MASTERING CHALLENGING CONFINED SPACE ISSUES

LITHOGRAPHY PLANT FATALITY

E. J. Willwerth, CMC, CIH
6 June 2007
Recordable Injury and Illness Rate by Industry, 1989-2000

Source: BLS
APPROXIMATELY 1/3 OF ALL WORLD VESSEL DISPLACEMENT IS DEDICATED TO CRUDE OR Refined petroleum shipment - AND NEARLY ALL MARINE VESSELS HAVE FUEL TANKS & SYSTEMS
IMPERIAL REFINERY TANK FARM FIRE, PENNSYLVANIA, 1878
<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Guideline / Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confined Space work, non-maritime activities:</td>
<td>OPNAVINST 5100.23G</td>
</tr>
<tr>
<td>Non-maritime work, maritime activities:</td>
<td>OPNAVINST 5100.23F and/or</td>
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<tr>
<td></td>
<td>NAVSEA S6470-AA-SAF-010</td>
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<tr>
<td>Maritime work performed at non-maritime activities:</td>
<td>29CFR 1915 (OSHA)</td>
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<tr>
<td>USN Shipyards &amp; Regional Maintenance Centers (RMCs):</td>
<td>NAVSEA S6470-AA-SAF-010</td>
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<tr>
<td>Afloat activities:</td>
<td>Naval Ships Technical Manual Chapt. 074, Gas Free Engineering</td>
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<tr>
<td></td>
<td>OPNAVINST 5100.19F, NAVOSH Manual for Forces Afloat</td>
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<tr>
<td></td>
<td>For Contractors: 29CFR 1915</td>
</tr>
<tr>
<td>Aircraft Fuel Cells:</td>
<td>NAVAIR 01-1A-35</td>
</tr>
</tbody>
</table>
GROUND SEWAGE & WASTEWATER HAD BEEN LEAKING INTO THE VOID SPACE FOR SOME TIME. THE SPACE HAD BECOME SLIGHTLY PRESSURIZED WITH H₂S AND CO₂, AND THE OXYGEN HAD BEEN DEPLETED BY DECAYING SEWAGE. ONCE THE PIPE CONNECTIONS WERE BROKEN, THE CHOT GAS MIX FLOODED INTO THE SHAFT ALLEY.
TYPICAL AGST REPAIR JOB: INSTALLATION OF NEW TANK FLOOR IN LEAKING FLOATING ROOF GASOLINE TANK
VOLUME = 7.5 m³
Meaning, for toluene vapor:
• ~1.4 liters liquid to vapor = Mid-Explosive range (4.1%)
VOLUME = 7.5 m$^3$
Meaning, for toluene vapor:
- ~1.4 liters liquid to vapor = Mid-Explosive range (4.1%)
- ~390 ml liquid to vapor = Lower Explosive Limit (1.1%)
VOLUME = 7.5 m³
Meaning, for toluene vapor:
- ~1.4 liters liquid to vapor = Mid-Explosive range (4.1%)
- ~390 ml liquid to vapor = Lower Explosive Limit (1.1%)
- ~17 ml liquid to vapor = IDLH (500 ppm)
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- ~7 ml liquid to vapor = PEL (200 ppm)
VOLUME = 7.5 m$^3$

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- Vapor pressure toluene @ 68F = ~21mmHg
- ~2.8% vapor in air (28,000 ppm)
Accident Date: October 23, 1992

29CFR1910.146 Effective: April 15, 1993

Company Referred to ANSI Z117.1-1989

And the Proposed 29CFR1910.146, Issued June 5, 1989 in Federal Register
<table>
<thead>
<tr>
<th>OSHA Cited</th>
<th>Proposed Fine:</th>
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<tbody>
<tr>
<td>5(a)(1) General Duty Clause/Willful:</td>
<td>$70,000</td>
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<td>and</td>
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<tr>
<td>1910.134(a)(2), (b)(7), (b)(11) Grouped Respirator Violations/Willful:</td>
<td>$70,000</td>
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<tr>
<td>1910.134(b)(5), (b)(6), ((f)(5)(I) Respirator Violations/Serious:</td>
<td>$14,000</td>
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<td>1904.2(a)(1) and 1904.4 (OSHA 200 log Violations/Other Than Serious:</td>
<td>$2,000</td>
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<tr>
<td>Total:</td>
<td>$156,000</td>
</tr>
</tbody>
</table>
Installation of Second Access
Do Not Be Mislead Into Using Your IH Skills to Allow CS Work Before All Steps Are Made to Remove CS Hazards From the Outside:
Keep Your Meter In Front Of You!
(A 1986 USCG review of over 200 OSHA-reported oxygen-deficiency fatalities (1972 - 1985) failed to find ANY oxygen testing done prior to the first victim’s entry.)

(LT CR Guy Colonna)
Concentrate Efforts & Resources in Making the Space Safe For the Worker - Not in Making The Worker Safe for the Space.
Then Follow Your Applicable Regulations and Guidelines …