OSHA

Interpretations

Regarding

Pressure Systems

The attached OSHA interpretations are all those that I found applicable to pressure systems at NASA Centers when I checked the OSHA site on March 13, 2009. It is possible that I have missed some, or that one or more of those that I did not include in this compilation might apply because of particular operations or operational details at one or more Centers, and of which I am unaware.

The attached list of interpretations was found at:
http://www.osha.gov/pls/oshaweb/searchresults.relevance?p_text=pressure%20vessel&p_title=&p_osha_filter=INTERPRETATIONS&p_status=CURRENT&p_start=0&p_finish=15&p_sort_order=SCORE&p_desc=DESC&p_direction=Next

Owen R. Greulich

March 13, 2009

OSHA Interpretations Regarding PVS
March 13, 2009

Date	Section	Issue	Conclusion
12/16/1985	1910.106	Flammable liquid containing PV	Requires Code, and no grandfathering
4/14/1980	1910.106	Access openings (also 1910.169)	Defers to Code on size of access openings
3/2/1977	1910.106	Vessels not covered by ASME Code	Hydraulic accumulators outside the scope of codes need not meet those codes, but the employer "is required to furnish hydraulic accumulators free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees."
12/26/2007	1910.106	Relief discharge inside building	The response to Question 6 of this inquiry requires "the employer would be required to identify, evaluate, and control [1910.119(e)(1)] the hazard of discharging flammable and combustible materials through an emergency relief device into the inside of a building."
2/6/1996	1910.106	OSHA regulation versus its referenced standards	The OSHA regulation takes precedence
2/13/1986	1910.106	Relief Valve sizing	Use "best solution and apply a liberal safety margin."
8/16/1996	1910.119	PSM vessels with inerting gas pressure	Are not subject to 1910.119(a)(1)(ii)(B) atmospheric tank exception
3/5/1998	1910.119	Codes no longer in use	For PSM, requires that difference between the original and the current code be documented, and verification of continued suitability of equipment for operation.
1/30/2001	1910.119	Code updates	If an appropriate analysis of equipment was made prior to putting it into operation, there is no need to re-evaluate simply because the code has been revised.
7/17/2006	1910.169	"in accordance" with the Code versus to the "principles" of the Code	"built in accordance with the ASME Boiler and Pressure Vessel Code" means conforms to, is stamped, and maintained.
4/6/1981	1910.169	Valve between air receiver and safety valve	Local jurisdiction may authorize, leading to de minimus violation
1/24/1980	1910.169	Compressed air on vehicles	1910.169 doesn't apply.
6/16/1982	1910.261	Vessels not covered by ASME Code	U-1(c)(3) of Section VIII, Div 1 excludes certain types of units. Those thusly excluded are not within the scope of the code and therefore need not meet it.
2/7/1995	1910.261	Relief valves on vessels	1910.261(g)(17)(i) requires a safety valve on a separate line for each pressure vessel, with no hand valve between. This interpretation clarifies that a valve on the main steam source is not considered sufficient, as the requirement is intended to provide redundancy.
7/7/1975	1926.350	Oxygen or fuel cylinders in tunnels	Limitations on bringing oxygen and fuel cylinders into confined spaces or underground are being clarified.

Standard Interpretations

12/16/1985 - Applicability of Section 1910.106 to Chemicals Plants.

Standard Interpretations - Table of Contents

• **Standard Number:** 1910.106

OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at http://www.osha.gov.

December 16, 1985

MEMORANDUM FOR: LINDA R. ANKU
REGIONAL ADMINISTRATOR

FROM: JOHN B. MILES, JR., DIRECTOR
DIRECTORATE OF FIELD OPERATIONS

SUBJECT: Applicability of Section 29 CFR 1910.106 to Chemical Plants

Reference is made to your memorandum dated November 11, 1985, subject as above.

Attached mare the answers to the questions posed in the memorandum.

Applicability of 29 CFR 1910.106 to Chemical Plants

(Answers In Response to Region 111 Memorandum dated November 11, 1985)

Questions 1a: Is 1910.106(c) applicable to chemical plants or is there a consensus standard which can be used to evaluate piping?

