewed MUTCD requirements.

Table 3: Changes in 1993 MUTCD (vs. 1971 ANSI) that Lead to Potential Cost Decreases or Increases

1971 ANSI MUTCD	1993 Rev 3, Part VI MUTCD	Nature of Change (\$)
<p><u>6E-3 Flagmen</u> The use of an orange vest, and/or an orange cap shall be required for flagmen. For nighttime . . . garments shall be reflectorized.</p>	<p><u>6E-3: High Visibility Clothing:</u> 1. For daytime work, the flagger's vest, shirt, or jacket shall be orange, yellow, strong yellow green or fluorescent versions of these colors. For nighttime work, . . . the garments shall be retroreflective: 1. Orange, yellow, white, silver, strong yellow-green, or a fluorescent version of one of these. 2. Shall be visible at a minimum distance of 1,000 feet. 3. Shall be designed to identify clearly the wearer as a person and be visible through the full range of body motions.</p>	<p>Mandatory provisions offer more flexibility—wider range of acceptable garments and colors. Clarification of visibility distance requirements. Millennium Edition no longer requires visibility through full range of body motions.</p>
<p><u>6E-2. Hand-Signaling Devices:</u> Sign paddles should be at least 24 inches wide . . .</p>	<p><u>6E-4. Hand-Signaling Devices:</u> The standard STOP/SLOW sign paddle shall be 18 inches square.</p>	<p>Sign change.</p>
<p><u>6E-5. Flagger Stations:</u> . . . distance is related to approach speed and physical conditions at the site; however, 200 to 3000 feet is desirable.</p>	<p><u>6E-6. Flagger Stations:</u> Table VI-1, Guidelines for length of longitudinal buffer space, may be used for locating flagger stations in advance of the work space. (Pg. 13: lengths start at 35 feet for 20MPH speed to 485 feet for 65 MPH))</p>	<p>Guidance provisions that offer more flexibility.</p>

Table 3 (continued)

1971 ANSI MUTCD	1993 Rev 3, Part VI MUTCD	Nature of Change (s)
	<p>Footnote to the guidelines in Table VI indicate that distances apply on wet and level pavements. Employers will have to purchase the AASHTO (1990) document (A Policy on Geometric Design of Highways and Streets, AASHTO) for recommended adjustments for the effect of grade on stopping and variation for trucks. Also, 6E-6 references the same AASHTO document (1990), Table III-2 for "distance may be increased for downgrades." The reference to the 1990 document is outdated. Employers may purchase AASHTO: A Policy on Geometric Design of Highways and Streets, 2001, Member Price: \$80 or Non Member Price: \$102</p>	<p>Contractors that perform work on steep downgrades most likely have referenced the document under projects covered by DOT regulations. OSHA should be able to include this information in the Federal Register or on the web.</p>
<p>Figure 6-12 depicts 14 commonly used regulatory signs.</p> <p>R4-7: international symbol with additional plaque that reads Keep Right (24"X18").</p>	<p>Figure VI-7a and VI-7b includes the 14 commonly used regulatory signs depicted in 1971 ANSI plus 7 additional signs:</p> <p>R3-1 (24"X24") International symbol: no right turn</p> <p>R3-2 " " " " no left turn</p> <p>R3-5 (30"X36") left curve only</p> <p>R3-6 (30"X36") International symbol: left lane bear left</p> <p>R3-7 (30"X30") Left lane must turn left</p> <p>R3-8 (30"X30") Multi-turn left lanes</p> <p><u>Two of the 14 signs depicted in ANSI 1971 were modified:</u></p> <p>R4-7: additional plaque (24"X18") is no longer required.</p>	<p>The additional signs allow greater flexibility.</p>
<p>R8-3 (24"X30") "No Parking" sign.</p>	<p>R8-3 (24"X24") Letter sign was revised to reflect the international symbol for no parking.</p>	<p>Sign change.</p>

Table 3 (continued)

