**DEPARTMENT OF LABOR**

**Occupational Safety and Health Administration**

**[Docket No. OSHA-2014-0011]**

**Impregilo Healy Parsons Joint Venture; Application for Permanent Variance and Interim Order; Grant of Interim Order; Request for Comments**

**AGENCY**: Occupational Safety and Health Administration (OSHA), Labor.

**ACTION**: Notice.

**SUMMARY**: In this notice, OSHA announces the application of Impregilo Healy Parsons Joint Venture for a permanent variance and interim order from the provisions of OSHA standards that regulate work in compressed air environments and presents the Agency's preliminary finding to grant the permanent variance. OSHA also announces its grant of an interim order in this notice.

**DATES**: Submit comments, information, documents in response to this notice, and request for a hearing on or before [INSERT DATE 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]. The interim order specified by this notice becomes effective on [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER], and shall remain in effect until the completion of the Anacostia River tunnel project or the interim order is modified or revoked.

**ADDRESSES**: Submit comments by any of the following methods:

1. Electronically: Submit comments and attachments electronically at http://www.regulations.gov, which is the Federal eRulemaking Portal. Follow the instructions online for making electronic submissions.

2. Facsimile: If submissions, including attachments, are not longer than 10 pages, commenters may fax them to the OSHA Docket Office at (202) 693-1648.

3. Regular or express mail, hand delivery, or messenger (courier) service: Submit comments, requests, and any attachments to the OSHA Docket Office, Docket No. OSHA-2014-0011, Technical Data Center, U.S. Department of Labor, 200 Constitution Avenue, NW., Room N-2625, Washington, DC 20210; telephone: (202) 693-2350 (TTY number: (877) 889-5627). Note that security procedures may result in significant delays in receiving comments and other written materials by regular mail. Contact the OSHA Docket Office for information about security procedures concerning delivery of materials by express mail, hand delivery, or messenger service. The hours of operation for the OSHA Docket Office are 8:15 a.m. - 4:45 p.m., e.t.

4. Instructions: All submissions must include the Agency name and the OSHA docket number (OSHA-2014-0011). OSHA places comments and other materials, including any personal information, in the public docket without revision, and these materials will be available online at http://www.regulations.gov. Therefore, the Agency cautions commenters about submitting statements they do not want made available to the public, or submitting comments that contain personal information (either about themselves or others) such as Social Security numbers, birth dates, and medical data.

5. Docket: To read or download submissions or other material in the docket, go to http://www.regulations.gov or the OSHA Docket Office at the address above. All documents in the docket are listed in the http://www.regulations.gov index; however, some information (e.g., copyrighted material) is not publicly available to read or download through the web site. All submissions, including copyrighted material, are

available for inspection and copying at the OSHA Docket Office. Contact the OSHA Docket Office for assistance in locating docket submissions.

6. Copies of this Federal Register notice. Electronic copies of the Federal Register notice are available at http://www.regulations.gov. This Federal Register notice, as well as new releases and other relevant information, also are available at OSHA's webpage at http://www.osha.gov.

7. Extension of comment period: Submit requests for an extension of the comment period on or before [INSERT DATE 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER] to the Office of Technical Programs and Coordination Activities, Directorate of Technical Support and Emergency Management, Occupational Safety and Health Administration, U.S. Department of Labor, 200 Constitution Avenue, NW., Room N-3655, Washington, DC 20210, or by fax to (202) 693-1644.

8. Hearing requests. According to 29 CFR 1905.15, hearing requests must include: (1) A short and plain statement detailing how the variance would affect the requesting party; (2) a specification of any statement or representation in the variance application that the commenter denies, and a concise summary of the evidence adduced in support of each denial; and (3) any views or arguments on any issue of fact or law present in the variance application.

**FOR FURTHER INFORMATION CONTACT**: Information regarding this notice is available from the following sources:

Press inquiries: Contact Mr. Frank Meilinger, Director, OSHA Office of Communications, U.S. Department of Labor, 200 Constitution Avenue, NW., Room N-

3647, Washington, DC 20210; telephone: (202) 693-1999; email: Meilinger.francis2@dol.gov.

General and technical information: Contact Mr. Kevin Robinson, Acting Director, Office of Technical Programs and Coordination Activities, Directorate of Technical Support and Emergency Management, Occupational Safety and Health Administration, U.S. Department of Labor, 200 Constitution Avenue, NW., Room N-3655, Washington, DC 20210; phone: (202) 693-2110 or email: robinson.kevin@dol.gov.

**SUPPLEMENTARY INFORMATION:**

**I. Notice of Application**

On April 3, 2014, Impregilo Healy Parsons Joint Venture, ("IHP JV" or "the applicant"), 2600 Independence Avenue, SE, Washington, DC 20003, submitted an application for a permanent variance and interim order under Section 6(d) of the Occupational Safety and Health Act of 1970 ("OSH Act"; 29 U.S.C. 655) and 29 CFR 1905.11 ("Variances and other relief under section 6(d)") from several provisions of the OSHA standard that regulates work in compressed air at 29 CFR 1926.803. IHP JV also requested an interim order pending OSHA's decision on the application for a variance (Exhibit OSHA-2014-0011-0002, Request for Variance). Specifically, the applicant seeks a variance from the provisions of the standard that: (1) Prohibit compressed-air worker exposure to pressures exceeding 50 pounds per square inch (p.s.i.) except in an emergency (29 CFR 1926.803(e)(5)); [1] (2) require the use of the decompression values specified in decompression tables in Appendix A of the compressed-air standard for

[1]The decompression tables in Appendix A of subpart S express the maximum working pressures as pounds per square inch gauge (p.s.i.g.), with a maximum working pressure of 50 p.s.i.g. Therefore, throughout this notice, OSHA expresses the 50 p.s.i. value specified by §1926.803(e)(5) as 50 p.s.i.g., consistent with the terminology in Appendix A, Table 1 of subpart S.

construction (29 CFR 1926.803(f)(1)); and (3) require the use of automated operational controls and a special decompression chamber (29 CFR 1926.803(g)(1)(iii) and .803(g)(1)(xvii), respectively).

According to its application, IHP JV is currently the general contractor for the District of Columbia Water and Sewer Authority's ("DC Water") project to construct the Anacostia River tunnel. The Anacostia River tunnel project design requires the ability to safely perform hyperbaric interventions in compressed air at pressures higher than allowed in the existing OSHA standard 29 CFR 1926.803(e)(5) which states: "No employee shall be subjected to pressure exceeding 50 (p.s.i.g.) except in emergency" (see footnote 1).

The applicant is a contractor that works on complex tunnel projects using recently developed equipment and procedures for soft-ground tunneling. The applicant's workers engage in the construction of subaqueous tunnels below the water table through soft soils consisting of clay, silt, and sand using advanced shielded mechanical excavation techniques in conjunction with an Earth Pressure Balanced Tunnel Boring Machine (EPBTBM).

IHP JV employs specially trained personnel for the construction of the tunnel, and states that this construction project will use shielded mechanical-excavation techniques. IHP JV asserts that its workers perform hyperbaric interventions at pressures greater than 50 p.s.i.g. in the excavation chamber of the EPBTBM. The hyperbaric interventions consist of conducting inspections and maintenance work on the cutter-head structure and cutting tools of the EPBTBM.