Response: 1910.106(c) is applicable to chemical plants since they are not specifically exempted under 1910.106(c)(1)(ii).

Question 1b: Would Section (5)(a)(1) citation policy preclude the issuance of a general duty citation for the state of the art piping requirements, ANSI B31.3?

Response: An OSHAct Sec. 5(a)(1) citation is improper because 1910.106(c)(1)(i) specifically permits the application of ANSI B31 series requirement relative to hazards. Therefore, since 1910.106(c) is essentially a performance standard, 1910.106(c) should be

cited with reference to applicable ANSI B31 series specifications.

Question 1c: If the ANSI B31.3 standard is used, what year of issue of the standard should be referenced?

Response: The ANSI B31 series standard in effect on the date of incorporation by 1910.106 is the appropriate standard.

They are as follows:

ANSI B31.1- 1967 ANSI B31.2- 1968 ANSI B31.3- 1966 ANSI B31.4- 1966 USASI B31.5- 1966

Question 2a: Since 1910.106(i) does not address "incidental usage and container and portable tank storage," can 1910.106(d) and 1910.106(e) be used to evaluate compliance in captive operations of a chemical plant, such as maintenance shops and warehouses?

Response: The 1910.106(i) does, in a general way, deal with incidental usage, container and portable tank storage. 1910.106(d) and (e) cannot be used as they exclude chemical plants since 1910.106(a)(8) defines a chemical plant as, "a large integrated plant or that portion of such plant...where flammable or combustible liquids are produced by chemical reactions or used in chemical reactions."

Question 2b: Would warehouse operations be exempted from 1910.106(d) even though the fire hazards are the same in the chemical plant warehouse as an industrial plant warehouse (especially since the intent of NFPA was to require the same fire protection requirements for warehouses containing flammable and combustible liquids)?

Response: Warehousing operations in a chemical plant are exempt from 1910.106(d).

Question 2c: Should maintenance shop use of flammable and combustible liquids be regulated by 1910.106(e) since its scope includes incidental use of liquids and unit physical operations?

Response: Maintenance shops with chemical plants are exempt from 1910.106(e).

Question 3: Although the handling of flammable and combustible liquids at wharves of chemical plants is specifically covered by subsection 1910.106(i), by reference to 1910.106(f)(4), is the use of the standard precluded by coverage under OSHA's "Maritime Safety and Health Standards"?

Response: The use of 1910.106(f)(4) is not precluded by the Maritime standards. **None** of the Maritime standards are applicable to bulk transfer of liquid cargo to and from ships or vessels. 1910.106(f)(4) is applicable to the handling of flammable and combustible liquid cargo to and from ships and vessels, and effects the equipment and procedures from the shore facility up to the ship hook-up flange (vessel flange connection). All onboard ship/vessel liquid cargo transfer and handling systems are under the jurisdiction of the U.S. Coast Guard and must comply with their requirements.

Question 4: Are compressed gases, such as ethylene oxide, because of their liquid state during storage and use, covered by the provisions of 1910.106?

Response: No. Liquified compressed gas, such as ethylene oxide (EtO), is outside the scope of 1910.106. EtO is regulated as toxic substance under 1910.1047. Hazardous circumstances associated with liquified compressed gases, other than LPG which are regulated at 1910.110, are OSHAct Sec. (5)(a)(1) violations. Documents such as CGA S-1.3-1980 by the Compresses Gas Association may be used to support OSHAct Sec. 5(a)(1) violations. 1910.1047 Appendix B, II, may be used to verify the presence of hazardous circumstances relating to fire or

explosion regarding EtO.

Question 5: Should 1910.106 be interpreted to require pressure vessels built prior to 1968 to comply with this code?

Response: Yes. 1910.106(b)(1)(v)(b) requires, as a minimum, that unfired pressure vessels comply with the ASME Boiler and Pressure Vessel Code-1968. 1910.106(i)(3) requires, as a minimum, that in chemical plants fired and unfired pressure vessels comply with the ASME Boiler and Pressure Vessel Code-1968. There is no grandfathering.

No grandfathering w.r.t ASME Code in flammable liquids

Question 6a: Are the requirements for determining emergency relief venting capacity in 1910.106(b)(2)(v) applicable to processing vessels of unit operations, such as reactors, mixers, and heat exchangers, which are used to contain flammable and combustible liquids?

