UNITED STATES OF AMERICA
OCCUPATIONAL SAFETY AND HEALTH REVIEW COMMISSION

SECRETARY OF LABOR, Complainant, v. BRANDENBURG INDUSTRIAL SERVICES COMPANY, Respondent.	DOCKET NO. 96-1405

Appearances: For Complainant: Richard T. Buchanan, Esq., Office of the Solicitor, U. S. Department of Labor, Philadelphia, PA.; For Respondent: Oldrich Foucek, III, Esq., Tallman, Hudders & Sorrentino, Allentown, PA.

Before: Judge Covette Rooney

DECISION AND ORDER

This proceeding is before the Occupational Safety and Health Review Commission pursuant to Section 10(c) the Occupational Safety and Health Act of 1979 (29 U.S.C. §651, *et seq.*)("the Act"). Respondent, Brandenburg Industrial Services Company, at all times relevant to this action maintained at a worksite at the Bethlehem Steel Corporation plant located at 1905 East Fourth Street, Bethlehem, PA., where it was engaged in demolition work. Respondent admits that it is an employer engaged in a business affecting commerce withing the meaning of Section 3(5) of the Act, 29 U.S.C. §652(a). Accordingly, Respondent is subject to the requirements of the Act.

From July 2, 1996 to August 23, 1996, Compliance Safety and Health Officer ("CO") Mark Stelmack conducted an inspection of the aforementioned worksite. Respondent was involved in the demolition of portions of the Bethlehem Steel Plant (Tr. 11)[1]. As a result of this inspection, on September 6, 1996, Respondent was issued one citation alleging three serious violations with a proposed total penalty in the amount of $4,225.00. By timely Notice of Contest Respondent brought this proceeding before the Review Commission. A hearing was held before the undersigned on September 9-11, 1997. Counsel for the parties have submitted Post-Hearing Briefs and Reply Briefs, and this matter is ready for disposition.

[1] "Tr" refers to trial transcript. "Exh." refers to exhibits.

SECRETARY'S BURDEN OF PROOF

The Secretary has the burden of proving his case by a preponderance of the evidence.

> In order to establish a violation of an occupational safety or health standard, the Secretary has the burden of proving: (a) the applicability of the cited standard, (b) the employer's noncompliance with the standard's terms, (c) employee access to the violative conditions, and (d) the employer's actual or constructive knowledge of the violation (the employer either knew or with the exercise of reasonable diligence could have known, of the violative conditions).

Atlantic Battery Co., 16 BNA OSHC 2131, 2138 (No. 90-1747, 1994).

CITATION 1, ITEM 1

29 CFR §1926.652(a)(1) Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with paragraph (b) or (c)[2] of this section except when:

(I) Excavations are made entirely in stable rock; or

(ii) Excavations are less than 5 feet (1.52 m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

a) BETHLEHEM STEEL SITE: EAST OF SAUCON ROLL SHOP - EMPLOYEES WERE EXPOSED TO A CAVE-IN HAZARD WHILE WORKING IN AN EXCAVATION APPROXIMATELY EIGHT FEET DEEP FOR THE PURPOSE OF CUTTING AND CAPPING AN EXISTING WATER LINE. THE SLOPE OF THE EXCAVATION WALLS DID NOT MEET THE REQUIREMENTS OUTLINED IN APPENDIX B OF SUBPART P.

The cited excavation was a man-made trench which had been formed by earth removal. 29 U.S.C. §1926.650 (a) and (b). Section 1926.652(a)(1) requires the use of a protective system for excavations 5 feet or more in depth, and permits several alternatives to designing and installing various systems, described in §1926.652(b)[sloping and benching systems] and (c)[support systems, shield systems, and other protective systems]. The record contains unrebutted evidence that the cited trench was more than 5 feet in depth (Tr. 17, 135, 437). Thus, the undersigned finds that the cited standard is applicable.

When an employer elects to protect employees by sloping several options are available.[3] Section 1916. 652(b)(1), *Option 1* requires the sloping of the sides of a trench at an angle not steeper than 1 ½ horizontal to 1 vertical (34 degrees measured from the horizontal), unless the employer uses another option described in the standards. Section 1926.652(b)(2) permits sloping

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[2] See Appendix "A"

[3] "Sloping" means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads. 29 C.F.R. §1926.650(b).

or benching in accordance with Appendices A and B in Subpart P.[4] When the employer elects to use sloping *Option 2*, soil classification per the requirements of Appendix A, is mandatory. Appendix B contains the specifications for sloping and benching where an employer designs a protective system under §1926.652(b)(2).

It is Complainant's position that Respondent violated the cited standard because there was no protective system in the excavation made on July 2, 1996 that complied with the requirements of §1926.652 (b) or (c), and there were employees in the excavation (Tr. 17). CO Stelmack testified that on July 2, 1996, he came across an excavation site just outside the roll shop as he headed toward the soaking pits (Tr. 14-15,116; Exh. 2). He observed a ladder on the west side of the trench which had saw at the bottom of it. There was a shovel leaning against a 30-inch water pipe which ran across the trench in an east-west direction (Tr. 22-23). He also observed two employees in the excavation. One employee was standing on the south side of the pipe, toward the east face of the excavation (Tr. 26-27). The other employee was located on the opposite side , i.e., the north side of the 30-inch pipe toward the east face of the excavation (Tr. 27-28). He learned that the employee on the south side of the pipe was Tom O'Donnell, the foreman of the project (Tr. 15). The employees exited the trench via the ladder. Mr. O'Donnell explained to him that the trench was being dug for purposes of cutting and capping a 30-inch iron water pipe which ran an east-west direction between the Saucon Roll Shop and the Soaking Pit Building. Mr. O'Donnell informed him that the depth of the excavation was 8 feet (Tr. 17, 437). Mr. O' Donnell subsequently testified that he informed CO Stelmack that the trench was 8 feet at its deepest point (Tr. 437). CO Stelmack asked Mr. O" Donnell if he had performed any type of testing to determine the soil type. Mr. O'Donnell informed him that no tests had been done, and that he determined the trench was "okay" by his visual inspection of the excavation (Tr.18, 124-125). He also testified that he subsequently spoke with Mr. O'Donnell in Respondent's conference room a week or two later, and at that time Mr. O'Donnell informed him that he soil was either Type A or B (Tr. 129, 527-28).