## II. The Variance Application

### A. Background

IHP JV asserts that innovations in tunnel excavation, specifically with EPBTBMs, have, in most cases, eliminated the need to pressurize the entire tunnel. This technology negates the requirement that all members of a tunnel-excavation crew work in compressed air while excavating the tunnel. These advances in technology modified substantially the methods used by the construction industry to excavate subaqueous tunnels compared to the caisson work regulated by the current OSHA compressed-air standard for construction at 29 CFR 1926.803. Such advances reduce the number of workers exposed, and the total duration of exposure, to hyperbaric pressure during tunnel construction.

Using shielded mechanical-excavation techniques, in conjunction with precast concrete tunnel liners and backfill grout, EPBTBMs provide methods to achieve the face pressures required to maintain a stabilized tunnel face through various geologies, and isolate that pressure to the forward section (the working chamber) of the EPBTBM. Interventions in the working chamber take place only after halting tunnel excavation and preparing the machine and crew for an intervention. Interventions occur to inspect or maintain the mechanical-excavation components located in the working chamber. Maintenance conducted in the working chamber includes changing replaceable cutting tools and disposable wear bars, and, in rare cases, repairing structural damage to the cutter head.

In addition to innovations in tunnel-excavation methods, research conducted after OSHA published its compressed-air standard for construction in 1971 resulted in

advances in hyperbaric medicine. In this regard, the applicant asserts that the use of decompression protocols incorporating oxygen is more efficient, effective, and safer for tunnel workers than compliance with the existing OSHA standard (29 CFR 1926, subpart S, Appendix A decompression tables). According to the applicant, contractors routinely and safely expose employees performing interventions in the working chamber of EPBTBMs to hyperbaric pressures up to 75 p.s.i.g., which is 50% higher than maximum pressure specified by the existing OSHA standard (see 29 CFR 1926.803(e)(5)). The applicant asserts that these hyperbaric exposures are possible because of advances in hyperbaric technology, a better understanding of hyperbaric medicine, and the development of a project-specific HOM (Hyperbaric Operations Manual) that requires specialized medical support and hyperbaric supervision to provide assistance to a team of specially trained man-lock attendants and hyperbaric workers.

The applicant contends that the alternative safety measures included in its application provide its workers with a place of employment that is at least as safe and healthful as they would obtain under the existing provisions of OSHA's compressed-air standard for construction. The applicant certifies that it provided employee representatives of affected workers with a copy of the variance application.[2] The applicant also certifies that it notified its workers of the variance application by posting, at prominent locations where it normally posts workplace notices, a summary of the application and information specifying where the workers can examine a copy of the application. In addition, the applicant informed its workers and their representatives of their rights to petition the

[2]See the definition of "Affected employee or worker" in section V. D.

Assistant Secretary of Labor for Occupational Safety and Health for a hearing on the variance application.

B. Variance from Paragraph (e)(5) of 29 CFR 1926.803, Prohibition of Exposure to Pressure Greater than 50 p.s.i.g. (see footnote 1)

The applicant states that it may perform hyperbaric interventions at pressures greater than 50 p.s.i.g. in the working chamber of the EPBTBM; this pressure exceeds the pressure limit of 50 p.s.i.g. specified for nonemergency purposes by 29 CFR 1926.803(e)(5). The EPBTBM has twin man locks, with each man lock having two compartments. This configuration allows workers to access the man locks for compression and decompression, and medical personnel to access the man locks if required in an emergency.

EPBTBMs are capable of maintaining pressure at the tunnel face, and stabilizing existing geological conditions, through the controlled use of propel cylinders, a mechanically driven cutter head, bulkheads within the shield, ground-treatment foam, and a screw conveyor that moves excavated material from the working chamber. As noted earlier, the forward-most portion of the EPBTBM is the working chamber, and this chamber is the only pressurized segment of the EPBTBM. Within the shield, the working chamber consists of two sections: the staging chamber and the forward working chamber. The staging chamber is the section of the working chamber between the man-lock door and the entry door to the forward working chamber. The forward working chamber is immediately behind the cutter head and tunnel face.

The applicant will pressurize the working chamber to the level required to maintain a stable tunnel face. Pressure in the staging chamber ranges from atmospheric (no

increased pressure) to a maximum pressure equal to the pressure in the working chamber. The applicant asserts that most of the hyperbaric interventions will be at or near atmospheric pressure. However, the applicant maintains that they may have to perform interventions at pressures up to 52 p.s.i.g.

During interventions, workers enter the working chamber through one of the twin man locks that open into the staging chamber. To reach the forward part of the working chamber, workers pass through a door in a bulkhead that separates the staging chamber from the forward working chamber. The maximum crew size allowed in the forward working chamber is three. At certain hyperbaric pressures (i.e., when decompression times are greater than work times), the twin man locks allow for crew rotation. During crew rotation, one crew can be compressing or decompressing while the second crew is working. Therefore, the working crew always has an unoccupied man lock at its disposal.

The applicant developed a project-specific HOM for the Anacostia River tunnel project (Exhibit OSHA-2014-0011-0003, IHP JV Project-Specific HOM) that describes in detail the hyperbaric procedures and required medical examinations used during the tunnel-construction project. The HOM is project-specific, and discusses standard operating procedures and emergency and contingency procedures. The procedures include using experienced and knowledgeable man-lock attendants who have the training and experience necessary to recognize and treat decompression illnesses and injuries. The attendants are under the direct supervision of the hyperbaric supervisor and attending physician. In addition, procedures include medical screening and review of prospective compressed-air workers (CAWs). The purpose of this screening procedure is to vet

prospective CAWs with medical conditions (e.g., deep vein thrombosis, poor vascular circulation, and muscle cramping) that could be aggravated by sitting in a cramped space (e.g., a man lock) for extended periods or by exposure to elevated pressures and compressed gas mixtures. A transportable recompression chamber (shuttle) is available to extract workers from the hyperbaric working chamber for emergency evacuation and medical treatment; the shuttle attaches to the topside medical lock, which is a large recompression chamber. The applicant believes that the procedures included in the HOM provide safe work conditions when interventions are necessary, including interventions above 50 p.s.i.g.

C. Variance from Paragraph (f)(1) of 29 CFR 1926.803, Requirement to Use OSHA Decompression Tables

OSHA's compressed-air standard for construction requires decompression in accordance with the decompression tables in Appendix A of 29 CFR 1926, subpart S (see 29 CFR 1926.803(f)(1)). As an alternative to the OSHA decompression tables, the applicant proposes to use newer decompression schedules that supplement breathing air used during decompression with pure oxygen. The applicant asserts that these decompression protocols are safer for tunnel workers than the decompression protocols specified in Appendix A of 29 CFR 1926, subpart S. Accordingly, the applicant proposes to use the 1992 French Decompression Tables to decompress CAWs after they exit the hyperbaric conditions in the working chamber.