1971 ANSI MUTCD	1993 Rev 3, Part VI MUTCD	Nature of Change (s)
<p><u>6B-8 Road (Street) Closed Sign</u></p> <p>The Road (Street) Closed sign shall be used where the roadway is closed to all traffic except contractors' equipment . . . and shall be accompanied by appropriate detour signing.</p>	<p><u>6-F.1.a(4)</u></p> <p>The "shall" provisions for Road (Street) Closed signs, etc., have been changed to "should."</p>	<p>Changed to non-mandatory</p>
<p><u>6B-10 Weight Limit Signs</u></p> <p>Weight restrictions must be consistent with State or local regulations . . .</p>	<p><u>6-F.1.a(6)</u></p> <p>Weight restrictions should be consistent with State or local regulations</p> <p>One weight limit sign (R12-5 (30"x36") was added for optional use.</p>	<p>Changed to non-mandatory</p>
<p>"Flagman 500 Ft" sign.</p>	<p>Sign changed to international symbol for flagger (48"x48")—this sign may be used in conjunction with other warning signs.</p>	<p>Changed to non-mandatory</p>
<p>"Road Work 1 Mile" sign.</p>	<p>This sign is omitted.</p>	
<p>"Road Narrows" W5-1: 30"x30"</p>	<p>Dimensions changed to 36"x36"</p>	<p>Sign change.</p>
<p>"Narrow Bridge" W5-2: 30"x30"</p>	<p>Dimensions changed to 36"x36"</p>	<p>Sign change.</p>
<p>"Right Lane Ends" W9-1: 30"x30"</p>	<p>Dimensions changed to 36"x36"</p>	<p>Sign change.</p>
<p>International symbol signs require descriptive plaques:</p> <p>(1) W6-1 with plaque: Divided Highway (24"x18")</p> <p>(2) W6-2 with plaque: Divided Highway Ends (24"x18")</p> <p>(3) W12-2 with plaque: Low Clearance (24"x18")</p> <p>(4) W8-5 with plaque: Slippery When Wet (24"x18")</p>	<p>International symbol signs no longer require descriptive plaques:</p>	<p>Greater flexibility. Reduction in requirements.</p>

Table 3 (continued)

1971 ANSI MUTCD	1993 Rev 3, Part VI MUTCD	Nature of Change (s)
	<p><u>6-F.1 b.(4)</u>: Other approach warning signs. Certain conditions require other advance warning signs, such as limited sight distance or because an obstruction may require a motorist to stop. There are no specified standards for such signs. The determination of the sign or signs to be used shall be based on an engineering study using the following sections as guidelines. As an alternative to a specific distance on these advance warning signs, the word AHEAD may be used.</p> <p>Blasting Zone Ahead: W22-1; Previously, "Blasting Zone 1000 ft"</p> <p>Turn off Two-way Radios and Cellular Telephones: W22-2; "and Cellular Telephones" was added.</p>	<p>Greater flexibility.</p>

<p>Greater flexibility.</p>	<p><u>New signs available for selection:</u> Shoulder Drop Off: W8-9a Uneven Lanes: W8-11 No Center Strip: W8-12 Lane curves: W1-4bR; W1-4cR Bear right: W1-8 Signal ahead: W3-3 Right lane traffic merging: W4-1; W4-3 Lane narrows: W5-2a International symbol for "pavement ends": W8-3a Truck crossing: W8-6 Loose gravel: W8-7 Rough Road: W8-7 Shoulder Drop off: W8-9a Be Prepared to Stop: W20-7b</p>	<p>6F-2. <u>Portable Changeable Message Signs (PCMS).</u> . . . used most frequently on high-density, urban freeways, . . . or where highway alignment, traffic routing problems or other conditions require advance warning and information.</p>
<p>PCMS is most frequently on high-density, urban freeways. These situations are most likely to be covered by DOT regulations, and thus, not affected by the OSHA standard.</p>		

Table 3 (continued)

