Introduction to Diesel Fuel - TLV

In 2002, ACGIH (American Conference of Governmental Industrial Hygienists) adopted a new exposure limit for diesel fuel. The new Threshold Limit Value (TLV) specifies an eight-hour time weighted average (TWA) for total diesel hydrocarbons (vapor and aerosol) of 100 milligrams-per-cubic meter (mg/m3). This is equivalent to approximately 15 part-per-million (ppm) diesel vapor.

TLV's, which are published by the ACGIH, are among the world's most widely used and respected guidelines for controlling workplace exposure to potentially toxic substances. They are designed to function as recommendations to control health hazards. Although they are not developed as legal standards they are incorporated by reference in many state, federal and international regulations and in consensus standards, such as National Fire Protection Association (NFPA) and American National Standards Institute (ANSI). Many employers base their Safety and Health Programs on the most conservative recognized standard. ACGIH recommendations are frequently more conservative than OSHA PELs. In the case of diesel fuel OSHA has not established a PEL for either vapor or its aerosol. This should make the employer's decision that much easier.

During 2002 and 2003 the shipbuilding industry appeared to be slow to implement the new TLV for diesel fuel. In the past, most of the attention paid to diesel fuel has been centered on its combustibility. Unless you followed the ACGIH TLV adoption/revision process very closely and read the notice of intended changes included in the annually published handbook**,** this new TLV may have been a surprise. After all there was very little, if any, public notification or published discussion other than that performed by the ACGIH process. By now the surprise should be gone and as safety professionals we should be appropriately protecting our employees.

Monitoring Issues

Along with the new TLV came a new sampling problem. The conventional combustible gas detector will not measure diesel vapor at concentrations low enough to determine employee exposures with acceptable sensitivity and accuracy. In addition, available hydrocarbon colorometric detector tubes were not sensitive enough to measure at the new TLV. Many shipyards, marine chemists and safety professionals were not equipped to measure concentrations of diesel vapor/aerosol at this new level. This added a significant amount of difficulty and confusion in implementing the new TLV. A new economic market was developed and equipment manufacturers responded in kind. Currently there are several improved instrument methods available that will monitor diesel vapor at the concentration necessary to determine employee exposure. The two most readily available methods are the photo-ionization detector (PID) and the colorimetric detector tube. There are a several manufacturers of PIDs but, currently, only one that produces a hydrocarbon detector tube capable of measuring diesel vapor at the required concentration. (At the time of this article Rae Systems Inc. is the only supplier of hydrocarbon detector tubes sensitive enough to measure diesel vapor at the new TLV) We are confident, however, that this will quickly change due to the competitive and responsive nature of the industry.

Engineering Controls, PPE and Administrative Controls

Prior to the new TLV the focus was on the atmosphere's combustibility and maintaining less than 10% of the LEL. This level of vapor represents a concentration, which is approximately 600 ppm, greater than 40 times the new TLV. Obviously something must be done to better protect our workforce.

Calculation: Using a generally accepted Lower Explosive Limit for diesel fuel of 0.6%, which equals approximately 6000 ppm x 10% of the LEL = 600 ppm

The adoption of the new diesel fuel TLV caused shipyards to reassess engineering controls, mainly ventilation, associated with work in and around diesel fuel tanks and other areas where exposure is likely. They also had to take into consideration the potential need for and limitations of personal protective equipment (PPE), and potentially instituting administrative controls, such as adjusted work schedules, to reduce employee exposures. The Marine Chemist Association has accumulated a significant amount of preliminary data that may help shipyards perform their assessment and implement better workplace protection. The information is provided as a series of matrices and should be used only as guidelines as they do not represent your specific potential for exposure.

It must be stressed that workplace experience, safety and industrial hygiene practice holds (and the federal government requires as part of the Occupational Safety and Health Act of 1970) that when protecting employees from potential workplace hazards, there is a priority used when applying appropriate protective measures. To mitigate hazards, employers are to use engineering controls (such as ventilation and hazard isolation) first, administrative controls (such as adjusted or limited work schedules) second, and to turn to PPE as a last alternative when the first two measures are not sufficient, are impractical or not feasible. In actual practice, however, since so much of marine construction and repair work is dynamic and not subject to perfect application of engineering controls, PPE is often used in conjunction with ventilation and administrative controls to ensure adequate protection, however, should never be used as the primary control method. Therefore, when working with diesel-contaminated workspaces, mechanical ventilation (an engineering control) is expected as the first and most important tool in mitigating exposure and protecting workers in marine enclosed and confined spaces. Any guidance drawn from the following documents assumes that mechanical ventilation, at a minimum, is in place whenever possible.