CO Stelmack testified that the north wall was vertical - no slope was present. He did not take any measurements on the south side (Tr. 34, 36, 121; Exh. 3). He testified that he took measurements of the trench with a steel tape while standing on the south face of the excavation (Tr. 28, 122). Although he did not measure the depth of the trench, he determined the depth to be 8 feet based upon the information Mr. O'Donnell gave him and his observation of Mr. O'Donnell in the trench - who was as tall as he, i.e., 6 feet, and the top of the trench was above his head - (Tr. 135). He lined up the toe of the slope - the portion of the excavation where the bottom ended and the side wall began - and proceeded to put a mark on the east side. He then marked the top of the slope on the east face. He measured 2½ feet between the toe of the slope and the top of the slope at ground level (Tr. 28-29). He determined that this 2 ½ feet (horizontal) to 8 feet (vertical) ratio was present on the north and the south side of the pipe on the east wall (Tr. 37-38; Exh. 2). He testified that this slope did not comply with the minimum requirements for sloping a Type A slope. Type A soil must have a ¾ to 1 slope unless the slope will be open for a short-term (a period of time less than or equal to 24 hours), wherein the slope can be reduced to ½ horizontal to 1 vertical (Tr. 30). He explained that to achieve the ½ to 1 ratio at an

[4] See "Appendix B", attached hereto

8-foot depth for short-term Type A soil, the horizontal measurement would have to be 4 feet

This slope also did not meet the requirements for Type B soil which required a 1 horizontal to 1 vertical slope or 45 degree angle. He further explained that if there had been no determination made with regard to the type of soil in the trench, the minimum sloping requirement mandated that the soil be assumed to be Type C, wherein the slope would have to be 1½ horizontal to 1 vertical (Tr. 30-31). For Type C soil with an 8-foot deep excavation the horizontal measurement would have to be 12 feet horizontal - a ratio of 1 ½ to 1 (Tr. 33).

He also took measurements of the west wall of the trench (Tr. 34). He determined that the measurements of the west wall, south of the pipe, were 5 feet horizontal to 8 feet vertical (Tr. 31-32). He determined that this complied with the minimum sloping requirements for Type A soil for a short term-excavation. However, this slope did not otherwise comply with the minimum requirements for sloping for Type A or Type B soil (Tr. 32).

He testified that the west wall, north of the pipe contained two existing pipe lines - a branch of the east-west pipeline running north as it came together in a T, and a smaller pipe. The soil below the pipe lines was not sloped (Tr. 35- 36). The ladder was against the west wall, north of the 30-inch pipe (Tr. 36; Exh.3). He learned from Mr. O'Donnell that there were concrete footers (base structure for a foundation to a building which supported the weight of the previously existing building) along the east face of the excavation, both north and south of the 30-inch pipe as well as perpendicular to the east face. Mr. O'Donnell informed him that the footers had a depth of 3 feet from the surface to the top of the footer, and the footer extended approximately 2 feet in height (Tr. 39). CO Stelmack testified that he did not consider these footers to be a protective system because these footers had been previously designed to support a structure, with forces acting downward on the footers. The footers had not been designed nor engineered to support the lateral forces of the soil in the excavation, and they had not been designed or constructed by Respondent (Tr. 40). This fact was also acknowledged by Respondent's witnesses. Andrew Dabrowski, Environmental Health and Safety Manager for Respondent testified that these footers has not been designed by any engineer of Respondent for the purpose of shoring this trench or withstanding any amount of pressure in the trench (Tr. 298). Although he believed that water line served to some extent as a protective system for the trench, he acknowledged that the water pipe had not been installed by Respondent nor had it been designed to be a shoring system for the trench (Tr. 301).

CO Stelmack testified that he determined that the soil in the area of the pipes and footers could not be considered Type A soil because the soil had been previously disturbed - the soil had to have been excavated to install those structures (Tr. 40, 129). The standard states that previously disturbed soil cannot be classified as Type A. He determined that the soil in the trench was Type B based upon the fact that the soil around the water pipe and footer had been previously disturbed as a result of their installation (Tr. 129; Subpt. P, App. A). James Arendas, a witness for Respondent agreed that the soil around the pipe and the footer was previously disturbed because it had to have been excavated. However, it was his belief that all of the soil in the trench was not previously disturbed soil because the trench went beyond the previously disturbed soil (Tr. 375).

The undersigned notes that Review Commission precedent has established that a trench wall composed of materials of differing strengths is only as stable as its weakest component.

Woolston Construction Co., 15, BNA OSHC 114, 117 (No. 88-1877, 1991), citing *CCI Inc.*, 9 BNA OSHC 1169, 1173 (No. 76-1228, 1980), *aff'd.* 688 F.2d 88 [10 BNA OSHC 1718] (10th Cir. 1982). The video and photographs admitted into evidence by the parties reveal that the footers and concrete walls as well as the area surrounding the water lines were a significant portion of the trench. Accordingly, the undersigned finds that a preponderance of evidence that the trench walls containing the footers and the pipes contained soil which had been previously disturbed. Thus, the trench could not have consisted of solely Type A soil. The undersigned also notes that CO Stelmack testified that the trench walls contained rock fragments which also supported his finding that the trench soil was not Type A (Tr. 532).[5]

The undersigned finds that when an option at §1926.652(b) requires the conditions and requirements of an appendix, that the appendix then becomes mandatory. The undersigned finds that the term"shall", as set forth in *Option (2)*, make the requirements and provisions of the appendix mandatory.[6] Accordingly, the soil classification system is mandatory when an employer chooses *Option (2)*[as well as *Option 1(ii)*]. Appendix A (c) contains the requirements for making soil classifications and sets forth that the classifications "shall be made based on the results of at least one visual and at least one manual analysis". Appendix B contains various maximum angles expressed in degrees for slopes. These angles are dependent upon the soil classification of the trench. Thus, to utilize the slope measurements found at Appendix B, a soil classification is mandatory. The undersigned finds that in order to determine whether or not a prima facie case of the cited standard can be established, the record must be examined to determine whether the

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[5] The Secretary presented testimony from Dr. Peck who did not actually view or perform any tests upon the soil of the subject trench (Tr. 174). He concluded that the soil classification was Type B based upon his review of the OSHA video tape of the site and photographic evidence (Exhs. G-2 and 5). He testified that the video revealed evidence of many rock fragments and showed a great inclination to break apart into fragments rather than stick together, in the vicinity of the excavation which corresponded to Type B soil. He provided examples of where rock material appeared in the video and photographic evidence (Tr. 189-190, 194-97). He indicated that the soil was composed of sandy slit in areas, clay in areas and rock fragments in other areas. He also stated that the material was broken up into microscopic fissures that would correspond to fissures. This mixed soil was indicative to Type B. He also indicated that the soil around the pipe showed evidence of having been previously disturbed (Tr. 197). It was his opinion that there was not "any way" the soil depicted in the video and photograph could have been Type A (Tr. 199). He also explained that previously disturbed soil is soil no longer a natural deposit - it has been manually moved. He also stated that Type A, B, or C soil can contain clay (Tr. 524). The undersigned finds that this testimony corroborated CO Stelmack's testimony concerning his observations of the trench.