Depending on the maximum working pressure and exposure times, the 1992 French Decompression Tables provide for air decompression with or without oxygen. IHP JV asserts that oxygen decompression has many benefits, including reducing decompression

time by about 33 percent, and significantly lowering the rate of decompression illness (DCI), compared to the air-decompression tables in Appendix A of 29 CFR 1926, subpart S. In addition, the HOM requires a physician certified in hyperbaric medicine to manage the medical condition of CAWs during hyperbaric exposures and decompression. A trained and experienced man-lock attendant also will be present during hyperbaric exposures and decompression. This man-lock attendant will operate the hyperbaric system to ensure compliance with the specified decompression table. A hyperbaric supervisor (competent person), trained in hyperbaric operations, procedures, and safety, will directly oversee all hyperbaric interventions, and ensure that staff follow the procedures delineated in the HOM or by the attending physician.

The applicant asserts that at higher hyperbaric pressures, decompression times exceed 75 minutes. The HOM establishes protocols and procedures that provide the basis for alternate means of protection for CAWs under these conditions. Accordingly, based on these protocols and procedures, the applicant requests to use the 1992 French Decompression Tables for hyperbaric interventions up to 52 p.s.i.g. for the Anacostia River tunnel project. The applicant is committed to follow the decompression procedures described in the project-specific HOM during these interventions.

D. Variance from Paragraph (g)(1)(iii) of 29 CFR 1926.803, Automatically Regulated Continuous Decompression

According to the applicant, breathing air under hyperbaric conditions increases the amount of nitrogen gas dissolved in a CAW's tissues. The greater the hyperbaric pressure under these conditions, and the more time spent under the increased pressure, the greater the amount of nitrogen gas dissolved in the tissues. When the pressure

decreases during decompression, tissues release the dissolved nitrogen gas into the blood system, which then carries the nitrogen gas to the lungs for elimination through exhalation. Releasing hyperbaric pressure too rapidly during decompression can increase the size of the bubbles formed by nitrogen gas in the blood system, resulting in DCI, commonly referred to as "the bends." This description of the etiology of DCI is consistent with current scientific theory and research on the issue (see footnote 11 in this notice discussing a 1985 NIOSH report on DCI).

The 1992 French Decompression Tables proposed for use by the applicant provide for stops during worker decompression (i.e., staged decompression) to control the release of nitrogen gas from tissues into the blood system. Studies show that staged decompression, in combination with other features of the 1992 French Decompression Tables such as the use of oxygen, result in a lower incidence of DCI than the OSHA decompression requirements of 29 CFR 1926.803, which specify the use of automatically regulated continuous decompression (see footnotes 8 through 15 in this notice for references to these studies).[3] In addition, the applicant asserts that staged decompression is at least as effective as an automatic controller in regulating the decompression process because:

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[3]In the study cited in footnote 9 of this notice, starting at page 338, Dr. Eric Kindwall notes that the use of automatically regulated continuous decompression in the Washington State safety standards for compressed-air work (from which OSHA derived its decompression tables) was at the insistence of contractors and the union, and against the advice of the expert who calculated the decompression table and recommended using staged decompression. Dr. Kindwall then states, "Continuous decompression is inefficient and wasteful. For example, if the last stage from 4 psig . . . to the surface took 1 h, at least half the time is spent at pressures less than 2 psig . . . , which provides less and less meaningful bubble suppression . . . ." In addition, the report referenced in footnote 5 under the section titled, "Background on the Need for Interim Decompression Tables" addresses the continuous-decompression protocol in the OSHA compressed-air standard for construction, noting that "[a]side from the tables for saturation diving to deep depths, no other widely used or officially approved diving decompression tables use straight line, continuous decompressions at varying rates. Stage decompression is usually the rule, since it is simpler to control."

1. A hyperbaric supervisor (a competent person experienced and trained in hyperbaric operations, procedures, and safety) directly supervises all hyperbaric interventions and ensures that the man-lock attendant, who is a competent person in the manual control of hyperbaric systems, follows the schedule specified in the decompression tables, including stops; and

2. The use of the 1992 French Decompression Tables for staged decompression offers an equal or better level of management and control over the decompression process than an automatic controller and results in lower occurrences of DCI.

Accordingly, the applicant is applying for a permanent variance from the OSHA standard at 29 CFR 1926.803(g)(1)(iii), which requires automatic controls to regulate decompression. As noted above, the applicant is committed to conduct the staged decompression according to the 1992 French Decompression Tables under the direct control of the trained man-lock attendant and under the oversight of the hyperbaric supervisor.

E. Variance from Paragraph (g)(1)(xvii) of 29 CFR 1926.803, Requirement of Special Decompression Chamber

The OSHA compressed-air standard for construction requires employers to use a special decompression chamber when total decompression time exceeds 75 minutes (see 29 CFR 1926.803(g)(1)(xvii)). Another provision of OSHA's compressed-air standard calls for locating the special decompression chamber adjacent to the man lock on the atmospheric pressure side of the tunnel bulkhead (see 29 CFR 1926.803(g)(2)(vii)). However, since only the working chamber of the EPBTBM is under pressure, and only a few workers out of the entire crew are exposed to hyperbaric pressure, the man locks

(which, as noted earlier, connect directly to the working chamber) are of sufficient size to accommodate the exposed workers. In addition, available space in the EPBTBM does not allow for an additional special decompression lock. Again, the applicant uses the man locks, each of which adequately accommodates a three-member crew, for this purpose when decompression lasts up to 75 minutes. When decompression exceeds 75 minutes, crews can open the door connecting the two compartments in each man lock during decompression stops or exit the man lock and move into the staging chamber where additional space is available. This alternative enables CAWs to move about and flex their joints to prevent neuromuscular problems during decompression.

F. Multi-State Variance

As stated earlier in this notice, IHP JV applied for a permanent variance and interim order for its Anacostia River tunnel project only. The Anacostia River tunnel project is located entirely in the District of Columbia and thus under Federal OSHA's exclusive jurisdiction. Therefore, any variance OSHA grants IHP JV will have effect only in the District of Columbia.

Twenty-seven state safety and health plans have been approved by OSHA under section 18 of the (OSH) Act.[4] As part of the permanent variance process, the Directorate of Cooperative and State Programs will notify the State Plans of IHP JV's variance application and grant of the Anacostia River tunnel project interim order.

[4]Five State Plans (Connecticut, Illinois, New Jersey, New York, and the Virgin Islands) limit their occupational safety and health authority to state and local employers only. State Plans that exercise their occupational safety and health authority over both public- and private-sector employers are: Alaska, Arizona, California, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Washington, and Wyoming.

Additionally, OSHA notes that four State Plans have previously granted sub-aqueous tunnel construction variances and imposed different or additional requirements and conditions (California, Nevada, Oregon, and Washington). California also promulgated new standards[5] for similar sub-aqueous tunnel construction work.

## III. Description of the Conditions Specified by the Application for a Permanent Variance

This section describes the alternative means of compliance with 29 CFR 1926.803(e)(5), (f)(1), (g)(1)(iii), and (g)(1)(xvii) and provides additional detail regarding the proposed conditions that form the basis of IHP JV's application for a permanent variance.

Proposed Condition A: Scope

The scope of the permanent variance limits coverage to the work situations specified under this proposed condition. Clearly defining the scope of the permanent variance provides IHP JV, IHP JV's employees, and OSHA with necessary information regarding the work situations in which the proposed permanent variance would apply.