Response: No. 1910.106(b)(2)(v) applies only to aboveground storage tanks and vessels. However, the Compressed Gas Associations's CGA S-1.3-1980, Pressure Relief Device Standards, may be used to support OSHAct Sec. 5(a)(1) findings.

Question 6b: Are the API 520 and API 521 standards the most recognized practices to calculate emergency relieving systems for unfired pressure vessels?

Response: 1910.106(i)(3)(ii), which references the requirements of the ASME 1968 Code, is the sole standard applicable. Of course, the use of equal or better procedures are recognized as de minimis.

Question 6c: As mentioned in the API 2000 and 1910.106(b)(2)(v)(c), standards for aboveground storage tanks, should different considerations for the calculations of pressure vessel emergency relieving devices be taken for unstable liquids?

Response: Yes. The ASME Codes UG-125 through UG-136 or CGA S-1.3-1980, Sections 4 and 5, may be used for calculation purposes.

Question 7a: How is a "flood area" defined for the purpose of 1910.106(b)(5)(iv)?

Response: Any location where a tank is located in an area subjected to flooding either from a natural event or from an internal process, procedure, or malfunction.

Question 7b: What document would provide adequate documentation to demonstrate this "flood area"?

Response: Internal corporate records, local building and safety department records, or insurance company data, may be used in conjunction with the Army Corps of Engineers 100-year record. The Army complies the data from the Federal Emergency Management Agency (FEMA) as Flood Plain Information Studies. These studies are overseen by: Mr. Jerry Peterson, DAEN-CWP-F, in the Office of the Chief of Engineers in Washington, D.C. Telephone Number 202-272-0169 Specific data, is available, may be requested from him.

Question 8: Should the specific standard in 1910.106(i) be cited when referencing another standard or should the referenced standard be cited?; i.e., should 1910.106(i)(1) be cited for alleged violations of the tank storage requirements, or should the specific section in 1910.106 (b) be cited?

Response: The specific standard violated should be cited with a reference to the standard under which such authority or coverage is specified.

[Corrected 08/17/2006]

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Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

Standard Interpretations

04/14/1980 - The access to tanks or pressure vessels.

Standard Interpretations - Table of Contents

• **Standard Number:** 1910.106

April 14, 1980

OSHA defers to ASME (etc) on sizes of access openings.

John Torros, AIA
Division Chief Architect
Bechtel Power Corporation
15740 Shady Grove Road
Gaithersburg, Maryland 20760

Dear Mr. Torres:

This is in response to your request concerning OSHA standards on the minimum size of the access to tanks or pressure vessels. This also confirms a conversation on the subject matter with Mr. Pete Wasko, a member of my staff.

In brief, there are no specific OSHA standards on the minimum size of the access to tanks or pressure vessels beyond the requirements of acceptable good standards of design, such, as may be indicated in the ASME, API, or UL code under which they may have been built as mentioned in such OSHA standards as 29 CFR 1910.106 (b)(l)(iii)(a); 1910.106(b)(l)(iv)(b); 1910.106 (b)(l)(v)(b); 1910.169(a)(2)(i). Copies of these standards are enclosed.

Should you need any further assistance, please feel free to call or write.

Sincerely,

Grover C. Wrenn Director,
Federal Compliance and State Programs

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Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

Standard Interpretations

03/02/1977 - OSHA standards covering hydraulic accumulators.

Standard Interpretations - Table of Contents

• **Standard Number:** 1910.106

March 2, 1977

Mr. Duane Anderson, Manager
Hydraulic Department
Robert Bosch Corporation
2800 South 25th Avenue
Broadview, Illinois 60153

Dear Mr. Anderson:

This is in response to your letter of December 23, 1976, addressed to Mr. Stockmeier of the Occupational Safety and Health Administration (OSHA) Chicago Regional Office, regarding OSHA standards covering hydraulic accumulators. In addition, it confirms a phone conversation to your office by a member of my staff and receipt of literature on Robert Bosch high pressure hydraulic accumulators.