1971 ANSI MUTCD	1993 Rev 3, Part VI MUTCD	Nature of Change (s)
	<p>6F-3. <u>Arrow Displays</u>. . . . intended to provide additional warning and directional information to assist in merging and controlling traffic through or around a temporary traffic control zone.</p> <p>Type A: appropriate for use on low-speed urban streets.</p> <p>Type B: for intermediate-speed facilities and for maintenance or mobile operations on high-speed roadways.</p> <p>Type C: used on high-speed, high volume traffic control projects.</p> <p>Arrow display panels shall be mounted on a vehicle, a trailer, or other suitable support.</p> <p>Arrow display shall not be used on a two-lane, two-way roadway for temporary one-lane operation.</p> <p>An arrow display shall not be used on a multilane roadway to laterally shift all lanes of traffic, because unnecessary lane changing may result.</p>	<p>The Arrow Displays is an optional means (non-mandatory) for employers to supplement other traffic control devices. It is popular because it can be highly mobile (mounted on a vehicle, trailer, etc.) and easily repositioned as the job progresses.</p>

	<p>6F-4. High-level warning device (flag tree). . . . most commonly used in urban high-density traffic situations to warn motorists of short-term operations.</p> <p>. . . may supplement other traffic control devices in temporary traffic control zones.</p> <p>. . . shall consist of:</p> <ul style="list-style-type: none">-minimum of two flags with or without a Type B, high intensity, flashing warning light.-distance from the road way to the bottom of the lens of the light and to the lowest point of the flay material shall be no less than 8 feet.-flags shall be 16 inches square or larger and shall be orange or fluorescent versions of orange in color.	<p>The high level warning device, also referred to as the flag tree, is another option (non-mandatory) for employers to use in addition to other traffic control devices.</p>
--	--	---

Table 3 (continued)

1971 ANSI MUTCD	1993 Rev 3, Part VI MUTCD	Nature of Change (s)
<p><u>6C-3 Cone Design.</u> These shall be a minimum of 18 inches in height.</p>	<p><u>6F-5 Channelizing Devices.</u> <u>6F-5b Cones.</u> ... shall be a minimum of 18 inches—except when used on freeways and other high-speed highways they shall be 28 inches in height.</p> <p>Retroreflection of 28-inch or larger cones shall be provided by a white band 6 inches wide, no more than 3 to 4 inches from the top of the cone, and an additional 4-inch wide white band a minimum of 2 inches below the 6-inch band.</p>	<p>Projects on freeways and high-speed highways are likely to fall under DOT regulations, and thus, are unaffected by the OSHA standard.</p>
<p><u>6C-5 Vertical Panel Design.</u> ... shall consist of at least one panel 6 to 8 inches in width ...</p>	<p><u>6F-5d Vertical Panels.</u> ... shall be 8 to 12 inches wide ... Vertical panels used on expressways, freeways, and other high-speed roadways shall have a minimum of 270 square inches of retro reflective area facing traffic.</p>	<p>Projects on expressways, freeways and high-speed highways are likely to fall under DOT regulations, and thus, are unaffected by the OSHA standard.</p>

<p><u>6C-4 Drum Design.</u> Drums are normally metal drums, of 30 to 55 gallon capacity . . .</p>	<p><u>6F-5e Drums.</u> Drums . . . shall be constructed of lightweight, flexible, and deformable materials and be a minimum of 36 inches in height; and have at least an 18 inch minimum width, regardless of orientation. Steel drums shall not be used.</p>	<p>Device change.</p>
	<p><u>6F-8 Other devices.</u> New section added to reflect current technology.</p> <ol style="list-style-type: none"> 1. 6F-8a. Impact Attenuators. 2. 6F-8b. Portable Barriers 3. 6F-8c. Temporary Traffic Signals. 4. 6F-8d. Rumble Strips. 5. 6F-8e. Screens. 6. 6F-8f. Opposing Traffic Lane Divider. 	<p>Offers greater flexibility. Impact Attenuators, portable barriers, etc. are new devices added to reflect common practices among highway construction and repair contractors.</p>