In addition, the use of PPE, especially respiratory protection, must be applied in compliance with OSHA regulations. Respiratory protection used in the marine workplace must follow 29CFR1910.134, and applicable sections of 29CFR1915, Subpart I. These standards require, among other things, that the employer have a written respiratory protection program in place, that the issued respirators be selected to mitigate the hazards recognized and measured in the workplace, that employees are trained to use and maintain the equipment properly, and that employees are fit-tested to ensure respirators will do the job.

Since adjusted work schedules are administrative controls, they are preferable, at first glance, to using PPE to mitigate hazards for a number of reasons. First, the employer shouldn't have to be concerned that employee overexposure can occur if respiratory protection or other PPE fails, or is not used properly when supervision isn't around or is overwhelmed. In other words, the employee should theoretically never be in a situation where they might be overexposed. Second, correct and effective use of administrative controls relieves the employer of the details and expense of regulatory requirements in 29CFR1910.134

Nevertheless, use of adjusted work schedules leaves two important requirements for an employer choosing this approach. First is the burden of knowing for certain what the exposure of the employee is for the entire work shift. This requirement is often overlooked. For example, if the employer finds that a tank has 30 ppm diesel vapor in it, and workers have only two hours work to accomplish in the space, the employer may feel confident that he or she may assign the work without the need to issue PPE or have concern that the workers will be overexposed. Once they are done, the assumption is that they will spend the rest of the shift in places where there is no exposure, giving the workers an average time-weighted exposure of about 7.5 ppm for the entire shift - well within the standard.

Calculation: 2 hours x 30 ppm (or 60 ppm-hours,) plus six hours x 0 ppm (or 0 ppm-hours,), giving an average of 60 ppm-hours ÷ 8 hours, or 7.5 ppm

What may not have been considered by the supervisor is any of the following:

- What exactly did the workers do while in the contaminated tank?
- Who made measurements of their exposure to ensure assumptions about levels of vapor were confirmed, and how were the measurements made?
- Did the workers help clean the tank, thereby, disturbing the material and potentially greatly increasing the amount of vapor exposure?
- Exactly what are the workers going to be exposed to for the balance of the shift?
- Will they see additional exposure to diesel vapor somewhere else in the shipyard later in the shift?
- How will the supervisor be sure of the lack of subsequent exposure after they leave the tank?

A second serious concern is to realize that the use of adjusted work schedules has carefully defined restrictions and limitations. For example, once you realize that the TLV is based on a full eight hours of exposure, and adjusted work schedules permit you to balance higher exposures against time of lesser exposures, you may wonder how far you can take the use of this to avoid implementing other protective actions.

- Can you let a worker go into a diesel-contaminated space (one containing free product that is evaporating and saturating the atmosphere of a fuel tank, for example) and get a few minutes exposure of a very high level as long as they see no exposure for the rest of the day?
- How high can that maximum level be?
- How long can the excursion be?

Industrial hygienists, marine chemists and toxicologists call a limited exposure over the recommended TLV or PEL "an excursion". *Said another way, an average of 15 ppm over eight hours means a total of 15 x 8, or 120 ppm-hours total exposure as the area under the exposure-time curve. Expressed in units of minutes, this would mean 15 ppm x 8 hours x 60 minutes/hour = 7200 ppm-minutes in an eight hour shift.* Given that diesel has the ability to establish an atmosphere of between 2,000 and 3,000 ppm at room temperature, is it proper to send a worker into a tank with liquid diesel in it for, say, no more that 2 minutes, as long as they stay away from diesel for the remainder of the shift?

The answer is absolutely not. The limitations of excursions are clearly defined by ACGIH when using its TLVs. In the absence of other guidance (such as "Short Term Exposure Limits", or STELs - and there is no STEL established for diesel's TLV), ACGIH limits the excursions of TLVs to three times the TLV for periods of up to 30 minutes, and at no time can the excursion exceed five times the TLV. For diesel's TLV, this would mean at no time can the worker enter a space without respiratory protection at levels exceeding an average of 45 ppm for more than 30 minutes, and the level can never exceed 75 ppm. Obviously, unprotected entry in a space with liquid diesel is not covered by the use of adjusted work schedules unless there is adequate ventilation to maintain exposure levels to below 45 ppm.