The information you furnished is that Robert Bosch, Germany, supplies accumulators to manufacturers of machinery in Europe, and the machines are then exported to the United States with the Robert Bosch accumulator installed. Your question is, "What regulations does OSHA have governing such accumulator applications?" There is no clear-cut across-the-board answer to you question.

Generally, a pressure vessel shall mean a storage tank or vessel which has been designed to operate at pressures above 15 p.s.i.g.. Some OSHA standards require a pressure vessel to be built in accordance with the Code for Unfired Pressure Vessels, Section VIII of the ASME Boiler and Pressure Vessel Code 1968, e.g., 29 CFR 1910.106(b)(1)(v)(b) Flammable and Combustible Liquids. The scope of the pressure vessel code has certain exemptions, such as: Pressure containers which are integral parts or components of rotating or reciprocating mechanical devices, such as pumps, compressors, turbines, generators, engines, and hydraulic or pneumatic cylinders when the primary design considerations and/or stresses are derived from the functional requirements of the device; and, vessels having an inside diameter not exceeding 6 inches with no limitation on pressure. If your hydraulic accumulators are not covered by an OSHA standard or are exempt by the scope of the pressure vessel code, the employer is required to furnish hydraulic accumulators free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.

OSHA has no written agreements with European safety inspection bodies, such as TUV in

Germany. However, OSHA has an open-door policy of cooperation within the limits of the Occupational Safety and Health Act of 1970.

Thank you for your concern and continuing interest in occupational safety and health.

Sincerely,

John K. Barto,
Chief Division of
Occupational Safety Programs

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Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

Standard Interpretations

12/26/2007 - Clarification of requirements for storage and use of flammable and/or combustible liquids.

Standard Interpretations - Table of Contents

- **Standard Number:** 1910.106; 1910.106(b); 1910.106(b)(4)(ii); 1910.106(e); 1910.106(e)(2)(ii)(c); 1910.106(e)(2)(iii); 1910.106(e)(2)(iv)(d); ; 1910.106(e)(3)(v)(a); 1910.106(e)(3)(vi); 1910.106(h)(4)(iii)(a); 1910.119(e)(1); 1910.1000

December 26, 2007

Mr. John C. Lewis
Process Discipline Leader
O'Neal Engineering, Inc.
3000 RDU Center Drive, Suite 200
Morrisville, NC 27560

Dear Mr. Lewis:

Thank you for requesting clarification of the Occupational Safety and Health Administration (OSHA) standard, 29 CFR 1910.106, pertaining to storage and use of flammable and/or combustible liquids. This letter constitutes OSHA's interpretation only of the requirements discussed, and may not be applicable to any questions not delineated within your original correspondence. We apologize for the delay in our response. Your paraphrased scenario and questions, and our responses are provided below.

Scenario: Typically, the flammable liquid usage in pharmaceutical manufacturing operations involves Isopropyl Alcohol or Ethanol for chromatography column regeneration and buffer preparation. These are Class IB and Class IC flammable liquids. The chromatography operations are in-line with the production process. These chromatography operations may fall under §1910.106(e).

Question 1: In a manufacturing plant where small quantities of flammable liquid(s) are used in a manufacturing process (i.e., less than ten gallons of Class IC liquid), is this considered as incidental storage/or use as discussed in 1910.106(e)(2)?

Response 1: No. Since the chromatography operation, as you noted in your scenario, is part of a production process (i.e., in-line with production process), §§1910.106(e)(3), 1910.106(h), and 1910.119 may apply.

Question 2: §1910.106(e)(2)(iii) in part states that "Adequate natural or mechanical ventilation shall be provided." Does the adequate ventilation in this paragraph mean the ventilation rate of 1 cubic foot per square foot of solid floor area, as defined in §1910.106(e)(3)(v)?

Response 2: As defined in §1910.106(a), ventilation is "considered to be adequate if it is sufficient to prevent accumulation of significant quantities of vapor-air mixtures in concentrations over one-fourth of the lower flammable limit." However, if an employer chooses to provide a ventilation of 1 cubic foot per minute per square foot of solid floor area, as required under 1910.106(e)(3)(v), OSHA would consider such a rate to meet §1910.106(e)(2)(iii) requirements. You must note, however, that compliance with §1910.106 requirements may not preclude an employer from complying with other OSHA standards, such as §1910.1000 (which has requirements pertaining to health hazards). Compliance with §1910.1000 may require ventilation rates higher than the rates prescribed under §1910.106.