According to 29 CFR 1905.11, an employer (or class or group of employers[6]) may request a permanent variance for a specific workplace or workplaces (multiple sites). If granted, the variance applies to the specific employer(s) that submitted the application. In this instance, if OSHA were to grant a permanent variance, it would apply to the IHP JV's Anacostia River tunnel project only. As a result, it is important to understand that

[5]See California Code of Regulations, Title 8, Subchapter 7, Group 26, Article 154, available at http://www.dir.ca.gov/title8/sb7g26a154.html.

[6]A class or group of employers (such as members of a trade alliance or association) may apply jointly for a variance provided an authorized representative for each employer signs the application and the application identifies each employer's affected facilities.

the variance **would not apply** to any other employers such as other joint ventures the applicant may undertake in the future. However, the variance rules of practice do contain provisions for future modification of permanent variances. Under the provisions of 29 CFR 1905.13, an applicant may submit an application to modify or amend a permanent variance to add or include additional employers for the project.

Proposed Condition B: Application

This proposed condition specifies the circumstances under which the permanent variance would be in effect, notably only for hyperbaric work performed during interventions. The proposed condition places clear limits on the circumstances under which the applicant can expose its employees to hyperbaric pressure.

Proposed Condition C: List of Abbreviations

Proposed condition C defines a number of abbreviations used in the proposed permanent variance. OSHA believes that defining these abbreviations serves to clarify and standardize their usage, thereby enhancing the applicant's and its employees' understanding of the conditions specified by the proposed permanent variance.

Proposed Condition D: Definitions

The proposed condition defines a series of terms, mostly technical terms, used in the proposed permanent variance to standardize and clarify their meaning. Defining these terms serves to enhance the applicant's and its employees' understanding of the conditions specified by the interim order and proposed permanent variance.

Proposed Condition E: Safety and Health Practices

This proposed condition requires the applicant to develop and submit to OSHA an HOM specific to the Anacostia River tunnel project at least six months before using the

EPBTBM for tunneling operations. Additionally, the proposed condition includes a series of related hazard prevention and control requirements and methods (e.g., decompression tables, job hazard analyses (JHA), operations and inspections checklists, incident investigation, recording and notification to OSHA of recordable hyperbaric injuries and illnesses, etc.) designed to ensure the continued effective functioning of the hyperbaric equipment and operating system.

Review of the HOM enables OSHA to: (1) Determine that the safety and health instructions and measures it specifies would be appropriate and would adequately protect the safety and health of the CAWs; and (2) request the applicant to revise or modify the HOM if it finds that the hyperbaric safety and health procedures are not suitable for the specific project and would not adequately protect the safety and health of the CAWs. Once approved, the project specific HOM becomes part of the variance, thus enabling OSHA to enforce its safety and health procedures and measures.[7]

Proposed Condition F: Communication

Proposed condition F would require the applicant to develop and implement an effective system of information sharing and communication. Effective information sharing and communication ensures that affected workers receive updated information regarding any safety-related hazards and incidents, and corrective actions taken, prior to the start of each shift. The condition also requires the applicant to ensure that reliable means of emergency communications are available and maintained for affected workers

[7]Publication of this Federal Register notice announcing IHP JV's application for a permanent variance and grant of a project-specific interim order constitutes acknowledgement by OSHA of the acceptability of the HOM provided by IHP JV for the Anacostia River tunnel project.

and support personnel during hyperbaric operations. Availability of such reliable means of communications would enable affected workers and support personnel to respond quickly and effectively to hazardous conditions or emergencies that may develop during EPBTBM operations.

Proposed Condition G: Worker Qualification and Training

This proposed condition would require the applicant to develop and implement an effective qualification and training program for affected workers. The condition specifies the factors that an affected worker must know to perform safely during hyperbaric operations, including how to enter, work in, and exit from hyperbaric conditions under both normal and emergency conditions. Having well-trained and qualified workers performing hyperbaric intervention work ensures that they recognize, and respond appropriately to, hyperbaric safety and health hazards. These qualification and training requirements enable affected workers to cope effectively with emergencies, as well as the discomfort and physiological effects of hyperbaric exposure, thereby preventing injury, illness, and fatalities among workers.

Paragraph (2)(e) of this proposed condition also would require the applicant to provide affected workers with information they can use to contact the appropriate healthcare professionals if they believe that they are developing hyperbaric-related health effects. This requirement provides for early intervention and treatment of DCI and other health effects resulting from hyperbaric exposure, thereby reducing the potential severity of these effects.

Proposed Condition H: Inspections, Tests, and Accident Prevention

Proposed condition H would require the applicant to develop, implement, and operate a program of frequent and regular inspections of the EPBTBM's hyperbaric equipment and support systems, and associated work areas. This condition would help to ensure the safe operation and physical integrity of the equipment and work areas necessary to conduct hyperbaric operations. The condition would also enhance worker safety by reducing the risk of hyperbaric-related emergencies.

Paragraph (3) of this proposed condition would require the applicant to document tests, inspections, corrective actions, and repairs involving the EPBTBM, and maintain these documents at the job site for the duration of the job. This requirement would provide the applicant with information needed to schedule tests and inspections to ensure the continued safe operation of the equipment and systems, and to determine that the actions taken to correct defects in hyperbaric equipment and systems were appropriate, prior to returning them to service.

Proposed Condition I: Compression and Decompression

This proposed condition would require the applicant to consult with its designated medical advisor regarding special compression or decompression procedures appropriate for any unacclimated CAW. This proposed provision would ensure that the applicant consults with the medical advisor, and involves the medical advisor in the evaluation, development, and implementation of compression or decompression protocols appropriate for any CAW requiring acclimation to the hyperbaric conditions encountered during EPBTBM operations. Accordingly, CAWs requiring acclimation would have an opportunity to acclimate prior to exposure to these hyperbaric conditions. OSHA believes this condition would prevent or reduce adverse reactions among CAWs to the

effects of compression or decompression associated with the intervention work they perform in the EPBTBM.

Proposed Condition J: Recordkeeping

Proposed condition J would require the applicant to maintain records of specific factors associated with each hyperbaric intervention. The information gathered and recorded under this provision, in concert with the information provided under proposed condition K (using OSHA 301 Incident Report form to investigate and record hyperbaric recordable injuries as defined by 29 CFR 1904.4, 1904.7, 1904.8 through 1904.12), would enable the applicant and OSHA to determine the effectiveness of the permanent variance in preventing DCI and other hyperbaric-related effects.[8]

Proposed Condition K: Notifications

Under this proposed condition, the applicant would be required, within specified periods, to notify OSHA of: (1) any recordable injuries, illnesses, in-patient hospitalizations, amputations, loss of an eye, or fatality that occur as a result of hyperbaric exposures during EPBTBM operations; (2) provide OSHA with a copy of the incident investigation report (using OSHA 301 form) of these events; (3) include on the 301 form information on the hyperbaric conditions associated with the recordable injury or illness, the root-cause determination, and preventive and corrective actions identified and implemented by the applicant; and (4) its certification that it informed affected workers of the incident and the results of the incident investigation.