[6] "**shall**"... **1** ... will have to: MUST ... **2** ...used to express a command or exhortation...used in laws, regulations, or directives to express what is mandatory... *Webster's New Collegiate Dictionary* 1056 (Merriam-Webster ed. 1979).

procedures set forth in Appendix A were followed. The failure to follow this mandatory requirement prohibits Respondent from availing itself of *Option 2* , and thus, Respondent would have been required to slope the walls of the trench at an angle not steeper than 1 ½ horizontal to 1 vertical or 12 feet horizontal to 8 feet vertical in this instance. An evaluation of the credibility of the witnesses is critical in resolving this issue. CO Stelmack testified that on July 2, Mr. O'Donnell informed him that he had performed no tests on had been done to determine the soil classification, and that he had done a visual inspection of the excavation (Tr. 18). This statement is corroborated by the fact that his handwritten notes reflect that Mr. O'Donnell said "no testing done prior to entry, performing only visual observation" (Tr. 125).[7] Approximately a week or two later, Mr. O'Donnell told him that he had determined that the soil was either Type A or Type B(Tr. 129).

However, Mr. O'Donnell testified that when he went into the trench he performed a thumb penetration test and found the soil to be firm (Tr. 427). This thumb penetration test was done on the east wall. He considered the wall on the other walls to be the same (Tr. 473). He determined that the soil was Type A and did not need much sloping because the trench was going to be open less than 24 hours (Tr. 429). He testified that he determined that the soil on top of the concrete and the soil directly beside the pipe for approximately 4 inches had been previously disturbed for installation purposes (Tr. 459). He testified that he grabbed a handful of it and squeezed it to feel how it compressed and found the it stuck together when he rolled it into a ball and a pen size string (Tr. 426). He also determined that the soil was Type A - clay - because there were no visible voids in the soil or fissures.

Respondent attempted to explain the inconsistencies in the statements which Mr. O'Donnell's gave CO Stelmack on July 2, and his testimony. Mr. O'Donnell testified that he informed CO Stelmack that he had not tested the soil because it was his impression that CO Stelmack was asking him whether he had "scientifically tested it". He stated that he did not tell him about the visual test and thumb test which he had performed because he did not think that he was being asked about those tests (Tr. 438-439).

In evaluating the credibility of the testimony of CO Stelmack and Mr. O'Donnell the undersigned has considered a number of factors. The undersigned finds Mr. O'Donnell's explanation concerning what he believed was a "scientific" inquiry, skeptical and incredible. Mr. O'Donnell testified that on July 2, CO Stelmack did not ask him if he had determined what type of soil he was digging in or at what angle he was sloping the trench. He testified that it was not until a couple of days later that CO Stelmack asked him if he had tested the soil, to which he replied "no" (Tr. 438). CO Stelmack testified that this question was asked at the trench on July 2 - a

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[7] Respondent attacks the accuracy of this statement because CO Stelmack did not show this statement to Mr. O'Donnell for his concurrence with its contents per OSHA inspection procedures as set forth in the field operations manual. The undersigned finds that CO Stelmack's failure to show Mr. O'Donnell his notes does not negate the veracity of the contents of said notes. Furthermore, Review Commission precedent has established that the field operations is not binding on the Secretary and does not create any substantive rights for employers. *See Andrew Catapano Enterprises, Inc.*, 17 BNA OSHC 1776, 1780 (Nos. 90-0189 et al, 1996), and cases cited therein.

statement supported by his notes (Tr. 18, 124). The undersigned notes that Mr. Dabrowski testified that one of the first topics he discussed with Mr. O'Donnell upon his arrival at the trench was the soil type, because he had a concern with the angles of the walls (Tr. 242-246). Mr. Dabrowski testified that when he arrived, he noticed CO Stelmack at the trench and that was part of his concern. The trench was immediately reconfigured. The undersigned finds it difficult to give credence to the fact that Mr. O'Donnell had discussed his findings concerning the soil type with Mr. Dabrowski and not with the OSHA inspector who in the process of examining the trench.

Additionally, in response to his attorney's questions at trial, Mr. O'Donnell unequivocally, set forth in detail the field tests he routinely conducted at trench sites. This response was based upon his training, experience, and familiarity with specific governmental regulations regarding trenches (Tr. 405-409). However, when CO Stelmack asked him what tests he performed he did not convey this information (Tr. 469-70). He testified that he believed that CO Stelmack was questioning about "scientific testing". He acknowledged however, that CO Stelmack did not ask him about "scientific testing", he asked him if he had "checked it" (Tr, 468-68). An examination of the record reveals that there was nothing brought up in that conversation, per his testimony, which the undersigned finds would have lead him to believe that CO Stelmack was questioning him about a scientific lab test. Because of his admitted familiarity with the acceptable field tests and the routine nature of his performance of these test, it would have been logical for him to have at least mentioned the results of these tests, especially since he had informed Mr. Dabrowski of his determination. His neglect in describing his manual field tests is illogical. Additionally, the undersigned finds that Mr. O'Donnell's subsequent statement, regarding the soil type as Type A or Type B - which was recorded in CO Stelmack's notes - took place after Respondent had taken samples of the soil and forwarded them to a lab.[8] Thus, this statement was made after the results of those tests had been made known. Furthermore, the undersigned finds that Respondent's reliance upon Mr. O'Donnell's findings of the concrete footer along the east wall is of no consequence to the visual observations made by Mr. O'Donnell. The record establishes that Respondent did not design or install them. The record is also void of any evidence that Respondent tested the adequacy of the footer or the water pipe with regard to holding back soil and. Additionally, the record is void of any evidence that Mr. O'Donnell was qualified to perform such tests.

The undersigned also finds that the CO Stelmack's demeanor on the witness stand was forthright and his responses were supported by his notes. Accordingly, his testimony is found to be credible. The undersigned also finds that the initial inquiry of Mr. O'Donnell concerning the soil determination took place on July 2, as verified in CO Stelmack's notes, and not a couple of

[8] The undersigned assigns little weight to the results of these tests in view of the fact that they were taken subsequent to July 2, and subsequent to the trench being backfilled (Tr. 254, 257 304-307; Exh. R-9). Furthermore, the undersigned notes that Mr. Richard Zaloum, a registered professional engineer, whose company ran tests in the lab and in the field indicated that the results of said samples indicated that the sample had an unconfined compressive strength of 1.5 tons per square foot, however, it was his opinion that without having been present at the time of the excavation, he could not give a definitive opinion as to whether the soil was Type A or Type B (Tr. 504).

days later as Mr. O'Donnell testified (Tr. 438). Again, Mr. O'Donnell's testimony is found to be not credible with respect to his alleged misinterpretation of the type of testing CO Stelmack was referring, i.e., scientific testing. The undersigned also observed, as did counsel for Complainant, that there was some hesitation exhibited by Mr. O'Donnell in response to questions posed during cross examination. Mr. O'Donnell explained that this was a reaction to wanting to tell the truth (Tr. 455). However, the undersigned observed a distinct variation in his demeanor during cross examination from direct examination. At best, his testimony appeared to be tailored to serve the best interest of his employer, the Respondent.