In summary, the following points are assumed to be part of use of the following matrices:

- Mechanical ventilation is applied to the spaces as the required engineering control during all entry and work involving spaces that are known to be diesel contaminated.
- Any PPE is assigned, used and maintained in accordance with applicable regulations.
- If there is any reasonable suspicion that the concentration of diesel vapor in the space to be worked may have the ability to increase then the space must be regularly monitored to ensure that the PPE selection, or assumed adjusted work schedule, or both, are sufficient to provide proper protection.
- Supervision must be confident that when using adjusted work schedules, worker exposure is under their control for the entire work shift.

Matrices

- **Matrix #1** – provides minimum guidelines for the type of PPE at specific exposure levels and also adjusted work schedule general information.
- **Matrix #2** – provides specific information on the concentration of diesel fuel vapor in tanks, during a variety of operations on off shore supply vessels, tugboats, towboats and crew boats and the PPE required for each operation.
- **Matrix #3** – provides specific information on the concentration of diesel fuel vapor in tanks, during a variety of operations on a DDG class naval vessel and the minimal level of PPE required for each operation.
- **Matrix #4** – provides specific information on the concentration of diesel fuel vapor in tanks, at initial opening and tank cleaning on a LPD class naval vessel and the recommended level of PPE.

- **Matrix #5 –** provides specific information on the concentration of JP-5 vapor in tanks, on LPD, DDG, CVN and RO-Ro class vessels at initial opening.


Diesel Fuel - Exposure vs PPE

Matrix #1

Diesel Oil (vapor/aerosol) PPE Requirements at Specific Concentrations

Concentration in ppm (TWA_8)

PPE	0-15	15 - 30	30 - 45	45 – 75 note #1	>75 note #2	75 – 150 note #3	150 – 600 note #4	>600 IDLH >10%LEL
No respirator	X	8 - 4 hr AWS*	4 – 0.5 hr AWS*	30 min max	No entry	No entry	No entry	No entry
½ mask APR		X	X	X	X	X	No entry	No entry
Full face APR		X	X	X	X	X	X	No entry
Airline								Note #5
Protective Clothing (full)		X	X	X	X	X	X	Note #5
Facial/Eye Protection		X	X	X	X	X	X	Note #5

***AWS** – Adjusted Work Schedules are an administrative control used to prevent employee exposures from exceeding the TLV/PEL.

Adjusted Work Schedules are calculated based on the potential exposure to employees remaining constant.

Employees may enter a space containing a concentration in excess of the TLV for a limited time. This time period is calculated by determining the concentration of toxic material in the space and limiting the time the employee can stay in the space so the employee will not be exposed to greater than the TWA-TLV. A safety factor is usually applied to the calculation.

Example: Concentration of 30 ppm diesel oil vapors is twice the TLV, therefore, the time must be restricted to a maximum of ½ of an 8 hour work shift, or 4 hours.

It may be appropriate to include a safety factor and limit the exposure to a time less than four hours if there is reason to believe that the concentration may increase.

AWS cannot be used when the concentration exceeds a short term exposure limit (TLV-STEL), a ceiling limit (TLV-C) or in the absence of a published STEL or ceiling limit, a calculated ceiling limit which is typically 5 times the TLV.

Matrix #1

Diesel Oil (vapor/aerosol) PPE Requirements at Specific Concentrations

Concentration in ppm (TWA_8)

PPE	0 –15	15 - 30	30 - 45	45 – 75 note #1	>75 note #2	75 – 150 note #3	150 - 600 note #4	>600 IDLH >10% LEL
No respirator	X	8 - 4 hr AWS*	4 – 0.5 hr AWS*	30 min max	No entry	No entry	No entry	No entry
½ mask APR		X	X	X	X	X	No entry	No entry
Full face APR		X	X	X	X	X	X	No entry
Airline								Note #5
Protective Clothing (full)		X	X	X	X	X	X	Note #5
Facial/Eye Protection		X	X	X	X	X	X	Note #5

Note #1 – Based on the ACGIH excursion limit which states “Excursions” in worker exposure levels may exceed 3 times the TLV TWA for no more than a total of 30 minutes during a workday, and under no circumstances should they exceed 5 times the TLV TWA, provided that the TLV TWA is not exceeded.”

