



Subject: Permanent Variance From §1926.803(e)(5), §1926.803(f)(1), §1926.803(g)(1)(iii), and §1926.803(g)(1)(xvii), Chesapeake Tunnel Joint Venture

- A. Purpose.
This directive transmits the above-referenced permanent variance order to field personnel.
- B. Scope.
This directive applies to all VOSH personnel and specifically to Occupational Safety Enforcement and Voluntary Compliance personnel.
- C. Action.
The Assistant Commissioner, Directors and Supervisors shall assure that the Hampton Roads Connector Partners complies with the terms of its Permanent variance order (i.e., review company compliance with the order on an annual basis).
- D. Expiration Date.
Not Applicable.
- E. Summary.
See attached permanent variance order dated January 2023.
- F. Background.
See attached order.

Gary G. Pan
Commissioner

Attachment: Permanent Variance From §1926.803(e)(5), §1926.803(f)(1), §1926.803(g)(1)(iii), and §1926.803(g)(1)(xvii); Chesapeake Tunnel Joint Venture

Distribution: Commissioner of Labor and Industry
Assistant Commissioner
Deputy Commissioners
Directors and Supervisors
Safety and Health Staff
OSHA Regional Administrator, Region III



COMMONWEALTH of VIRGINIA
DEPARTMENT OF LABOR AND INDUSTRY

Gary G. Pan
COMMISSIONER

Main Street Centre
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Richmond, Virginia 23219
PHONE (804) 371-2327
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January 20, 2023

Chesapeake Tunnel Joint Venture
2377 Ferry Road
Virginia Beach, Virginia 23455

SUBJECT: Request for Permanent Variance From 1926.803(e)(5), 1926.803(f)(1),
1926.803(g)(1)(iii), and 1926.803(g)(1)(xvii)

Dear Chesapeake Tunnel Joint Venture:

The thirty day public comment period on your application for a permanent variance lapsed on June 1, 2022, and no comments were received by the Department. In accordance with the Virginia Occupational Safety and Health (VOSH) Administrative Regulations Manual (ARM) Section 6, my staff and I have completed our review of your application.

The Department has concluded that Chesapeake Tunnel Joint Venture (CTJV) has shown by a preponderance of the evidence that its proposed methods to ensure compressed air work safety (with certain conditions added by the Department) provides employment and a place of employment as safe and as healthful as would be provided by complying with 1926.803(e)(5), 1926.803(f)(1), 1926.803(g)(1)(iii), and 1926.803(g)(1)(xvii).

This variance is effective January 20, 2023. It will remain in effect for as long as you continue to follow the conditions you described in your variance applications or until withdrawn by you or the Department. Our VOSH inspectors will be notified of this decision.

This variance decision is limited to the specific provisions in 1926.803 for which the variance was requested. It is the CTJV's responsibility to assure compliance with all other applicable VOSH laws, standards and regulations. This variance is in no way to be construed to certify or approve CTJV's descriptions of the methods it will use to address hazards associated with VOSH laws, standards and regulations not the subject of this variance (e.g., lockout/tagout, hearing conservation, respiratory protection, welding, etc., and the corresponding VOSH standards and regulations designed to protect employees against those hazards).

If an illness or injury of an employee occurs as a direct result of working in a compressed air

environment, CTJV will report to VOSH within 24 hours using DOLI's online reporting form that can be found here: <https://www.doli.virginia.gov/ser/>. If there is a change in your workplace operation that would affect this variance, CTJV must immediately report to the Department, in writing, any change and the details of the change in operation.

If in a future VOSH inspection, if it is determined that CTJV has violated the terms of this variance or other VOSH laws, standards or regulation, CTJV may be subject to potential citations and penalties.

You must post this letter for as long as the variance is in effect in every work site affected by this variance. All affected employees must be able to easily see it.

A copy of the order granting the Permanent Variance is enclosed. Please note that CTJV must comply with the terms of the Order (i.e. including the conditions added by the Department) during the operation of its compressed air work.