Question 3: Does §1910.106(e)(2)(iii) require introduction of fresh air similar to provisions contained in §1910.106(e)(3)(v)(a)?

Response 3: No. §1910.106(e)(2)(iii) does not require the exclusive use of fresh air for ventilation purposes. Additionally, 1910.106(e)(2)(iii) is a performance requirement and does not explicitly require introduction of fresh air to meet the performance requirements of the standard. OSHA, under §1910.106(e)(2)(iii), expects employers to provide adequate ventilation to maintain concentrations below 25% of the LEL. In other words, if an employer covered under §1910.106(e)(2)(iii) chooses to recirculate air, then the employer must take measures to provide adequate ventilation to maintain concentrations below 25% of the LEL.

Note that the recirculation of air for ventilation purposes can result in the reintroduction of already exhausted flammable and combustible materials back to the ventilated area. This recirculation can result in a buildup of flammable and combustible materials in the area being ventilated to rise to concentrations which are considered dangerous, i.e., greater than the 25% of the LEL. Paragraph 17.11 of NFPA 30-2008, which is applicable to all operations, including those at industrial plants, contains requirements for mechanical and natural exhaust ventilation. This paragraph requires exhaust ventilation to discharge to a safe location outside the building. In addition, this section prohibits the recirculation of the exhaust air with exception:

> **17.11.6** Recirculation of the exhaust air shall be permitted only when it is monitored continuously using a fail-safe system that is designed to automatically sound an alarm, stop recirculation, and provide full exhaust to the outside in the event that vapor-air mixtures in concentrations over one-fourth of the lower flammable limit are detected.

Therefore, although §1910.106(e)(2)(iii) does not explicitly require fresh air to prevent the short circuiting of the ventilation, when recirculated air is used, OSHA expects the controls listed in NFPA 30-2008 paragraph 17.11.6 to be used to control a potential fire/explosion hazard that could seriously or fatally injure employees. OSHA may find that the failure to do so constitutes a violation of the General Duty Clause of the OSHAct (29 USC §654(a)(1)).

Question 4: Does §1910.106(b) apply to storage of Class IB or IC flammable liquids in quantities less than 120 gallons?

Response 4: §1910.106(b) applies to fixed tanks, regardless of quantities involved; it does not apply to drums, containers, or portable tanks. If quantities less than 120 gallons of Class IB or IC are stored (i.e., not used in a process/process tank or not staged in a process area ready to be used) in fixed tanks, then §1910.106(b) will apply.

Question 5: Regardless of quantity, does §1910.106(e)(2)(iv)(d), §1910.106(h)(4)(iii)(a), or §1910.106(h)(4)(iv)(a) prohibit pouring of a Class IB liquid into the open manway of a buffer tank in making a Class IC liquid?

Response 5: There is insufficient information provided to determine if the plant is an industrial (covered under 1910.106 (e)) or a processing plant (covered under 1910.106(h)).

Further, if this question were related to an industrial plant, due to the lack of information, we cannot determine which of the industrial plant requirements would apply ((e)(2) – Incidental storage or (e)(3) – Unit Physical Operations). However, we have provided information below, which may assist you in determining how to apply the various standards in question.

If the operation is an incidental activity covered by §1910.106(e)(2), paragraph §1910.106 (e)(2)(iv)(d) allows transfer of flammable or combustible liquids into vessels, containers and portable tanks within a building only:

a) through a closed piping; or
b) from safety cans; or
c) by means of a device drawing through the top; or
d) from a container or portable tanks by gravity through an approved self-closing valve.

Therefore, pouring (i.e., one means of gravity transfer) flammable and combustible liquids into an open manway of a process tank/vessel would be allowed (for operations covered under 1910.106(e)(2)) per the language of the standard, "*from safety cans*" or "*from a container or portable tanks by gravity through an approved self-closing valve.*" However, during such a pouring operation (as stated in the question), the employer must take measures for protection against static sparks (see §1910.106(e)(6)(i)), through bonding and grounding methodologies, e.g., by electrically interconnecting the transfer nozzle of the pouring container and the tank and by ascertaining that the receiving tank is grounded to dissipate any potential static current that may have generated during the pouring operation.