Matrix #1

Diesel Oil (vapor/aerosol) PPE Requirements at Specific Concentrations

Concentration in ppm (TWA_8)

PPE	0 -15	15 - 30	30 - 45	45 – 75 note #1	>75 note #2	75 – 150 note #3	150 – 600 note #4	>600 IDLH >10%LEL
No respirator	X	8 - 4 hr AWS*	4 – 0.5 hr AWS*	30 min max	No entry	No entry	No entry	No entry
½ mask APR		X	X	X	X	X	No entry	No entry
Full face APR		X	X	X	X	X	X	No entry
Airline								Note #5
Protective Clothing (full)		X	X	X	X	X	X	Note #5
Facial/Eye Protection		X	X	X	X	X	X	Note #5

Note #2 – 75 ppm has been set as the ceiling level based on 5 times the TLV. Respiratory protection in accordance with 29 CFR 1910.134 is mandatory.

Matrix #1

Diesel Oil (vapor/aerosol) PPE Requirements at Specific Concentrations

Concentration in ppm (TWA_8)

PPE	0 -15	15 - 30	30 - 45	45 – 75 note #1	>75 note #2	75 – 150 note #3	150 – 600 note #4	>600 IDLH >10%LEL
No respirator	X	8 - 4 hr AWS*	4 – 0.5 hr AWS*	30 min max	No entry		No entry	No entry
½ mask APR		X	X	X	X	X	No entry	No entry
Full face APR		X	X	X	X	X	X	No entry
Airline								Note #5
Protective Clothing (full)		X	X	X	X	X	X	Note #5
Facial/Eye Protection		X	X	X	X	X	X	Note #5

Note #3 – Based on the protection factor for a half face air purifying respirator which is typically 10 times the TLV (10 x 15 ppm = 150 ppm). Greater than 150 ppm exceeds the protection factor of the respirator. See 29 CFR 1910.134. (Depends on the outcome of the skin protection question)

Matrix #1

Diesel Oil (vapor/aerosol) PPE Requirements at Specific Concentrations

Concentration in ppm (TWA_8)

PPE	0 –15	15 - 30	30 - 45	45 – 75 note #1	>75 note #2	75 – 150 note #3	150 – 600 note #4	>600 IDLH >10%LEL
No respirator	X	8 - 4 hr AWS*	4 – 0.5 hr AWS*	30 min max	No entry	No entry	No entry	No entry
½ mask APR		X	X	X	X	X	No entry	No entry
Full Face APR		X	X	X	X	X	X	No entry
Airline								Note #5
Protective Clothing (full)		X	X	X	X	X	X	Note #5
Facial/Eye Protection		X	X	X	X	X	X	Note #5

Note #4 – Based on the protection factor of a full face air purifying respirator which is theoretically a maximum of 50 times the TLV (50 x 15 ppm = 750 ppm). However, exposures greater than the IDLH, in this case 600 ppm, limits the use of this respirator. This IDLH is based on 10% of the published LEL value (0.6%) for diesel fuel.

Matrix #1

Diesel Oil (vapor/aerosol) PPE Requirements at Specific Concentrations

Concentration in ppm (TWA_8)

PPE	0 - 15	15 - 30	30 - 45	45 – 75 note #1	>75 note #2	75 – 150 note #3	150 – 600 note #4	>600 IDLH >10%LEL
No respirator	X	8 - 4 hr AWS*	4 – 0.5 hr AWS*	30 min max	No entry	No entry	No entry	No entry
½ mask APR		X	X	X	X	X	No entry	No entry
Full face APR		X	X	X	X	X	X	No entry
Airline								Note #5
Protective Clothing (full)		X	X	X	X	X	X	Note #5
Facial/Eye Protection		X	X	X	X	X	X	Note #5

Note #5 – Entry may only be performed for the purpose of installing ventilation or for rescue in accordance with 29 CFR 1915.12. Protection associated with entry into IDLH atmospheres must be in accordance with the requirements in 29 CFR 1910.134 (referenced in 29 CFR 1915.154).

MATRIX #2

Vessel Type: OSV, Tugboats, Tow boats, Crew boats

Diesel Oil (vapor/aerosol) – Exposure Monitoring Matrix

Ambient Temp 60-110 degrees F

	Concentration of Diesel Vapor Note #1	Monitoring Equipment	Ventilation	Protective Clothing Required – Note #2	Type of Respiratory Protection Required	Comments
Initial Opening of Tanks – no vent	753 – 1350 ppm	PID	NO	YES	N/A No Entry Performed	IDLH 600 ppm approx. Based on 10% LEL – Note #3
Tank Washing	978 – 1350 ppm	PID	YES	YES	Supplied Air	In excess of IDLH – additional vent required
Liquid Removal	319 – 673 ppm	PID	YES	YES	Supplied Air or FF-APR w/OV cartridge	FF-APR organic vapor cartridge may be worn for exposures <600 ppm
Tank Cleaning Completed	57 – 321 ppm	PID	NO	N/A	N/A	Ventilation must remain on
MC Certificate Inspection	6 – 57 ppm	PID	YES	In some cases (>15 ppm)	In some cases (>15 ppm) APRs w/ OV cartridge is required	Well vented tanks may preclude respiratory protection
Machinery Space Bilges	< 14 ppm	PID	FIXED	NO	NO	