Sincerely,

Gary G. Pan
Commissioner



COMMONWEALTH of VIRGINIA

DEPARTMENT OF LABOR AND INDUSTRY

Gary G. Pan
COMMISSIONER

Main Street Centre
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PHONE (804) 371-2327
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ORDER

AGENCY: Virginia Department of Labor and Industry

ACTION: Grant of Permanent Variance

SUMMARY: This Order announces the granting of an application by Chesapeake Tunnel Joint Venture, for a Permanent Variance from Sections 1926.803(e)(5), 1926.803(f)(1), 1926.803(g)(1)(iii), and 1926.803(g)(1)(xvii) of the Virginia Occupational Safety and Health (VOSH) Standards for Construction.

DATE: The effective date of the granting of the Permanent Variance is January 20, 2023.

BACKGROUND

Chesapeake Tunnel Joint Venture applied for Permanent Variances from 1926.803(e)(5), 1926.803(f)(1), 1926.803(g)(1)(iii), and 1926.803(g)(1)(xvii) of the VOSH Standards for Construction, by email dated July 7, 2021.

In accordance with the procedures in 16VAC25-60-190.C of the VOSH Administrative Regulations Manual (ARM), a notice of the request and 30-day comment period was published in the Richmond Times dispatch on December 4 – 13, 2020. The comment period closed on January 8, 2021, with no comments having been received.

This variance decision is limited to the specific provisions in 1926.803 for which the variance was requested. It is the CTJV's responsibility to assure compliance with all other applicable VOSH laws, standards and regulations.

This variance is in no way to be construed to certify or approve CTJV's descriptions of the methods it will use to address hazards associated with VOSH laws, standards, and regulations not the subject of this variance (e.g., lockout/tagout, hearing conservation, respiratory protection, welding, etc., and the corresponding VOSH standards and regulations designed to protect employees against those hazards).

SUMMARY OF PERMANENT VARIANCE REQUEST

The Partners summarize the historical background of the request and their operation as follows:

Chesapeake Tunnel Joint Ventures (CTJV) will be constructing a 1.1-mile-long sub-aqueous tunnel under the Thimble Shoal Channel of the Chesapeake Bay, which is located west of the existing tunnel crossing, using an Earth Pressure Balance Tunnel Boring Machine (EPBTBM). This project is called the Thimble Shoal Tunnel Project.

When complete, the new tunnel and approach structures will carry two lanes of traffic southbound, and the existing tunnel will carry two lanes of traffic northbound. The project includes the construction of building structures, trestle replacement and replacement of the superstructure of the fishing pier that is located at Portal Island No. 1.

This is a design and build contract between Chesapeake Bay Bridge and Tunnel (CBBT) of the Commonwealth of Virginia and CTJV. CTJV is a joint venture between Dragados-USA and Schiavone Construction Company, LLC. Mott MacDonald (MM) is a consultant to Dragados USA.

Ballard Marine Construction (Ballard) has been contracted to perform hyperbaric support of this project. Ballard provided technical support and primarily crafted the Hyperbaric Operations Manual (HOM) Revision 8-January 19, 2023. Ballard and Dragados-USA have worked together on a prior joint venture to build the Seattle SR-99 project. CTJV intends to begin the tunneling process in February 2023 and anticipates that the entire tunneling process will take 12 to 13 months. An employee representative has been designated.

The method of operation makes it most difficult to comply with the above captioned regulations for the following reasons:

1. According to geotechnical and contract documents, the tunnel boring machine (TBM), and employees, could be exposed to pressures of up to 65.25 psi (4.5 bar) and all equipment and procedures will be designed to at least the full potential pressure of 65.25 psi (4.5 bar). Current VOSH standards state that “no employee shall be subject to pressure exceeding 50 pounds per square inch except in emergency.”
2. Compression and decompression procedures with appropriate decompression tables for the full range of possible working pressures include the use of French Air Tables, French Oxygen Tables with oxygen decompression, and US Navy Saturation Tables with Heliox.
3. Current VOSH standards state that “decompression to normal conditions shall be in accordance with the Decompression Tables in Appendix A of this subpart. (1926 Subpart S App A – Decompression Tables). The project uses manual control, rather than automatic controls, for staged compression by a trained manlock tender. The VOSH standard states that “Except where air pressure in the working chamber is below 12 p.s.i.g., each man lock shall be equipped with automatic controls...”