TABLE 4.—PRICES FOR TRAFFIC WARNING SIGNS AND DEVICES CHANGED BY THE 1993 MUTCD REQUIREMENTS

Sign/Device	Summary of change	Source	Price	Applicable standard
'Stop/Slow' Sign Paddle	1971 ANSI width requirements were (at least) 24 inches; Changed to 18 inches square in 1993 MUTCD.	Pac Sign Co. (G-hs-12)	\$65.00	1971 ANSI
'No Parking Any Time'	Changed to reflect International symbol for No Parking.	John M. Warren, Inc. (TC1006)	33.50	1993 MUTCD
		John M. Warren, Inc. (TS1011)	12.95	1971 ANSI
No Parking: international symbol, without written legend.		Newman Signs (R7-31A)	12.05	1993 MUTCD
		Newman Signs (R8-3A)	8.47	1993 MUTCD
'No Parking' with international symbol below legend.		Pac Sign Co. (G-r-101be5)	16.00	1993 MUTCD
		Pac Sign Co. (G-r-101ra5)	22.00	1993 MUTCD
'Narrow Bridge; 'Right Lane Ends'; "Road Narrows'. 'Right Lane Closed Ahead'	Dimensions changed from 30X30 in 1971 to 36X36 in 1993.	Pac Sign Co. (G-w5-2ara22; G-w9-1ra22; G-w5-1ra22).	59.00	1971 ANSI
		Pac Sign Co. (G-w20-5rra27)	90.00	1993 MUTCD
		Newman Signs (W20-5R-A)	46.63	1993 MUTCD
Reflective Traffic Drum	1971 ANSI requirement: Metal drums of 30-55 gallon capacity.	1971 ANSI version no longer produced; Northeast Traffic Control Company.	¹ 45 to 60	1971 ANSI
	1993 MUTCD requirement: Constructed of lightweight, flexible, and deformable materials," 36 inch height minimum, 18 inch width minimum.	Bent Manufacturing Superdome Drum.	68.00	1993 MUTCD

Notes:

¹ When last available; estimate by sales representative.
 Price data were obtained from the following Web sites:
 John M. Warren, Inc., Mobile, AL
<http://www.johnmwarren.com/item.asp?cat=1&ThisPage=0&maxPage=0&prodID=140>
<http://parkingsignsbypac.safeshopper.com/501/cat501.htm>
<http://www.johnmwarren.com/item.asp?cat=2&ThisPage=2&maxPage=2&prodID=290>
 Newman Signs
<http://www.newmansigns.com/>
 Pac Sign Co., Binghamton, NY
<http://parkingsignsbypac.safeshopper.com/226/cat226.htm?239>
<http://parkingsignsbypac.safeshopper.com/544/cat544.htm?239>
<http://parkingsignsbypac.safeshopper.com/542/cat542.htm?239>
<http://parkingsignsbypac.safeshopper.com/383/cat383.htm?239>
 Bent Manufacturing, Huntington Beach, CA
<http://www.bentmfg.com/drums.htm>

TABLE 5.—DATA AND CALCULATIONS FOR REGULATORY FLEXIBILITY ANALYSIS

Data Type/Calculation	Amount/Result
Receipts (1,000) ¹	\$9,807,978
Median return on sales ² (in percent)	3.00
Estimated profit for 1997	\$294,239,340
Total employment ¹	42,501
Number of establishments ¹	8,104
Employment per establishment (Total employment divided by number of establishments)	5.24
Receipts per establishment (Receipts divided by number of establishments)	\$1,210,264
Profit per establishment (Profit divided by number of establishments)	\$36,308
Number of crews per establishment (Employment per establishment divided by 4, assuming 4-person crew)	1.31
Worst-case one-time cost per crew (from economic analysis)	\$1,648
Total one-time cost per establishment (Worst-case one-time cost per crew multiplied by number of crews per establishment)	\$2,161
Annualization factor (10 year life, 7% interest) ³	0.14
Annualized cost per establishment (Total one-time cost per establishment multiplied by annualization factor)	\$308
Cost as a percentage of receipts per establishment (Annualized cost per establishment divided by receipts per establishment) ..	0.03
Cost as a percentage of profit per establishment (Annualized cost per establishment divided by profit per establishment)	0.85

¹ Data from the U.S. Bureau of Census, "Number of Firms, Number of Establishments, Employment, Annual Payroll, and Receipts by Employment Size of the Enterprise for the United States, All Industries—1997," (<http://www.census.gov/csd/susb/susb2.htm#go97>) for SIC 1611, Highway and Street Construction (Enterprises with less than 20 employees).