Note #1: Refers to a time weighted average during the monitoring period (15-30 minutes) taken directly from the PID, not an 8 hr TWA.
Note #2: Type of protective clothing and when this requirement should be implemented is under review.
Note #3: IDLH (based on 10% of the LEL using 0.6 as the LEL) is approximately 600 ppm. Work in IDLH atmospheres must be accomplished in accordance with 29 CFR 1910.134. Ventilation should be used to lower the concentration.

See the PPE Requirement Matrix for additional information

For information on respiratory protection see 29 CFR 1910.134

All PID readings are corrected values using a 0.9 correction factor.

MATRIX #3
Vessel Type: USN - DDG Class_
Diesel Oil (vapor/aerosol) – Exposure Monitoring Matrix
Ambient Temp 40-80 degrees F

	Concentration of Diesel Vapor Note #1	Monitoring Equipment	Ventilation	Protective Clothing Required	Type of Respiratory Protection Required	Comments
Initial Opening of Tanks – no vent	6 - 360 ppm	PID	None Note #3	N/A No entry	N/A No entry	Compensated tanks have no vapor space until the dewatering process is complete
Tank Washing & Liquids Removal	20-379 ppm (40 ppm TWA) Note#2	PID (3M - Vapor Badge)	3 – 4" exhaust tubes	Full	FF-OV APR	Full time exhaust vent lowers exposure concentrations
Tank Cleaning Completed	< 15 ppm	PID	1 – 4" exhaust tube	None	None	Vent remains in operation
MC Certificate Inspection	< 15 ppm	PID	1 – 4" exhaust tube	None	None	
Adjacent Spaces	< 15 ppm	PID	N/A	N/A	None	Exhaust vent in the tank prevents contamination of adjacent spaces
Machinery Space Bilges	< 15 ppm	PID	As needed	N/A	None	
Fuel Oil Service Tanks	932 ppm initial 939 ppm cleaning 76 ppm post clean	PID	yes	yes	See matrix #1	Not compensated. Elevated readings at initial opening, cleaning and post cleaning. Reduced ventilation. EWR certification

General Info: Compensated fuel system, tank cleaning process – 1) Defuel vessel by forcing water into storage tanks, 2) Dewater storage tanks by group, 3) Open tanks by group, 4) Vent all tanks to less than 75 ppm, if necessary, 5) Remove/pump residual fuel, 6) Water wash and pump simultaneously, 7) Squeegie or rag dry tanks, 8) Certify tanks. The defueling/dewatering process ventilates the tanks entirely, thereby reducing the concentration of diesel vapor at initial opening.

Note #1: Instantaneous reading obtained by PID, not a time weighted average

Note #2: Concentration determined using a 3M vapor badge worn for entire shift during tank cleaning process (TWA_8)

Note #3: Monitoring performed at initial opening of tank prior to any temporary ventilation being provided. Temporary ventilation applied after initial monitoring is accomplished and for the duration of the cleaning process

See the PPE Requirement Matrix for additional information - For information on respiratory protection see 29 CFR 1910.134

All PID readings are corrected values using a 0.9 correction factor.

Matrix #4

Vessel Type:USN - LPD
Diesel Oil (vapor/aerosol) – Exposure Monitoring Matrix
Ambient Temp 70 Degrees F

	Concentration of Diesel Vapor PPM	Monitoring Equipment	Ventilation	Protective Clothing Required	Type of Respiratory Protection Required	Comments
Initial Opening of Tanks – no vent	464 – 1022 ppm	PID	NO	No Entry	N/A	IDLH 600 ppm approx. Based on 10% LEL – Note #2
Tank Washing and Liquid Removal	645 – 990 ppm	PID	YES	YES	Supplied Air or FF-APR w/OV cartridge	FF-APR organic vapor cartridge may be worn for exposures <600 ppm
Tank Cleaning Completed	N/A	N/A	N/A	N/A	N/A	
MC Certificate Inspection	<15 – 82 ppm	PID	YES	YES Note #3	½ MASK APR	EWR Designation

Note #1: Instantaneous reading obtained by PID, not a time weighted average

Note #2: IDLH (based on 10% of the LEL using 0.6% as the LEL) is approximately 600 ppm. Work in IDLH atmospheres' must be accomplished in accordance with 29CR1910.134. Ventilation should be used to lower the concentration.