4. Pressurized face tunnel boring machines eliminate the need to pressurize an entire tunnel, and the entire crew, for the entire duration. Instead, this project will require compressed air work with two workers at a time, and only for cutter head inspection and limited maintenance and replacement of tools. The workers will have the ability to move, stand up, and stretch which significantly improves the body's circulation and also the effectiveness and safety of decompression especially with longer decompression times.
5. Three hyperbaric interventions are currently planned, although additional interventions may be necessary. Tool changes will only be done when necessary and in "free air" when hyperbaric interventions are not needed. Hyperbaric interventions will only be utilized if the soil is not stable without increased air pressure. CTJV has three hyperbaric interventions planned, but notes that additional may be necessary to maintain a safe work environment.
6. To provide a workplace that is as safe and healthful as the one that complies with the OSHA standard, CTJV has developed a project-specific Hyperbaric Operations Manual (HOM) for this project. The HOM Revision 8- January 19, 2023, is last version, and it includes the 10 Appendices listed below:
 - Appendix 1 – Permanent Variance Applications Revision 8
 - Appendix 2 – Forms, checklists, and exposure reports with cover
 - Appendix 3- French Regulation Air Standard Tables with cover
 - Appendix 4- Flow chars and treatment tables with cover
 - Appendix 5- Manlock documentation
 - Appendix 6- Shuttle documentation
 - Appendix 7- Medical lock documentation
 - Appendix 8- Saturation Diving Method
 - Appendix 9- US Diving Manual_Rev7
 - Appendix 10- Set of AHAs

CTJV is requesting a Permanent Variance to allow workers to be exposed to more than 50 psi, the use of decompressions tables other than OSHA's, allowing decompression to be performed manually instead of automatically, and to limit how many and which workers need to be decompressed at the end of a shift.

The project could expose workers to pressure up to 65.25 psi (4.5 bar). Therefore, CTJV, to assure the safety of the compressed air workers (CAWs), is preparing all procedures based on there being 87 psi, including the use of French Air Tables, French Oxygen Tables with oxygen decompression, and US Navy Saturation Tables with Heliox.

CTJV states that current OSHA decompression tables do not provide for the use of oxygen decompression, regardless that studies have concluded that oxygen decompression seems to be the only viable method for safely decompressing tunnel workers. CTJV requests the variance to apply French Air Tables for decompression after exposure to pressures in the range of 0-15 psi (0-1.05 bar), French Oxygen Tables with oxygen decompression after exposure to working pressures of 15-65 psi (4.5 bar) using bounce mode, and US Navy Tables with Heliox breathing media and combination Heliox/Oxygen decompression after

exposure to any working pressure when saturation mode is used.

Current OSHA decompression tables are outdated for today's technology, and were ineffective to begin with. OSHA decompression tables have not been updated in over 40 years. The National Institute for Occupational Safety and Health (NIOSH) noted that many modern projects require exposure to pressures greater than 50 psi, and the modern Tunnel Boring Machine allows projects at greater depths or unstable soil conditions that exceed 50 psi. Projects, like the one at Lake Mead, Nevada, exposed employees to pressure up to 200 psi. <https://www.cdc.gov/niosh/topics/decompression/limitations.html>

The current OSHA tables do not address pressures greater than 50 psi, and decompression sickness occurs among tunnel workers involved in pressures at 36 psi following the OSHA decompression tables. The OSHA tables do not provide for the use of oxygen decompression, regardless that studies have concluded that oxygen decompression seems to be the only viable method for safely decompressing tunnel workers....This is why some jobs use tables from other countries such as France and Germany that address higher pressures and the use of technical gas mixtures.

<https://www.cdc.gov/niosh/topics/decompression/nioshdeveloped.html>.
<https://www.cdc.gov/niosh/topics/decompression/limitations.html>

OSHA tables provide for continuous gradual decompression at a uniform rate. Control of this type of decompression is very difficult by manual means, and hence the OSHA requirement for the automatic controller. However, the proposed tables are based on staged decompression or a specified stop, where the pressure is reduced to the next stage, and maintained according to the specified stop time, and repeated until the decompression table is complete. This process eliminates the need for an automatic controller and offers a safer decompression process. A manlock tender eliminates potential failure point, such as failure of an automatic mechanism.