² Data from Dun and Bradstreet, "Industry Norms & Key Business Ratios, 1998-1999," for SIC 1611, Highway and Street Construction.

³ Annualization factor (Af) computed using the formula on page 18111: where i is the interest rate and n is the useful life of the equipment.

$$Af = \frac{i(1+i)^n}{(1+i)^n + 1}$$

Unfunded Mandates

This direct final rule, which amends Subpart G—Signs, Signals, and Barricades (29 CFR 1926.200(g)(2), 201(a), 202 and 203) has been reviewed in accordance with the Unfunded Mandates Reform Act of 1995 (UMRA) (2 U.S.C. §§ 1501 *et seq.*). For the purposes of the UMRA, the Agency certifies that this direct final rule does not impose 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.

Federalism

OSHA has reviewed this direct final rule in accordance with the Executive Order on Federalism (Executive Order 13132, 64 FR 43255, August 10, 1999), which requires that agencies, to the extent possible, refrain from limiting State policy options, consult with States prior to taking any actions that 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.

Section 18 of the Occupational Safety and Health (OSH) Act (29 U.S.C. §§ 651 *et seq.*) expresses Congress' intent to preempt State laws where 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. 29 U.S.C. § 667. 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. Subject to these requirements, State-Plan States are free to develop and enforce their own requirements for road-construction safety.

Although Congress has expressed a clear intent for OSHA standards to preempt State job safety and health rules in areas involving the safety and health of road-construction workers, this direct final rule nevertheless limits State policy options to a minimal extent. DOT requires compliance with the MUTCD for "application on any

highway project in which Federal highway funds participate and on projects in federally administered areas where a Federal department or agency controls the highway or supervises the traffic operations." 23 CFR § 655.603(a). For this work, which represents the majority of construction work in every State, all States (including State-plan States) must require compliance with the current edition of the MUTCD or another manual that substantially conforms to the current edition. States have been required to enforce Revision 3 or their own substantially conforming manual since 1994. DOT regulations allow States until January 2003 to adopt the Millennium Edition, or another manual that substantially conforms to the Millennium Edition. See 23 CFR 655.603(b). In addition, States must have highway safety programs that are approved by the Secretary of Transportation, even for roads that do not receive Federal aid. The Secretary is directed to promulgate guidelines for establishing these programs. 23 U.S.C. § 402(a). Those guidelines state, *inter alia*, that programs should conform with the current edition of the MUTCD. Accordingly, most States require compliance with the latest edition of the MUTCD even on roads that receive no Federal funding. The requirements described in this document are new requirements only for the very small percentage of employers that are not already covered by the DOT regulations or corresponding State requirements. Therefore, OSHA is only limiting State policy options to the extent that it requires State-plan States to apply the provisions of Revision 3 or the Millennium Edition to that extremely small percentage of employers. (See economic analysis) OSHA concludes that this action does not significantly limit State policy options.

State Plan Standards

The 26 States or territories with OSHA-approved occupational safety and health plans must adopt an equivalent amendment or one that is at least as protective to employees within six months of the publication date of this final standard. These are: Alaska, Arizona, California, Connecticut (for State and local government employees only), Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, New Jersey (for State and local government employees only), 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.

Paperwork Reduction Act

This action does not impose new information collection requirements for purposes of the Paperwork Reduction Act of 1995, 44 U.S.C. §§ 3501–30.