Note #3: Type of protective clothing and when it is required is under review.

Readings based on a correction factor of 0.9

Matrix #5
Vessel Type: USN – LPD, DDG, CVN, RO RO
JP 5 (vapor/aerosol) – Exposure Monitoring Matrix
Ambient Temp 40 – 70 Degrees F

	Conc. of JP-5 Vapors – Note #1	Monitoring Equipment	Ventilation	Protective Clothing Required	Type of Respiratory Protection Required
Initial Opening of Tanks – no vent	36 – 715 ppm	PID	No	No Entry	N/A
Tank Washing and Liquid Removal	No data				
MC Certificate Inspection	<25 ppm	PID	Yes	No	N/A

Note #1: Instantaneous readings obtained by PID, not a time weighted average
Readings based on a correction factor of 0.6

Diesel Fuel Exposures- CMC Issues

What is the IDLH for Diesel Fuel?

How is IDLH determined, CGI or PID?

Skin Notation in ACGIH- TLVs and BEIs Handbook

1/2 mask respirators

OSHA Letter Of Interpretation

10/11/1995 - Clarification on OSHA's policy regarding Immediately Dangerous to Life and Health since NIOSH has lowered several IDLH levels.

Standard Interpretations - Table of Contents

October 11, 1995

Mr. Dave Koch
Senior Technical Service Specialist
Willson Safety Products
Post Office Box 622
Reading, Pennsylvania 19603-0622

Dear Mr. Koch:

This is in response to your letter to Mr. Jim Johnson in the Occupational Safety and Health Administration's (OSHA) Philadelphia Regional Office dated August 30. Your letter was forwarded to the OSHA National Office for response. The letter requested a clarification on OSHA's policy regarding Immediately Dangerous to Life and Health (IDLH) since National Institute for Occupational Safety and Health (NIOSH) has lowered several IDLH levels in their (1994) NIOSH Pocket Guide to Chemical Hazards.

The IDLH guidelines are set by NIOSH on the best available scientific evidence, but since NIOSH is not a

regulatory agency and the guidelines have not been set through a regulatory procedure, they are not legal standards. Actual IDLH numeric limits or levels are not specified in OSHA standards. If the company involved has scientific evidence which can rebut the NIOSH recommended IDLH and points to a less restrictive limit, then it is up to the OSHA to weigh the evidence and make a determination on a case by case basis. If the employer does not have evidence which can plausibly rebut the NIOSH recommended IDLH, then the NIOSH limit certainly prevails.

An employer would use the IDLH limit set by NIOSH in determining appropriate respirator selection to comply with the OSHA standards. In many OSHA substance specific standards, however, there are tables which list the minimum, prescriptive requirements for respiratory protection for the substance at various concentrations including unknown concentrations. Those respirator requirements take precedence.

Your interest in occupational safety and health is appreciated. If we can be of further assistance please feel free to contact OSHA's Office of Compliance Assistance at (202) 219-8036.

Sincerely,

John B. Miles Jr., Director
Directorate of Compliance Programs

NIOSH Definition of IDLH

Includes the following statement:

“10% LEL indicates that the IDLH was based on 10% of the lower explosive limit for safety considerations even though the relevant toxicological data indicated that irreversible health effects or impairment of escape existed only at higher concentrations.”

If 10% of the LEL is IDLH and 10% of the LEL is 600 ppm, is 600 ppm as measured with a PID, IDLH?

Can shipyards work in this environment?

ACGIH “Skin” Notation

The designation “Skin” in the “Notations” column refers to the potential significant contribution to the overall exposure by the cutaneous route, including mucous membranes and the eyes, either by contact with vapors or, of probable greater significance, by direct skin contact with the substance.

While relatively limited quantitative data currently exists with regard to skin absorption of gases, vapors, and liquids by workers, ACGIH recommends that the integration of data from acute dermal studies and repeated dose dermal studies in animals and/or humans, along with the ability of the chemical to be absorbed, be used in deciding the appropriateness of the skin notation.