The record establishes that Mr. O'Donnell failed to perform a soil classification before sloping the subject trench. This requirement is mandatory before sloping is performed, and his failure to comply with Appendix A negates his option to slope according to Type A requirements. His only alternative was to slope in accordance with Type C requirements. In view of the above, the undersigned finds that the Secretary has proven a violation of the cited standard.

The record also establishes that in order for an 8 foot trench to have complied with Type C soil classification, the horizontal distance from the toe of the slopes at ground level would have to have been at least 12 feet. The undersigned finds that based upon CO Stelmack's measurements of the east and west walls, and the vertical nature of the north wall, the trench did not met this 12 foot requirement.

The undisputed presence of the foreman, Mr. O'Donnell and another employee in the trench establishes employee exposure. The record also establishes that Mr. O'Donnell who directed the work at trench was aware of the configuration of the trench on July 2. The undersigned finds that Mr. O'Donnell's admitted knowledge of the standards governing trenching standards as well as his training and experience, establish actual knowledge of the violative condition. His knowledge is imputed to the Respondent in view of his supervisory capacity.[9] Accordingly the Secretary has established a prima facie violation of the cited standard by a preponderance of evidence.

SERIOUS CLASSIFICATION

Section 17(k) of the Act, 29 U.S.C.. §666(k) of the Act, provides that a violation is "serious" if there is " a substantial probability that death of serious physical harm could result" from the violation. In order to establish that a violation should be characterized as serious, the Secretary need not establish that an accident is likely to occur, but must show that an accident is possible and it is probable that death or serious physical harm could occur. *Flintco Inc., 16 BNA OSHA 1404, 1405 (No 92-1396, 1993).*

CO Stelmack testified that the hazard presented was that of a cave-in from any one of the inadequate trench walls. He classified the violation as serious because fatal injuries could result

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[9] To satisfy the element of knowledge, the Complainant must prove that a cited employer either knew, or with the exercise of reasonable diligence could have known of the presence of the violative condition. *Seibel Modern Manufacturing & Welding Corp.*, 15 BNA OSHC 1218, 1221 (No. 88-821, 1991); *Consolidated Freightways Corp.*, 15 BNA OSHC 1317, 1320-1321 (No. 86-351, 1991). Review Commission precedent has established that actual or constructive knowledge of the employer's foreman or supervisor can be imputed to the employer. *Jersey Steel Erectors,* 16 BNA OSHC 1162 (No. 90-1307, 1993).

from a cave-in (Tr. 41). The Review Commission has recognized that "[i]f a cave-in occurred in an 8-foot deep trench, it is clear that there is a substantial probability that the likely result would be death or serious physical harm." *DiGioia Brothers Excavating Inc.,* 17 BNA OSHC 1181, 1183 (No. 92-3024, 1995), citing *Trumid Construction Co.,* 14 BNA OSHC 1784, 1789 (No. 86-1139, 1990). The undersigned finds that the serious nature of the aforementioned citation has been established by the Secretary.

PENALTY

Once a contested case is before the Review Commission, the amount of the penalty proposed by the Complainant in the Citation and Notification of Proposed Penalties is merely a proposal. What constitutes an appropriate penalty is a determination which the Review Commission as the final arbiter of penalties must make. In determining appropriate penalties "due consideration" must be give to the four criteria under Section 17(j) of the Act, 29 U.S.C., §666(j). These "penalty factors" are: the size of the employer's business, the gravity of the violation, the employer's good faith, and its prior history. *J.A. Jones Construction Co.,* 15 BNA OSHC 2201, 2213-14 (No. 87-2059, 1993). These factors are not necessarily accorded equal weight. Generally speaking, the gravity of a violation is the primary element in the penalty assessment. *Trinity Indus., Inc.,* 15 BNA OSHC 1481, 1483 (No. 88-2691, 1992). The gravity of a particular violation depends upon such matters as the number of employees exposed, the duration of the exposure, the precautions taken against injury, and the likelihood that any injury would result. *J.A. Jones, supra.*

CO Stelmack testified that the gravity of the violation was high. He testified that he determined that the severity of the expected injury was fatal. He determined that the probability of an injury occurring was lesser because of the amount time that employees been in the trench and he observed no sloughing or falling off of material from the side walls of the excavation (Tr. 43). These factors resulted in a$2,500.00 gravity-based penalty. This penalty was adjusted. A 10% reduction was applied for history because the Respondent had not been cited for any serious violations in the past 3 years. A 25% reduction was also applied for good faith in recognition of Respondent's effective health and safety program on site. No reduction was applied for size because the record establishes that the Respondent employed approximately 565 employees. The undersigned finds that the record supports the aforementioned findings, and that the proposed penalty in the amount of $1,625.00 is appropriate.

CITATION 1, ITEM 2

29 CFR §1926.850(I) All floor openings, not used as material drops, shall be covered over with material substantial enough to support the weight of any load which may be imposed. Such material shall be properly secured to prevent its accidental movement.

a) SINTER PLANT, MACHINE FLOOR, #4 MACHINE - THE FLOOR OPENING AT THE NORTH SIDE OF #4 MACHINE WAS NOT COVERED NOR GUARDED WITH PROPERLY INSTALLED STANDARD RAILING. THE OPENING, APPROXIMATELY 62" x 33" x 8'5" DEEP WAS PROVIDED WITH A CHAIN RAILING WHERE THE TOP RAIL SAGGED TO a HEIGHT OF 30" ABOVE THE FLOOR AND THE MID RAIL WAS 8" ABOVE THE

FLOOR.

CO Stelmack testified that there was a floor opening on the fourth floor of the Sinter Plant. On July 24, 1996, he observed two employees walking side by side by the aisleway adjacent to the floor opening (Tr. 52). The area had been identified as one where Respondent had been scheduled to perform demolition, and salvage work, such as pulling copper wire. The fall distance was 8 feet 5 inches (Tr. 45-46). Respondent does not take issue with the fact that the cited floor opening was not covered, nor were the guard rails left by Bethlehem Steel located at the proper height. Accordingly, the undersigned finds that the applicability of the standard is not disputed and that the standard was not complied with. However, Respondent asserts that the existence of this condition was not violative of the standard because no work was being performed in this area and no employees were exposed to the potential fall hazard (Respondent's Post Trial Brief, p. 23).