Public Participation

Interested persons are requested to submit written data, views, and arguments concerning this direct final rule. These comments must be received by June 14, 2002 and submitted in quadruplicate to Docket No. S–018, Docket Office, Room N2625, Occupational Safety and Health Administration, U. S. Department of Labor, 200 Constitution Avenue, NW., Washington, DC 20210.

Alternatively, one paper copy and one disk (3 ½ inch floppy in WordPerfect 6.0 or 8.0 or in ASCII) may be sent to that address, or one copy faxed to (202) 693–1648 and three paper copies mailed to the Docket Office mailing address; or one copy e-mailed to ecomments.osha.gov and one paper copy mailed to the Docket Office mailing address.

All written comments received within the specified comment period will be made a part of the record and will be available for public inspection and copying at the above Docket Office address.

OSHA requests comments on all issues related to changing the references in the safety and health regulations for construction from the 1971 MUTCD to Revision 3 (and, at the option of the employer, the Millennium Edition). OSHA also welcomes comments on the Agency's findings that there are not negative economic, environmental or other regulatory impacts of this action on the regulated community. OSHA is not requesting comment on any issues or opening the record for any issue other than those related to this amendment to 29 CFR §§ 1926.200, 201, 1926.202 and 203.

If OSHA receives no significant adverse comments on this amendment, OSHA will publish a **Federal Register** document confirming the effective date of this direct final rule. Such confirmation may include minor stylistic or technical changes to the amendment that appear to be justified. For the purpose of legal review, OSHA views the date of confirmation of the effective date of this amendment as the date of issuance.

If OSHA receives significant adverse comment on this amendment, it will withdraw the amendment and proceed with the proposed rule addressing the change of reference from the 1971 MUTCD to Revision 3 and the

Millennium Edition published in the Proposed Rules section of today's Federal Register.

List of Subjects in 29 CFR Part 1926

Incorporation by reference, MUTCD, Occupational Safety and Health, Traffic control devices.

Authority and Signature

This document was prepared under the direction of John Henshaw, Assistant Secretary of Labor for Occupational Safety and Health, 200 Constitution Avenue, NW., Washington, DC 20210.

This action is taken pursuant to sections 4, 6, and 8 of the Occupational Safety and Health Act of 1970 (29 U.S.C. §§ 653, 655, 657), section 4 of the Administrative Procedure Act (5 U.S.C. § 553), Section 107 of the Contract Work Hours and Safety Standards Act (Construction Safety Act), 40 U.S.C. 333, Secretary of Labor's Order No. 3-2000 (65 F.R. 50017), and 29 CFR Part 1911.

Signed at Washington, D.C., this 3rd day of April, 2002.

John Henshaw, Assistant Secretary of Labor.

Part 1926 of Title 29 of the Code of Federal Regulations is hereby amended as set forth below:

PART 1926—[AMENDED]

1. The authority citation for Subpart G of Part 1926 is revised to read as follows:

Authority: Sec. 107, Contract 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), or 3-2000 (65 FR 50017) as applicable, 29 CFR Part 1911.

Subpart G—[Amended]

2. Paragraph (g)(2) of § 1926.200 is revised to read as follows:

§ 1926.200 Accident prevention signs and tags

* * * * * (g) * * *

(2) All traffic control signs or devices used for protection of construction workers shall conform to Part VI of the Manual of Uniform Traffic Control Devices ("MUTCD"), 1988 Edition, Revision 3, September 3, 1993, FHWA-SA-94-027 or Part VI of the Manual on Uniform Traffic Control Devices, Millennium Edition, December 2000, FHWA, which are incorporated by reference. The Director of the Federal Register approves this incorporation by