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[8]See 29 CFR 1904 Recording and Reporting Occupational Injuries and Illnesses (http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9631); recordkeeping forms and instructions (http://www.osha.gov/recordkeeping/RKform300pkg-fillable-enabled.pdf); OSHA Recordkeeping Handbook (http://www.osha.gov/recordkeeping/handbook/index.html); and updates to OSHA's recordkeeping rule webpage ((79 FR 56130); http://www.osha.gov/recordkeeping2014/index.html)).

This proposed condition also would require the applicant to: notify the Office of Technical Programs and Coordination Activities (OTPCA) and the Baltimore/Washington D.C. Area Office within 15 working days should the applicant need to revise its HOM to accommodate changes in its compressed-air operations that affect its ability to comply with the conditions of the proposed permanent variance; and would provide OSHA's OTPCA and the Baltimore/Washington D.C. Area Office, at the end of the project, with a report evaluating the effectiveness of the decompression tables.

These notification requirements would enable the applicant, its employees, and OSHA to determine the effectiveness of the permanent variance in providing the requisite level of safety to the applicant's workers and, based on this determination, whether to revise or revoke the conditions of the proposed permanent variance. Timely notification would permit OSHA to take whatever action may be necessary and appropriate to prevent further injuries and illnesses. Providing notification to employees would inform them of the precautions taken by the applicant to prevent similar incidents in the future.

This proposed condition would also require the applicant to notify OSHA if it ceases to do business, has a new address or location for its main office, or transfers the operations covered by the proposed permanent variance to a successor company. In addition, the condition specifies that OSHA must approve the transfer of the permanent variance to a successor company. These requirements would allow OSHA to communicate effectively with the applicant regarding the status of the proposed permanent variance, and expedite the Agency's administration and enforcement of the permanent variance. Stipulating that an applicant would be required to have OSHA's approval to transfer a variance to a successor company would provide assurance that the

successor company has knowledge of, and will comply with, the conditions specified by proposed permanent variance, thereby ensuring the safety of workers involved in performing the operations covered by the proposed permanent variance.

**IV. Grant of Interim Order**

As noted earlier, the applicant requested an interim order that would remain in effect until completion of the Anacostia River tunnel project, or until the Agency makes a decision on its application for a permanent variance. During this period, the applicant will fully comply with the conditions of the interim order as an alternative to complying with the requirements of 29 CFR 1926.803 (hereafter, "the standard") that:

1. Prohibit employers using compressed air under hyperbaric conditions from subjecting workers to pressure exceeding 50 p.s.i.g., except in emergency (29 CFR 1926.803(e)(5));
2. Require the use of decompression values specified by the decompression tables in Appendix A of the compressed-air standard (29 CFR 1926.803(f)(1)); and
3. Require the use of automated operational controls and a special decompression chamber (29 CFR 1926.803(g)(1)(iii) and .803(g)(1)(xvii), respectively).

After reviewing the application, OSHA preliminarily determined that:

1. IHP JV developed, and proposed to implement, effective alternative measures to the prohibition of using compressed air under hyperbaric conditions exceeding 50 p.s.i.g. The proposed alternative measures include use of engineering and administrative controls of the hazards associated with work performed in compressed-air conditions exceeding 50 p.s.i.g. while engaged in the construction of a subaqueous tunnel using advanced shielded mechanical-excavation

techniques in conjunction with an EPBTBM. Prior to conducting interventions in the EPBTBM's pressurized working chamber, the applicant halts tunnel excavation and prepares the machine and crew to conduct the interventions. Interventions involve inspection, maintenance, or repair of the mechanical-excavation components located in the working chamber.

2. IHP JV developed, and proposed to implement, safe hyperbaric work procedures, emergency and contingency procedures, and medical examinations for the project's CAWs. The applicant compiled these standard operating procedures into a project-specific HOM. The HOM discusses the procedures and personnel qualifications for performing work safely during the compression and decompression phases of interventions. The HOM also specifies the decompression tables the applicant proposes to use. Depending on the maximum working pressure and exposure times during the interventions, the tables provide for decompression using air, pure oxygen, or a combination of air and oxygen. The decompression tables also include delays or stops for various time intervals at different pressure levels during the transition to atmospheric pressure (i.e., staged decompression). In all cases, a physician certified in hyperbaric medicine will manage the medical condition of CAWs during decompression. In addition, a trained and experienced man-lock attendant, experienced in recognizing decompression sickness or illnesses and injuries, will be present. Of key importance, a hyperbaric supervisor (competent person), trained in hyperbaric operations, procedures, and safety, will directly supervise all hyperbaric

operations to ensure compliance with the procedures delineated in the project-specific HOM or by the attending physician.

3. IHP JV developed, and proposed to implement, a training program to instruct affected workers in the hazards associated with conducting hyperbaric operations.
4. IHP JV developed, and proposed to implement, an effective alternative to the use of automatic controllers that continuously decrease pressure to achieve decompression in accordance with the tables specified by the standard. The alternative includes using the 1992 French Decompression Tables for guiding staged decompression to achieve lower occurrences of DCI, using a trained and competent attendant for implementing appropriate hyperbaric entry and exit procedures, and providing a competent hyperbaric supervisor, and attending physician certified in hyperbaric medicine, to oversee all hyperbaric operations.
5. IHP JV developed, and proposed to implement, an effective alternative to the use of the special decompression chamber required by the standard. EPBTBM technology permits the tunnel's work areas to be at atmospheric pressure, with only the face of the EPBTBM (i.e., the working chamber) at elevated pressure. The applicant limits interventions conducted in the working chamber to performing required inspection, maintenance, and repair of the cutting tools on the face of the EPBTBM. The EPBTBM's man lock and working chamber provide sufficient space for the maximum crew of three CAWs to stand up and move around, and safely accommodate decompression times up to 360 minutes. Therefore, OSHA preliminarily determined that the EPBTBM's man lock and

working chamber function as effectively as the special decompression chamber required by the standard.

OSHA conducted a review of the scientific literature regarding decompression to determine whether the alternative decompression method (i.e., the 1992 French Decompression Tables) the applicant proposed would provide a workplace as safe and healthful as that provided by the standard. Based on this review, OSHA preliminarily determined that decompressions conducted in tunneling operations performed with these tables[9] result in a lower occurrence of DCI than the decompression tables specified by the standard.[10,11,12]

The review conducted by OSHA found several research studies supporting the determination that the 1992 French Decompression Tables result in a lower rate of DCI than the decompression tables specified by the standard. For example, H. L. Anderson studied the occurrence of DCI at maximum hyperbaric pressures ranging from 4 p.s.i.g.

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[9]In 1992, the French Ministry of Labour replaced the 1974 French Decompression Tables with the 1992 French Decompression Tables, which differ from OSHA's decompression tables in Appendix A by using: (1) staged decompression as opposed to continuous (linear) decompression; (2) decompression tables based on air or both air and pure oxygen; and (3) emergency tables when unexpected exposure times occur (up to 30 minutes above the maximum allowed working time).

[10]Kindwall, EP (1997). Compressed air tunneling and caisson work decompression procedures: development, problems, and solutions. Undersea and Hyperbaric Medicine, 24(4), pp. 337-345. This article reported 60 treated cases of DCI among 4,168 exposures between 19 and 31 p.s.i.g. over a 51-week contract period, for a DCI incidence of 1.44% for the decompression tables specified by the OSHA standard.