CO Stelmack testified that he determined that the two employees he observed were exposed to the hazard of a fall, via the floor opening. He testified that the aisleway was 10 feet from the edge of the floor to the wall on the other side of the aisle, per information provided to him by Mr. Dabrowski (Tr. 145).[10] He determined that the employees were approximately 2 feet from the wall, and 4 feet from the floor opening (Tr. 51-52). On cross examination, he was asked to "guess" how far he was from these individuals when he observed them. He guessed 30 feet (Tr. 142-43). They were not performing any work when he observed them - they were "just passing by", i.e., walking (Tr. 143, 148). On July 25, he spoke with the two employees whom he had observed - Carlos Rojas and Glenn Miller. They advised him that they had been pulling copper wire to be salvaged at the Sinter Plant since Monday, July 22 (Tr. 54). His handwritten notes of that conversation indicate that they had "started pulling wire on Monday on fourth floor yesterday there were four guys on the fourth floor." (Tr. 147). CO Stelmack testified that he spoke with Mr. Dabrowski about the employees he had observed on the fourth floor. Mr. Dabrowski explained that the employees were pulling wires on the fourth floor (Tr. 55, 159).

Mr. Dabrowski testified that he was with CO Stelmack at the time the instant condition was observed, and he too observed the two employees. He disputed CO Stelmack's estimate of having been 30 feet from the employees at the time of the observation, and testified that they were approximately 75 feet away from the two employees (Tr. 267). He also testified that he was aware of no work being performed on this elevation, which CO Stelmack called the fourth floor. He further testified that copper wire was not being pulled at that location, he testified that it was being pulled on the "fourth elevation"- the floor directly above the floor the employees were observed (Tr. 267-268). He acknowledged that the two employees were not violating any rule by walking past the cited location (Tr. 329). It was his opinion that if the employees were more than 4 feet from the edge of the floor, they were not exposed to any fall hazard (Tr. 334).

Glenn Miller, one of the two observed employees, acknowledged that he removed wire at various locations at the Sinter plant, but denied that he told CO Stelmack that he pulled wire on the fourth floor of the Sinter plant (Tr. 341-42, 348). He testified at the time of the observation he was going from one set of steps to another - from the third floor to the fourth floor (Tr. 342-

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[10] Mr. Dabrowski testified he subsequently measured this area and it was 11 feet 8 inches from the wall to the edge of the floor (Tr. 263).

43). He recalled that he and the other employee were walking one behind the other. He testified that the walkway was by the floor opening was 8 to 10 feet wide and that he was approximately 6 feet from the floor opening (Tr. 347).

In *RGM Construction Co.,* 17 BNA OSHC 1229, 1234 (No. 91-2107, 1995), the Review Commission set forth precedent which has established that "[t]he Secretary may prove employee exposure to a hazard by showing that during the course of [employees'] assigned duties, their personal comfort activities on the job, or their normal ingress-egress to and from their assigned workplaces, employees have been in a zone of danger or that it is reasonably predictable that they will be a zone of danger. *Kaspar Electroplating Corp.*, 16 BNA OSHC 1517, 1521 (No. 90-2866, 1993); *Armour Food Co.*, 14 BNA OSHC 1817, 1824 (No. 86-247, 1990). The zone of danger is determined by the hazard presented by the violative condition and is normally that area surrounding the violative condition that presents the danger to employees which the standard is intended to prevent. *Gilles & Cotting, Inc.,* 3 BNA OSHC 2002, 2003 (No. 504, 1976).

The undersigned finds that the Secretary has proven employee exposure by a preponderance of evidence. The record reveals that there may have been some confusion with regard to where the pulling of wire was done in terms of the fourth floor or fourth elevation. The record reveals that there was also a dispute as to the distance from which the observation of the two employees was made. However, the undersigned finds that the unrebutted evidence establishes that the two employees were in the zone of danger of the uncovered floor opening as they traveled from one floor to another. Furthermore, the undersigned finds that Mr. Miller's testimony of being approximately 6 feet from the floor opening establishes exposure as did CO Stelmack's testimony of a 4 foot distance from the floor opening. The undersigned finds that traveling 4 to 6 feet from the uncovered floor opening establishes exposure a fall hazard. The distance may affect the probability of a fall, but does not negate the hazard of an uncovered floor opening as employees travel pass it. Furthermore, the fact that employees were not observed pulling wire at that location, does negate a finding of employee exposure. Per the observation of CO Stelmack, and as testified to by Mr. Miller, employees traveled pass the uncovered floor opening to go to and from their work locations. The undersigned finds that this activity put them in the zone of danger of a fall hazard as they passed the floor opening.

The undersigned finds that had Respondent exercised reasonable diligence, the presence of the presence of the cited condition would have been known. Reasonable diligence involves several factors, including an employer's "obligation to inspect the work area, to anticipate hazards to which employees may be exposed, and to take measures to prevent the occurrence." *Frank Swidzinski Co.,* 9 BNA OSHA 1230, 1233 (No. 76-4627, 1981). Mr. Dabrowski should have been aware of this condition, as he and other Brandenburg employees had conducted a survey of the Sinter Plant, prior to the start of demolition operations, to identify any safety hazards (Tr. 56-57, 260). Accordingly, the undersigned finds that the Secretary has proven employer knowledge. Mr. Dabrowski's knowledge is imputed to the Respondent. The undersigned finds that the Secretary has established a prima facie violation of the cited standard by a preponderance of evidence.

SERIOUS CLASSIFICATION

CO Stelmack determined that this violation was serious because the employees were exposed to a fall distance of 8 feet 5 inches from the fourth floor (Tr. 46). He concluded that the

injuries resulting in fractures could be expected from such a fall (Tr. 52- 53, 57). The undersigned finds that the record supports finding of serious physical harm as a result of this hazard.

PENALTY

CO Stelmack determined that the gravity of the violation reflected a low severity and a lesser probability. The undersigned finds that these recommendations adequately reflect the type of injuries expected - fractures. He also determined that there was a lesser likelihood that an injury would occur in view of the number of employees exposed and the short duration of their exposure. The gravity based penalty was adjusted as previously discussed for history and good faith. The undersigned finds that the record supports the aforementioned findings, and that the proposed penalty in the amount of $975.00 is appropriate.