reference in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. You may obtain a copy of the Millennium Edition from the following organizations: American Traffic Safety Services Association, 15 Riverside Parkway, Suite 100, Fredericksburg, VA 22406-1022; Telephone: 1-800-231-3475; FAX: (540) 368-1722; www.atssa.com; Institute of Transportation Engineers, 1099 14th Street, NW, Suite 300 West, Washington, DC 20005-3438; FAX: (202) 289-7722; www.ite.org; and American Association of State Highway and Transportation Officials; www.aashto.org; Telephone: 1-800-231-3475; FAX: 1-800-525-5562. Electronic copies of the MUTCD 2000 are available for downloading at http://mutcd.fhwa.dot.gov/kno-millennium. Electronic copies of the 1988 Edition MUTCD, Revision 3, are available for downloading at http://www.osha.gov/doc/highway-workzones. Both documents are available for inspection at the OSHA Docket Office, Room N2625, U.S. Department of Labor, 200 Constitution Avenue, NW, Washington, DC 20210 or at the Office of the Federal Register, 800 North Capitol Street, NW, Suite 700, Washington, DC.

* * * * * 3. Paragraph (a) of § 1926.201 is revised to read as follows:

§ 1926.201 Signaling.

(a) Flaggers. Signaling by flaggers and the use of flaggers, including warning garments worn by flaggers shall conform to Part VI of the Manual on Uniform Traffic Control Devices, (1988 Edition, Revision 3 or the Millennium Edition), which are incorporated by reference in § 1926.200(g)(2).

* * * * * 4. Section 1926.202 is revised to read as follows:

§ 1926.202 Barricades

Barricades for protection of employees shall conform to Part VI of the Manual on Uniform Traffic Control Devices (1988 Edition, Revision 3 or Millennium Edition), which are incorporated by reference in § 1926.200(g)(2).

5. Paragraph (c) of § 1926.203 is revised to read as follows:

§ 1926.203 Definitions applicable to this subpart.

* * * * * (c) Signals are moving signs, provided by workers, such as flaggers, or by devices, such as flashing lights, to warn of possible or existing hazards.

* * * * * [FR Doc. 02-8773 Filed 4-12-02; 8:45 am] BILLING CODE 4510-26-P

PENSION BENEFIT GUARANTY CORPORATION

29 CFR Parts 4022 and 4044

Benefits Payable in Terminated Single-Employer Plans; Allocation of Assets in Single-Employer Plans; Interest Assumptions for Valuing and Paying Benefits

AGENCY: Pension Benefit Guaranty Corporation.

ACTION: Final rule.

SUMMARY: The Pension Benefit Guaranty Corporation's regulations on Benefits Payable in Terminated Single-Employer Plans and Allocation of Assets in Single-Employer Plans prescribe interest assumptions for valuing and paying benefits under terminating single-employer plans. This final rule amends the regulations to adopt interest assumptions for plans with valuation dates in May 2002. Interest assumptions are also published on the PBGC's Web site (http://www.pbgc.gov).

EFFECTIVE DATE: May 1, 2002.

FOR FURTHER INFORMATION CONTACT: Harold J. Ashner, Assistant General Counsel, Office of the General Counsel, Pension Benefit Guaranty Corporation, 1200 K Street, NW., Washington, DC 20005, 202-326-4024. (TTY/TDD users may call the Federal relay service toll-free at 1-800-877-8339 and ask to be connected to 202-326-4024.)

SUPPLEMENTARY INFORMATION: The PBGC's regulations prescribe actuarial assumptions—including interest assumptions—for valuing and paying plan benefits of terminating single-employer plans covered by title IV of the Employee Retirement Income Security Act of 1974. The interest assumptions are intended to reflect current conditions in the financial and annuity markets.

Three sets of interest assumptions are prescribed: (1) A set for the valuation of benefits for allocation purposes under section 4044 (found in Appendix B to Part 4044), (2) a set for the PBGC to use to determine whether a benefit is payable as a lump sum and to determine lump-sum amounts to be paid by the PBGC (found in Appendix B to Part 4022), and (3) a set for private-sector pension practitioners to refer to if they wish to use lump-sum interest rates determined using the PBGC's historical methodology (found in Appendix C to Part 4022).

Accordingly, this amendment (1) adds to Appendix B to Part 4044 the interest assumptions for valuing benefits for allocation purposes in plans with valuation dates during May 2002, (2)