[11]Sealey, JL (1969). Safe exit from the hyperbaric environment: medical experience with pressurized tunnel operations. Journal of Occupational Medicine, 11(5), pp. 273-275. This article reported 210 treated cases of DCI among 38,600 hyperbaric exposures between 13 and 34 p.s.i.g. over a 32-month period, for an incidence of 0.54% for the decompression tables specified by the Washington State safety standards for compressed-air work, which are similar to the tables in the OSHA standard. Moreover, the article reported 51 treated cases of DCI for 3,000 exposures between 30 and 34 p.s.i.g., for an incidence of 1.7% for the Washington State tables.

[12]In 1985, the National Institute for Occupational Safety and Health (NIOSH) published a report entitled "Criteria for Interim Decompression Tables for Caisson and Tunnel Workers"; this report reviewed studies of DCI and other hyperbaric-related injuries resulting from use of OSHA's tables. This report is available on NIOSH's website: http://www.cdc.gov/niosh/topics/decompression/default.html.

to 43 p.s.i.g. during construction of the Great Belt Tunnel in Denmark (1992-1996);[13] this project used the 1992 French Decompression Tables to decompress the workers during part of the construction. Anderson observed 6 DCS cases out of 7,220 decompression events, and reported that switching to the 1992 French Decompression tables reduced the DCI incidence to 0.08%. The DCI incidence in the study by H. L. Andersen is substantially less than the DCI incidence reported for the decompression tables specified in Appendix A. OSHA found no studies in which the DCI incidence reported for the 1992 French Decompression Tables were higher than the DCI incidence reported for the OSHA decompression tables, nor did OSHA find any studies indicating that the 1992 French Decompression Tables were more hazardous to employees than the OSHA decompression tables.[14] Therefore, OSHA preliminarily concludes that the proposed use of the 1992 French Decompression Tables would protect workers at least as effectively as the OSHA decompression tables.

Based on a review of available evidence, the experience of State Plans that either granted variances (Nevada, Oregon, and Washington)[15] or promulgated a new standard (California)[16] for hyperbaric exposures occurring during similar subaqueous tunnel-construction work, and the information provided in the applicant's variance application, OSHA is issuing an interim order.

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[13]Anderson HL (2002). Decompression sickness during construction of the Great Belt tunnel, Denmark. Undersea and Hyperbaric Medicine, 29(3), pp. 172-188.

[14]Le Péchon JC, Barre P, Baud JP, Ollivier F (September 1996). Compressed air work - French tables 1992 - operational results. JCLP Hyperbarie Paris, Centre Medical Subaquatique Interentreprise, Marseille: Communication a l'EUBS, pp. 1-5 (see Ex. OSHA-2014-0011-0004).

[15]These state variances are available in the docket: Exs. OSHA-2014-0011-0005 (Nevada), OSHA-2014-0011-0006 (Oregon), and OSHA-2014-0011-0007 (Washington).

[16]See California Code of Regulations, Title 8, Subchapter 7, Group 26, Article 154, available at http://www.dir.ca.gov/title8/sb7g26a154.html.

Under the interim order and variance application, instead of complying with the requirements of 29 CFR 1926.803(e)(5), (f)(1), (g)(1)(iii), and (g)(1)(xvii), IHP JV will: (1) comply with the conditions listed below under "Specific Conditions of the Interim Order and the Application for a Permanent Variance" for the period between the date of this notice and completion of the Anacostia River tunnel project or the date OSHA publishes its final decision on IHP JV's application in the Federal Register; (2) comply fully with all other applicable provisions of 29 CFR part 1926; and (3) provide a copy of this Federal Register notice to all employees affected by the conditions, including the affected employees of other employers, using the same means it used to inform these employees of its application for a permanent variance. Additionally, this interim order will remain in effect until one of the following conditions occurs: (1) completion of the IHP JV tunnel project; (2) OSHA publishes its final decision on the variance application in the Federal Register; or (3) OSHA modifies or revokes the interim order in accordance with 29 CFR 1905.13.

## V. Specific Conditions of the Interim Order and the Application for a Permanent Variance

The following conditions apply to the interim order OSHA is granting to IHP JV. These conditions specify the alternative means of compliance with the requirements of paragraphs 29 CFR 1926.803(e)(5), (f)(1), (g)(1)(iii), and (g)(1)(xvii). In addition, the proposed conditions included in this notice specify the alternative means of compliance with the requirements of paragraphs 29 CFR 1926.803(e)(5), (f)(1), (g)(1)(iii), and (g)(1)(xvii) that IHP JV is proposing for its permanent variance. The proposed

conditions would apply to all employees of IHP JV exposed to hyperbaric conditions. These proposed conditions would be:[17]

A. Scope

The permanent variance would apply only to work:

1. That occurs in conjunction with construction of the Anacostia River tunnel project, a subaqueous tunnel constructed using advanced shielded mechanical-excavation techniques and involving operation of an EPBTBM;
2. Performed under compressed-air and hyperbaric conditions up to 52 p.s.i.g. at the Anacostia River tunnel project;
3. In the EPBTBM's forward section (the working chamber) and associated hyperbaric chambers used to pressurize and decompress employees entering and exiting the working chamber;
4. Except for the requirements specified by 29 CFR 1926.803(e)(5), (f)(1), (g)(1)(iii), and (g)(1)(xvii), IHP JV would be required to comply fully with all other applicable provisions of 29 CFR part 1926; and
5. The interim order granted for the Anacostia River tunnel project will remain in effect until one of the following conditions occurs (1) completion of the Anacostia River tunnel project; or (2) OSHA modifies or revokes this interim order or grants IHP JV's request for a permanent variance in accordance with 29 CFR 1905.13.

B. Application

[17]In these conditions, the future conditional form of the verb (e.g., "would") pertains to the application for a permanent variance (designated as "permanent variance"). Under the interim order, the applicant is required to comply with these conditions in lieu of complying with the requirements of 29 CFR 1926.803(e)(5), (f)(1), (g)(1)(iii), and (g)(1)(xvii).

The permanent variance would apply only when IHP JV stops the tunnel-boring work, pressurizes the working chamber, and the CAWs either enter the working chamber to perform interventions (i.e., inspect, maintain, or repair the mechanical-excavation components), or exit the working chamber after performing interventions.

C. List of Abbreviations

Abbreviations used throughout this proposed permanent variance would include the following:

1. CAW – Compressed-air worker
2. CFR – Code of Federal Regulations
3. DCI – Decompression Illness
4. EPBTBM – Earth Pressure Balanced Tunnel Boring Machine
5. HOM – Hyperbaric Operations and Safety Manual
6. JHA – Job hazard analysis
7. OSHA – Occupational Safety and Health Administration
8. OTPCA – Office of Technical Programs and Coordination Activities

D. Definitions

The following definitions would apply to this proposed permanent variance. These definitions would supplement the definitions in IHP JV's project-specific HOM.

1. Affected employee or worker – an employee or worker who is affected by the conditions of this proposed permanent variance, or any one of his or her authorized representatives. The term "employee" has the meaning defined and used under the Occupational Safety and Health Act of 1970 (29 U.S.C. 651 et seq.)

2. Atmospheric pressure – the pressure of air at sea level, generally 14.7 p.s.i.a., 1 atmosphere absolute, or 0 p.s.i.g.