Finally, pressurized-face Tunnel Boring Machines have eliminated the need to pressurize and entire tunnel, and the entire crew, for the entire duration. This tunnel will require compressed air work with only two workers at a time, and only for cutter head inspection and limited maintenance and replacement of tools. The workers will have the ability to move, stand up, and stretch which significantly improves the body's circulation and also the effectiveness and safety of decompression especially with longer decompression times.

REGULATORY REQUIREMENTS

16VAC25-60-190.E of the VOSH ARM provides that the Commissioner shall make a decision on a variance application promptly after the close of the period for public comments. "This decision will be based upon the information contained in the application, the report of any variance inspection made concerning the application, any other pertinent staff reports, federal OSHA submitted by employees, employee representatives, other employers, or the public."

The Commissioner will grant a variance request only if it is found that the employer has met by a preponderance of the evidence, the requirements of ... 16VAC25-60-200.B.4...."

16VAC25-60-210.B.4 requires the employer to include in a variance application “a description of the conditions, practices, means, methods, operations, or processes used and evidence that these would provide employment and a place of employment as safe and healthful as would be provided by the standard from which a variance is sought.”

1926.803(e)(5) states:

No employee shall be subjected to pressure exceeding 50 pounds per square inch except in emergency.

1926.803(f)(1) states:

Decompression to normal condition shall be in accordance with the Decompression Tables in Appendix A of this subpart.

1926.803(g)(1)(iii) states:

Except where air pressure in the working chamber is below 12 psig, each man-lock shall be equipped with automatic controls which, through taped programs, cams, or similar apparatus, shall automatically regulate decompressions. It shall also be equipped with manual controls to permit the lock attendant to override the automatic mechanism in the event of an emergency, as provided in paragraph (g)(1)(viii) of this section.

1926.803(g)(1)(xvii) states:

A special decompression chamber of sufficient size to accommodate the entire force of employees being decompressed at the end of a shift shall be provided whenever the regularly established working period requires a total time of decompression exceeding 75 minutes.

SUMMARY OF COMMISSIONER’S FINDINGS REGARDING APPLICATION FOR PERMANENT VARIANCE

From the information provided in the company’s application and based on the site-specific Hyperbaric Operations Manual, the Commissioner finds the following:

1. The Commissioner agrees with items 1-6 of the joint venture’s summary of their operation and notes specifically that compliance with the standards (making no changes to the pressure limit on workers, the decompression tables used, the use of automatic controls, and which workers need to be decompressed presently used) would cause more workers to be exposed to pressure above 50 psi that current technology eliminates, and decompression sickness by not using current decompression techniques.
2. The main safety hazards presented by this project are preparation for intervention, emergency response, hot work in compressed air, lock out tag out during an intervention, post intervention protocol, shuttle operations, tool change, worker (CAW) compression, site setup of intervention equipment, gas bounce, and saturation intervention.

DECISION

Based on the findings noted above Chesapeake Tunnel Joint Venture is granted a Permanent Variance effective on the date of this Order, pursuant to section 40.1-6(a) of the Code of Virginia and Section 6.J. of the VOSH ARM. The conditions of the Permanent Variance are as follows:

1. All CTJV personnel shall follow the site-specific Hyperbaric Operations Manual (HOM) Revision 8 January 19, 2023, and accompanying appendices 1-10, for the duration of the project.
2. The terms of these variances apply only to the worksite and conditions referenced in CTJV's application for variance.
3. The granting of these variances is conditional on compliance with the requirements of the site-specific HOM Revision 8, and CTJV will be required to fully implement their operations manual specific to the project's compressed air work.
4. Site-specific safety procedures for TBM operations shall include fire safety in compressed air environments, medical emergency protocol, and a specific job hazard analysis for all scheduled interventions.
5. CTJV will report to VOSH within 24 hours, using VOSH's online reporting system, any illness or injury of an employee as a direct result of working in a compressed air environment. The weblink to the reporting system is <https://www.doli.virginia.gov/ser/>.
6. If there is a change in your workplace operation that would affect this variance, CTJV must immediately report to the Department, in writing, any change and the details of the change in operation.

A copy of this notice must be posted in accordance with Section 4.1. of the VOSH ARM.

Gary G. Pan
Commissioner

January 20, 2023
Date