CITATION 1, ITEMS 3a and 3b

Item 3a

29 CFR § 1926.251(a)(1) Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to ensure that it is safe. Defective rigging equipment shall be removed from service.

a) BURNING FIELD, EXCAVATOR #1095 - THE MAGNET ON THE EXCAVATOR WAS ATTACHED TO THE MACHINE WITH A MAGNET SLING AND SHACKLE. THE SHACKLE HAD WEAR IN THE CROWN TO A POINT WHERE THERE WAS GREATER THAN a 10% LOSS IN ORIGINAL DIAMETER. THE 1 -1/2" SHACKLE WAS WORN IN THE CROWN TO 1-1/8". THIS IS A LOSS IN DIAMETER OF 25%. THIS SHACKLE WAS STILL IN SERVICE.

CO Stelmack testified that he observed that a shackle on the cited excavator was worn to a point where it would be deemed defective and should have been removed from service.[11] The excavator was used to manipulate steel with magnets. He described the shackle as the device that was used too couple the magnet chain to the excavator - it was attached to the end of the boom/dipper of the excavator (Tr. 59). He took a caliper reading of the diameter of the shackle in the area where it was worn. He also measured an area where there was no wear. The original diameter of the shackle was 1 ½ inches. The worn area, the crown, was 1 **c** inches (Tr. 59-60). This worn area represented a 25% difference in the original diameter. CO Stelmack determined that based upon his training as well as the manufacturer's information which stated that shackles with a greater than 10% wear or metal loss be removed from service, that the cited standard had been violated (Tr. 62). Respondent does not challenge the fact that the shackle was worn (Respondent's Post Trial Brief, p. 26). Respondent's witness, Mr. Dabrowski acknowledged that there is considerable data in the rigging industry that a shackle worn beyond 10% or its original diameter should be removed from service, and it would be the practice to remove from service

[11] The undersigned notes that the safety standards do not define the term "defective." The term "**defective**" is defined as " **1.** lacking something essential: FAULTY . . . " *Webster's New Collegiate Dictionary* 294 (Merriam-Webster ed. 1979).

any shackle that was so worn (Tr. 289-90). Accordingly, it is undisputed that the shackle was worn, and thus, the undersigned finds that it was defective.

The Respondent submits that this condition did not constitute a violation of the cited standard because the scope of §1926.251 is limited to "slings in conjunction with other material handling equipment for movement of material by hoisting..." 29 C.F.R.§1926.251(a)(5)(emphasis added). It is Respondent's position that the cited equipment was not being used for hoisting material, i.e., lift material. Instead the equipment was being used to manipulate material, i.e., move pieces of scrap metal by way of a magnet attached to the arm of an excavator with a shackle and sling assembly (Respondent's Post Trial Brief, p. 26; Tr. 98-99, 268-270, 379).

The undersigned finds that the term hoist encompasses the activity observed here.[12] The record reveals that the magnets were raising materials from piles, via their attraction, and moving them to other areas (See e.g., Tr. 99) The chain sling and shackles were a part of the apparatus used to lift the materials via the magnet. This activity is consistent with the activity of "hoisting" as used in §1925.251. The manipulation of the steel included lifting. Thus, the cited standard is applicable. Accordingly, the undersigned finds that the cited standard was applicable.

ITEM 3b

29 CFR§1926.251(b)(5) Whenever wear at any point of any chain link exceeds that shown in Table H-2, the assembly shall be removed from service.[13]

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[12] "**hoist** ... to raise into position by or as if by means of tackle... **tackle**...**1.** a set of the equipment used in a particular activity; . . . **2**. ...**b**. an assemblage of ropes and pulleys arranged to gain mechanical advantage for hoisting and pulling..." *Webster's New Collegiate Dictionary* 1056 (Merriam-Webster ed. 1979).

[13] TABLE H - 2. -- MAXIMUM ALLOWABLE WEAR AT ANY POINT OF LINK

Chain size, (inches)	Maximum allowable wear (inch)
1/4	3/64
3/8	5/64
1/2	7/64
5/8	9/64
3/4	5/32
7/8	11/64
1	3/16
1 1/8	7/32
1 1/4	1/4
1 3/8	9/32
1 1/2	5/16

a) BURNING FIELD, EXCAVATOR #1095 - THE MAGNET CHAIN SLING ASSEMBLY WAS IN USE WITH WEAR ON THE COUPLING LINKS GREATER THAN THAT ALLOWED IN TABLE H-2 OF SUBPART H. THE THREE 1" COUPLING LINKS WERE WORN GREATER THAN THE 3/16" ALLOWABLE IN TABLE H-2.

b) BURNING FIELD, EXCAVATOR #1083 - THE MAGNET CHAIN SLING ASSEMBLY WAS IN USE WITH WEAR ON THE COUPLING LINKS GREATER THAN THAT ALLOWED IN TABLE H-2 OF SUBPART H. THE THREE 1" COUPLING LINKS WERE WORN GREATER THAN THE 3/16" ALLOWABLE IN TABLE H-2.

Co Stelmack testified he observed two sets of 3-leg chain slings - one set on each of two excavators. The #1095 excavator utilized a 3-legged alloy steel chain to attach a magnet to the tip of its boom on July 25, 1996. The original diameter of each of the coupling links on the chains was 1 inch. Using a caliper, he measured the demitasse of the 3 links at 14/32 inch, 14/32 inch and 17/32 inch. Thus, the wear on these links was 18/32 inch, 18/32 inch, and 15/ 32 inch (Tr. 63-68,75-77; Exh. G-3). These measurements are beyond the 3/16 inch maximum allowable wear He also measured the wear on the three coupling links connecting a magnet to excavator #1083 excavator on July 25. He determined that the coupling links were worn greater than the 3/16 maximum allowable wear (Tr. 68). Respondent does not challenge the fact that the coupling links were worn (Respondent's Post Trial Brief, p. 26). Again, Respondent submits that this condition did not constitute a violation of the cited standard because the cited excavators were not engaged in hoisting. The undersigned again finds that the excavators were engaged in hoisting, and thus, the cited standard is applicable. (See discussion Item 3(a), *supra.)*

The undersigned also finds that the record reveals that Respondent presented no measurements which contradict the measurements CO Stelmack made of the chain links. Thus, a finding of noncompliance is appropriate.

EMPLOYEE EXPOSURE

Respondent contends that there was no employee exposure as a result of the conditions of the shackle and coupling links. (Respondent's Post Trail Brief, p. 28). CO Stelmack determined through his observations and employee interviews that the hazard associated with Items 3(a) and 3(b) was that of being struck by the magnet or the load on the magnet, or materials on the ground which the load may fall upon (Tr. 78-80, 85-87, 100-103).[14] He observed that the operator of a skid-steer loader, a piece of mobile equipment, was within the swing radius of the excavator

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1 3/4 .....| 11/32
_____|_____

[14] Again, CO Stelmack contemporaneously recorded his interviews with employees (Tr. 84-85).