3. Compressed-air worker – an individual who is specially trained and medically qualified to perform work in a pressurized environment while breathing air at pressures up to 52 p.s.i.g.

4. Competent person – an individual who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.[18]

5. Decompression illness – an illness (also called decompression sickness (DCS) or the bends) caused by gas bubbles appearing in body compartments due to a reduction in ambient pressure. Examples of symptoms of decompression illness include (but are not limited to): joint pain (also known as the 'bends' for agonizing pain or the 'niggles' for sight pain); areas of bone destruction (termed dysbaric osteonecrosis); skin disorders (such as cutis marmorata, which causes a pink marbling of the skin); spinal cord and brain disorders (such as stroke, paralysis, paresthesia, and bladder dysfunction); cardiopulmonary disorders, such as shortness of breath; and arterial gas embolism (gas bubbles in the arteries that block blood flow).[19]

Note: Health effects associated with hyperbaric intervention but not considered symptoms of DCI can include: barotrauma (direct damage to air-containing cavities in the body such as ears, sinuses and lungs); nitrogen narcosis (reversible alteration in

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[18]Adapted from 29 CFR 1926.32(f).

[19]See Appendix 10 of "A Guide to the Work in Compressed Air Regulations 1996," published by the United Kingdom Health and Safety Executive available from NIOSH at http://www.cdc.gov/niosh/docket/archive/pdfs/NIOSH-254/compReg1996.pdf

consciousness that may occur in hyperbaric environments and is caused by the anesthetic effect of certain gases at high pressure); and oxygen toxicity (a central nervous system condition resulting from the harmful effects of breathing molecular oxygen ($O_2$) at elevated partial pressures).

6. Earth Pressure Balanced Tunnel Boring Machine – the machinery used to excavate the tunnel.

7. Hot work – any activity performed in a hazardous location that may introduce an ignition source into a potentially flammable atmosphere.[20]

8. Hyperbaric – at a higher pressure than atmospheric pressure.

9. Hyperbaric intervention – a term that describes the process of stopping the EPBTBM and preparing and executing work under hyperbaric pressure in the working chamber for the purpose of inspecting, replacing, or repairing cutting tools and/or the cutterhead structure.

10. Hyperbaric Operations Manual – a detailed, project-specific health and safety plan developed and implemented by IHP JV for working in compressed air during the construction of the Anacostia River tunnel.

11. Job hazard analysis – an evaluation of tasks or operations to identify potential hazards and to determine the necessary controls.

12. Man lock – an enclosed space capable of pressurization, and used for compressing or decompressing any employee or material when either is passing into or out of a working chamber.

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[20]Also see 29 CFR 1910.146(b).

13. Pressure – a force acting on a unit area. Usually expressed as pounds per square inch (p.s.i.).

14. p.s.i. – pounds per square inch, a common unit of measurement of pressure; a pressure given in p.s.i. corresponds to absolute pressure.

15. p.s.i.a – pounds per square inch absolute, or absolute pressure, is the sum of the atmospheric pressure and gauge pressure. At sea-level, atmospheric pressure is approximately 14.7 p.s.i. Adding 14.7 to a pressure expressed in units of p.s.i.g. will yield the absolute pressure, expressed as p.s.i.a.

16. p.s.i.g. – pounds per square inch gauge, a common unit of pressure; pressure expressed as p.s.i.g. corresponds to pressure relative to atmospheric pressure. At sea-level, atmospheric pressure is approximately 14.7 p.s.i. Subtracting 14.7 from a pressure expressed in units of p.s.i.a. yields the gauge pressure, expressed as p.s.i.g.

17. Qualified person – an individual who, by possession of a recognized degree, certificate, or professional standing, or who, by extensive knowledge, training, and experience, successfully demonstrates an ability to solve or resolve problems relating to the subject matter, the work, or the project.[21]

18. Working chamber – an enclosed space in the EPBTBM in which CAWs perform interventions, and which is accessible only through a man lock.

E. Safety and Health Practices

1. IHP JV would have to develop and implement a project-specific HOM, and submit the HOM to OSHA for approval at least six months before using the EPBTBM. IHP JV would have to receive a written acknowledgement from OSHA regarding the

[21]Adapted from 29 CFR 1926.32(m).

acceptability of the HOM.[22] The HOM would provide the governing safety and health requirements regarding hyperbaric exposures during the tunnel-construction project.

2. IHP JV would have to implement the safety and health instructions included in the manufacturer's operations manuals for the EPBTBM, and the safety and health instructions provided by the manufacturer for the operation of decompression equipment.

3. IHP JV would have to use air as the only breathing gas in the working chamber.

4. IHP JV would have to use the 1992 French Decompression Tables for air, air-oxygen, and oxygen decompression specified in the HOM, specifically, the tables titled "French Regulation Air Standard Tables."

5. IHP JV would have to equip man locks used by its employees with an oxygen-delivery system as specified by the HOM. IHP JV would be required to not store oxygen or other compressed gases used in conjunction with hyperbaric work in the tunnel.

6. Workers performing hot work under hyperbaric conditions would have to use flame-retardant personal protective equipment and clothing.

7. In hyperbaric work areas, IHP JV would have to maintain an adequate fire-suppression system approved for hyperbaric work areas.

8. IHP JV would have to develop and implement one or more JHAs for work in the hyperbaric work areas, and review, periodically and as necessary (e.g., after making changes to a planned intervention that affects its operation), the contents of the JHAs

[22]This notice constitutes such acknowledgement by OSHA of the acceptability of the HOM provided by IHP JV for the Anacostia River tunnel project.

with affected employees. The JHAs would have to include all the job functions that the risk assessment[23] indicates are essential to prevent injury or illness.

9. IHP JV would have to develop a set of checklists to guide compressed-air work and ensure that employees follow the procedures required by this proposed permanent variance (including all procedures required by the HOM, which this proposed variance would incorporate by reference). The checklists would have to include all steps and equipment functions that the risk assessment indicates are essential to prevent injury or illness during compressed-air work.

10. IHP JV would have to ensure that the safety and health provisions of the HOM adequately protect the workers of all contractors and subcontractors involved in hyperbaric operations.[24]

F. Communication

1. Prior to beginning a shift, IHP JV would have to implement a system that informs workers exposed to hyperbaric conditions of any hazardous occurrences or conditions that might affect their safety, including hyperbaric incidents, gas releases, equipment failures, earth or rock slides, cave-ins, flooding, fires, or explosions.

2. IHP JV would have to provide a power-assisted means of communication among affected workers and support personnel in hyperbaric conditions where unassisted voice communication is inadequate.

(a) IHP JV would have to use an independent power supply for powered communication systems, and these systems would have to operate such that use or

[23]See ANSI/AIHA Z10-2012, American National Standard for Occupational Health and Safety Management Systems, for reference.

[24]See ANSI/ASSE A10.33-2011, American National Standard for Construction and Demolition Operations – Safety and Health Program Requirements for Multi-Employer Projects, for reference.

disruption of any one phone or signal location will not disrupt the operation of the system from any other location.

(b) IHP JV would have to test communication systems at the start of each shift and as necessary thereafter to ensure proper operation.