#1083 (Tr. 73-74, 79, 157; Exh G-3). He also testified that the excavators were used in the 100 to 200 acre area known as the burning fields. In this area employees were on foot burning pieces of scrap metal with hand held torches (Tr. 79). Also in the burning fields, there was an area known as the "separating bays" where employees on foot separated metal into piles. Employees in this area worked in conjunction with the excavators with the magnets. They would go into a pile of scrap and hand-pick pieces of material while the excavator was also working on the pile to take out what the magnet would attract (Tr. 80). He also testified that if one of the chain links broke, any load on the magnet and the load on the magnet would fall to the ground, exposing employees on the ground to hazards (Tr. 162-63). The record also reveals that the excavators would travel over various terrains without loads, wherein the magnets would swing from side to side (Tr. 293).

The undersigned finds that the employee exposure has been established by a preponderance of evidence. The record establishes that during the course of their assigned duties, employees would be in the zone of danger presented by the violative condition. The undersigned finds that in spite of the fact that the Respondent equipped its skid loader and excavator operators two-way radios, these employees were still exposed to a hazard of an unexpected fall of the magnet and/or load as the result of the inadequate the shackles and coupling links. The excavators traveled all over the worksite, including the burning fields, and were subject to varying rotating and swinging motions (Tr. 164-65, 283, 290). Thus, the potential exposure for employees on foot, who were burning or cutting scrap metal or were separating copper or salvageable material, and were not equipped with radios, varied with location (Tr. 283-85). The undersigned does not find that the Secretary must prove that the only employees potentially exposed were employees directly under the radius of the arm of the excavator at a particular time. The undersigned finds that all employees, including those in mobile equipment were subject to potential danger of being struck as a consequence of the excessive wear on the shackle and coupling links.

CO Stelmack determined that Respondent was aware of the conditions of the shackles and chains. Employees informed him that they had indicated within their inspection reports that the chains were bad. His examination of the crane reports for crane #1095 revealed that the condition of the chains had been noted from July 22 through July 25, 1996 (Tr. 155). He further testified that he spoke with Mr. Dabrowski and he informed him that he had received these reports and that they had not replaced the chains as yet because they had no replacements (Tr. 88; Exh. G-6). Mr. Dabrowski also acknowledged during his testimony that Respondent was aware that the chains were worn prior to the inspection and was awaiting an order for new chains (Tr. 276-277). Employer knowledge is established by a showing of employer awareness of the physical conditions constituting the violation. *Phoenix Roofing, Inc., 17 BNA OSHA 1076, (No. 90-2148, 1995), aff'd without op., 79 F. 3d 1146 (5th Cir. 1996).* The undersigned finds that the record establishes that Mr. Dabrowski was aware of the violative condition of the shackles and chains. Mr. Dabrowski's knowledge is imputed to the Respondent. Accordingly, the undersigned finds that the Secretary has established a prima facie case of a violation of the cited standards by a preponderance of evidence.

SERIOUS CLASSIFICATION

CO Stelmack classified these two items as serious because of the possibility of being

struck by material or the failure of the magnet. He expected serious physical harm or death would be the most likely result. The undersigned finds that the Secretary's serious classification of these items was appropriate. The failure of the cited shackles and chain links could result in serious physical harm or death to employees from the magnets or loads falling upon or around them.

PENALTY

Items 3(a) and 3(b) were grouped for penalty purposes because they involved similar or related hazards that may increase the potential for injury. CO Stelmack determined that the gravity of the violation was based upon a high severity as a result the expected injuries leading to death, and a lesser probability. Mr. Dabrowski testified that employees are trained to stay clear of the equipment, and if they must go into the area of the excavator, they must get the operator's concurrence by contacting the operator on his radio (Tr. 272). CO Stelmack also acknowledged that Respondent had a safety policy instructing employees not to walk under loads (Tr. 109). Additionally, employees operating the loaders and excavators had two-way radios. The gravity based penalty was again adjusted for history and good faith. The undersigned finds that the record supports the aforementioned findings, and that the proposed penalty in the amount of $1,625.00 is appropriate.

FINDINGS OF FACT AND CONCLUSIONS OF LAW

The foregoing decision constitutes the findings of fact and conclusions of law in accordance with Federal Rule of Civil Procedure 52(a).

ORDER

Based upon the foregoing, it is hereby ORDERED that:

Citation 1, Item 1 is AFFIRMED with a penalty of $1,625.00.
Citation 1, Item 2 is AFFIRMED with a penalty of $975.00.
Citation 1, Items 3(a) and 3(b) are AFFIRMED with a penalty of $1,625.00.

Covette Rooney
Judge, OSHRC

Dated:

Washington, D.C.

Appendix A

§1926.652 (b) ***Design of sloping and benching systems.*** The slopes and configurations of sloping and benching systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (b)(1); or, in the alternative, paragraph (b)(2); or, in the alternative, paragraph (b)(3); or, in the alternative, paragraph (b)(4), as follows:

(1) *Option (1)* - Allowable configurations and slopes. (I) Excavations shall be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless the employer uses one of the other options listed below.

(ii) Slopes specified in paragraph (b)(1)(I) of this section, shall be excavated to form configurations that are in accordance with the slopes shown for Type C soil in Appendix B to this subpart.

(2) *Option (2)* - Determination of slopes and configurations using Appendices A and B. Maximum allowable slopes, and allowable configurations for sloping and benching systems, shall be determined in accordance with the conditions and requirements set forth in appendices A and B to this subpart.

(3) *Option (3)* - Designs using other tabulated data. (I) Designs of sloping or benching systems shall be selected from and in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data shall be in written form and shall include all of the following:

(A) Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;

(B) Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(iii) At least one copy of the tabulated data which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Secretary upon request.

(4) *Option (4)* - Design by a registered professional engineer.

(I) Sloping and benching systems not utilizing Option (1) or Option (2) or Option (3) under paragraph (b) of this section shall be approved by a registered professional engineer.

(ii) Designs shall be in written form and shall include at least the following:

(A) The magnitude of the slopes that were determined to be safe for the particular project;

(B) The configurations that were determined to be safe for the particular project;

(C) The identity of the registered professional engineer approving the design.

(iii) At least one copy of the design shall be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy shall be made available to the Secretary upon request.

(c) ***Design of support systems, shield systems, and other protective systems.*** Designs of support systems , shield systems, and other protective systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (c)(1); or, in the alternative, paragraph (c)(2); or, in the alternative, paragraph (c)(3); or, I the alternative,

paragraph (c)(4) as follows:
. . .

APPENDIX "B"

APPENDIX A TO SUBPART P Soil Classification

(a) Scope and application - (1) Scope. This appendix describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. The appendix contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils.

(2) Application. This appendix applies when a sloping or benching system is designed in accordance with the requirements set forth in 1926.652(b)(2) as a method of protection for employees from cave-ins. This appendix also applies when timber shoring for excavations is designed as a method of protection from cave-ins in accordance with appendix C to subpart P of part 1926, and when aluminum hydraulic shoring is designed in accordance with appendix D. This Appendix also applies if other protective systems are designed and selected for use from data prepared in accordance with the requirements set forth in 1926.652(c), and the use of the data is predicated on the use of the soil classification system set forth in this appendix.

(b) Definitions. The definitions and examples given below are based on, in whole or in part, the following; American Society for Testing Materials (ASTM) Standards D653-85 and D2488; The Unified Soils Classification System; The U.S. Department of Agriculture (USDA) Textural Classification Scheme; and The National Bureau of Standards Report BSS-121.

"Cemented soil" means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

"Cohesive soil" means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical side slopes, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

"Dry soil" means soil that does not exhibit visible signs of moisture content.

"Fissured" means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

"Granular soil" means gravel, sand, or silt (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

"Layered system" means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or

shale are considered layered.

"Moist soil" means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

"Plastic" means a property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.

"Saturated soil" means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or sheer vane.

"Soil classification system" means, for the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type a, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the characteristics of the deposits and the environmental conditions of exposure.

"Stable rock" means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

"Submerged soil" means soil which is underwater or is free seeping.

"Type a" means cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type a. However, no soil is Type a if:

(I) The soil is fissured; or

(ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or

(iii) The soil has been previously disturbed; or

(iv) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or

(v) The material is subject to other factors that would require it to be classified as a less stable material.

"Type B" means:

(I) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or

(ii) Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.

(iii) Previously disturbed soils except those which would otherwise be classed as Type C soil.

(iv) Soil that meets the unconfined compressive strength or cementation

requirements for Type a, but is fissured or subject to vibration; or

(v) Dry rock that is not stable; or

(vi) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

"Type C" means:

(I) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or

(ii) Granular soils including gravel, sand, and loamy sand; or

(iii) Submerged soil or soil from which water is freely seeping; or

(iv) Submerged rock that is not stable, or

(v) Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.

"Unconfined compressive strength" means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.

"Wet soil" means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

(c) Requirements - (1) Classification of soil and rock deposits. Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type a, Type B, or Type C in accordance with the definitions set forth in paragraph (b) of this appendix.

(*2) Basis of classification.* The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis. Such analyses shall be conducted by a competent person using tests described in paragraph (d) below, or in other recognized methods of soil classification and testing such as those adopted by the American Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.

(3) Visual and manual analyses. The visual and manual analyses, such as those noted as being acceptable in paragraph (d) of this appendix, shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits.

(4) Layered systems. In a layered system, the system shall be classified in accordance with its weakest layer. However, each layer may be classified individually where a more stable layer lies under a less stable layer.

(5) Reclassification. If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any way, the changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumstances.

(d) Acceptable visual and manual tests. - (1) Visual tests. Visual analysis is conducted to

determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.
(I) Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine-grained material is cohesive material. Soil composed primarily of coarse-grained sand or gravel is granular material.
(ii) Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does not stay in clumps is granular.
(iii) Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack- like openings such as tension cracks could indicate fissured material. If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of moving ground and are indications of potentially hazardous situations.
(iv) Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.
(v) Observed the opened side of the excavation to identify layered systems. Examine layered systems to identify if the layers slope toward the excavation. Estimate the degree of slope of the layers.
(vi) Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the level of the water table.
(vii) Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.
(2) Manual tests. Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.
(I) Plasticity. Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8-inch in diameter. Cohesive material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of 1/8-inch thread can be held on one end without tearing, the soil is cohesive.
(ii) Dry strength. If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.
(iii) Thumb penetration. The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. (This test is based on the thumb penetration test described in American Society for Testing and Materials (ASTM) Standard designation D2488 - "Standard Recommended Practice for Description of Soils (Visual - Manual Procedure).") Type a soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be

molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.
(iv) Other strength tests. Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand-operated shearvane.
(v) Drying test. The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.54 cm) and six inches (15.24 cm) in diameter until it is thoroughly dry:
(a) If the sample develops cracks as it dries, significant fissures are indicated.
(B) Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as an unfissured cohesive material and the unconfined compressive strength should be determined.
(C) If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.

APPENDIX B TO SUBPART P- SLOPING AND BENCHING
(a) Scope and application. This appendix contains specifications for sloping and benching when used as methods of protecting employees working in excavations from cave-ins. The requirements of this appendix apply when the design of sloping and benching protective systems is to be performed in accordance with the requirements set forth in 1926.652(b)(2).
(b) Definitions.
"Actual slope" means the slope to which an excavation face is excavated.
"Distress" means that the soil is in a condition where a cave-in is imminent or is likely to occur. Distress is evidenced by such phenomena as the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slumping of material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the face of an excavation; and ravelling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the face of an excavation and trickling or rolling down into the excavation.
"Maximum allowable slope" means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).
"Short term exposure" means a period of time less than or equal to 24 hours that an excavation is open.
(c) Requirements - (1) Soil classification. Soil and rock deposits shall be classified in accordance with appendix a to subpart P of part 1926.
(2) Maximum allowable slope. The maximum allowable slope for a soil or rock deposit shall be determined from Table B-1 of this appendix.
(3) Actual slope. (I) The actual slope shall not be steeper than the maximum allowable slope.

(ii) The actual slope shall be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope shall be cut back to an actual slope which is at least 1/2 horizontal to one vertical (1/2H:1V) less steep than the maximum allowable slope.
(iii) When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person shall determine the degree to which the actual slope must be reduced below the maximum allowable slope, and shall assure that such reduction is achieved. Surcharge loads from adjacent structures shall be evaluated in accordance with 1926.651(I).
(4) Configurations. Configurations of sloping and benching systems shall be in accordance with Figure B- 1.

TABLE B-1
MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V)(1) FOR EXCAVATIONS LESS THAN 20 FEET DEEP(3)
STABLE ROCK	VERTICAL (90 Deg.)
TYPE a (2)	3/4:1 (53 Deg.)
TYPE B	1:1 (45 Deg.)
TYPE C	1 1/2:1 (34 Deg.)

Footnote(1) Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

Footnote(2) a short-term maximum allowable slope of 1/2H:1V (63 degrees) is allowed in excavations in Type a soil that are 12 feed (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53 degrees).

Footnote(3) Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.