G. Worker Qualifications and Training

IHP JV would have to:

1. Ensure that each affected worker receives effective training on how to safely enter, work in, exit from, and undertake emergency evacuation or rescue from, hyperbaric conditions, and document this training.

2. Provide effective instruction, before beginning hyperbaric operations, to each worker who performs work, or controls the exposure of others, in hyperbaric conditions, and document this instruction. The instruction would have to include topics such as:

(a) The physics and physiology of hyperbaric work;

(b) Recognition of pressure-related injuries;

(c) Information on the causes and recognition of the signs and symptoms associated with decompression illness, and other hyperbaric intervention-related health effects (e.g., barotrauma, nitrogen narcosis, and oxygen toxicity);

(d) How to avoid discomfort during compression and decompression; and

(e) Information the workers can use to contact the appropriate healthcare professionals should the workers have concerns that they may be experiencing adverse health effects from hyperbaric exposure.

3. Repeat the instruction specified in paragraph (b) of this proposed condition periodically and as necessary (e.g., after making changes to its hyperbaric operations).

4. When conducting training for its hyperbaric workers make this training available to OSHA personnel and notify the OTPCA at OSHA's national office and OSHA's nearest affected Area Office before the training takes place.

H. Inspections, Tests, and Accident Prevention

1. IHP JV would have to initiate and maintain a program of frequent and regular inspections of the EPBTBM's hyperbaric equipment and support systems (such as temperature control, illumination, ventilation, and fire-prevention and fire-suppression systems), and hyperbaric work areas, as required under 29 CFR 1926.20(b)(2) by:

(a) Developing a set of checklists to be used by a competent person in conducting weekly inspections of hyperbaric equipment and work areas; and

(b) Ensuring that a competent person conducts daily visual checks and weekly inspections of the EPBTBM.

2. If the competent person determines that the equipment constitutes a safety hazard, IHP JV would have to remove the equipment from service until it corrects the hazardous condition and has the correction approved by a qualified person.

3. IHP JV would have to maintain records of all tests and inspections of the EPBTBM, as well as associated corrective actions and repairs, at the job site for the duration of the job.

I. Compression and Decompression

IHP JV would have to consult with its attending physician concerning the need for special compression or decompression exposures appropriate for CAWs not acclimated to hyperbaric exposure.

J. Recordkeeping

IHP JV would have to maintain a record of any recordable injuries, illnesses, in-patient hospitalizations, amputations, loss of an eye, or fatality (as defined by 29 CFR part 1904 Recording and Reporting Occupational Injuries and Illnesses), resulting from exposure of an employee to hyperbaric conditions by completing the OSHA 301 Incident Report form and OSHA 300 Log of Work Related Injuries and Illnesses.

Note: Examples of important information to include on the OSHA 301 Incident Report form (along with the corresponding question on the form) would have to address the following: the task performed (Question (Q) 14); an estimate of the CAW's workload (Q 14); the composition of the gas mixture; the pressure worked at (Q 14); temperature in the work and decompression environments (Q 14); did something unusual occur during the task or decompression (Q 14); time of symptom onset (Q 15); duration of time between decompression and onset of symptoms (Q 15); nature and duration of symptoms (Q 16); a medical summary of the illness or injury (Q 16); duration of the hyperbaric intervention (Q 17); any possible contributing factors (Q 17); the number of prior interventions completed by injured or ill CAW (Q 17); the number of prior interventions completed by injured or ill CAW at that pressure (Q 17); the contact information for the treating healthcare provider (Q 17); and the date and time of last hyperbaric exposure for this CAW.

In addition to completing the OSHA 301 Incident Report form and OSHA 300 Log of Work Related Injuries and Illnesses, IHP JV would have to maintain records of:

1. The date, times (e.g., began compression, time spent compressing, time performing intervention, time spent decompressing), and pressure for each hyperbaric intervention.

2. The name of each individual worker exposed to hyperbaric pressure and the decompression protocols and results for each worker.

3. The total number of interventions and the amount of hyperbaric work time at each pressure.

4. The post-intervention physical assessment of each individual CAW for signs and symptoms of decompression illness, barotrauma, nitrogen narcosis, oxygen toxicity or other health effects associated with work in compressed air or mixed gasses for each hyperbaric intervention.

K. Notifications

1. To assist OSHA in administering the conditions specified herein, IHP JV would have to:

(a) Notify the OTPCA and the Baltimore/Washington D.C. Area Office of any recordable injuries, illnesses, in-patient hospitalizations, amputations, loss of an eye, or fatality (by submitting the completed OSHA 301 Incident Report form[25]) resulting from exposure of an employee to hyperbaric conditions including those that do not require recompression treatment (e.g., nitrogen narcosis, oxygen toxicity, barotrauma), but still meet the recordable injury or illness criteria (of 29 CFR 1904). The notification would have to be made within 8 hours of the incident, or after becoming aware of a recordable injury or illness, and a copy of the incident investigation (OSHA 301) would have to be provided within 24 hours of the incident, or after becoming aware of a recordable injury or illness. In addition to the information required by the OSHA 301, the incident-

[25]See footnote 8.

investigation report would have to include a root-cause determination, and the preventive and corrective actions identified and implemented.

(b) Provide certification within 15 days of the incident that it informed affected workers of the incident and the results of the incident investigation (including the root-cause determination and preventive and corrective actions identified and implemented).

(c) Notify the OTPCA and the Baltimore/Washington DC Area Office within 15 working days and in writing, of any change in the compressed-air operations that affects IHP JV's ability to comply with the proposed conditions specified herein.

(d) Upon completion of the Anacostia River tunnel project, evaluate the effectiveness of the decompression tables used throughout the project, and provide a written report of this evaluation to the OTPCA and the Baltimore/Washington DC Area Office.

Note: The evaluation report would have to contain summaries of: (1) the number, dates, durations, and pressures of the hyperbaric interventions completed; (2) decompression protocols implemented (including composition of gas mixtures (air and/or oxygen), and the results achieved; (3) the total number of interventions and the number of hyperbaric incidents (decompression illnesses and/or health effects associated with hyperbaric interventions as recorded on OSHA 301 and 300 forms, and relevant medical diagnoses and treating physicians' opinions); and (4) root-causes, and preventive and corrective actions identified and implemented.

(e) To assist OSHA in administering the proposed conditions specified herein, inform the OTPCA and the Baltimore/Washington DC Area Office as soon as possible after it has knowledge that it will:

(i) Cease to do business;

(ii) Change the location and address of the main office for managing the tunneling operations specified by the project-specific HOM; or

(iii) Transfer the operations specified herein to a successor company.

(f) Notify all affected employees of this proposed permanent variance by the same means required to inform them of its application for a variance.

2. OSHA would have to approve the transfer of the proposed permanent variance to a successor company.

**VI. Authority and Signature**

David Michaels, Ph.D., MPH, Assistant Secretary of Labor for Occupational Safety and Health, 200 Constitution Avenue, NW., Washington, DC 20210, authorized the preparation of this notice. Accordingly, the Agency is issuing this notice pursuant to 29 U.S.C. 655(d), Secretary of Labor's Order No. 1-2012 (77 FR 3912, Jan. 25, 2012), and 29 CFR 1905.11.

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**David Michaels,**
Assistant Secretary of Labor for Occupational Safety and Health.

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