However, if the operation in question is part of a unit physical operation covered under §1910.106(e)(3), then §1910.106(e)(3)(vi) (which refers to §1910.106(h)(4)), indirectly prohibits the use of gravity flow, except as required in process equipment. See §1910.106 (h)(4)(iii)(a). If an employer claims this exception, versus providing pumps or water displacement for transfer **through piping**, as required under this paragraph, they must be prepared to demonstrate why the process equipment necessitates gravity flow through piping in lieu of the pumping. In either case, whether the transfer is by means of gravity flow or by means of a pump, open-pouring of large quantities flammable or combustible liquids (which will not involve piping) into tanks will be in violation of §1910.106(h)(4)(iii)(a). Section 1910.106(h)(4)(iii)(a)'s requirement for pumps or water displacement comes from NFPA 30-1969, which was adopted in 1971 by OSHA into 1910.106. In commentary on this requirement, the NFPA stated that it was intended to prohibit transfer by pouring in such circumstances.[1]

Additionally, if the operation in question is part of a processing plant covered by §1910.106 (h), as stated above, §1910.106(h)(4)(iii)(a) prohibits the gravity transfer of large quantities of flammable and combustible liquids into an open manway of a process tank. Since open pouring involves transfer without piping, such pouring will be in violation of §1910.106(h)(4)(iii)(a).

Question 6: Are vents and emergency relief vents on portable tanks containing Class 1B and 1C flammable liquids required to be piped outside the building?

Response 6: OSHA does not have any provisions that require the emergency relief devices on portable tanks to discharge to the outside of buildings. However, if portable tanks are part of a PSM-covered process, at a minimum, the employer would be required to identify, evaluate, and control [§1910.119(e)(1)] the hazard of discharging flammable and combustible materials through an emergency relief device into the inside of a building. If this same condition exists for a non-PSM-covered process and employers have not properly evaluated and controlled a release inside a building or a room from emergency relief devices

on portable tanks, the employer may be cited under the General Duty Clause of the OSH Act for not controlling a serious fire/explosion hazard that is likely to cause death or serious physical harm to employees.

Question 7: Does §1910.106(e)(2)(ii)(c) and §1910.106(h)(4)(i)(b) apply to processing tanks, such as a buffer mix tank (not a storage tank)? If not, is there a requirement for the processing tank to vent outside the building?

Response 7: OSHA considers that buffer mix tank operations – where a Class IB liquid is poured into buffer mix tank in making a Class IC liquid – as process tanks, and not storage tanks. OSHA standards §1910.106(e)(2)(ii)(c) and §1910.106(h)(4)(i)(b) apply to storage tanks and not to process tanks, such as buffer mix tanks, and OSHA's 1910.106 standards do not have provisions requiring processing tanks such as mix tanks containing Class I liquids to vent outside the building. This assumes these tanks are not pressure vessels, i.e., designed to operate at pressures greater than 15 psig. If these tanks are pressure vessels, good engineering practice according to the ASME (Section VIII, UG-134(g) of the ASME Boiler and Pressure Vessel Code) requires in part, "Discharge lines from pressure-relieving safety devices shall . . . **lead to a safe place of discharge** [emphasis added]."

Similar to our Response 6, the employer is responsible for controlling the serious hazard of relieving/venting a process tank into a confined area such as a room/building. If a process tank is part of a PSM-covered process, then the employer must control the hazard as stated in Response 6. If the process tank is not part of a PSM-covered process, and this hazard exists, then OSHA may enforce the General Duty Clause of the Act. Note that NFPA 30 – 2008, Paragraph 17.11 requires that exhaust ventilation be discharged to a safe location outside of buildings. This provision applies to all types of operations that use and handle flammable and combustible liquids. Additionally, section 17.15.3 of NFPA 30-2008, in part, states that "The extent of fire prevention and control that is provided shall be determined by means of an engineering evaluation of the operation and application of sound fire protection and process engineering principles." OSHA may find that process tanks that do not comply with these requirements violate the General Duty Clause.

Question 8: A prevalent belief is that if there is adequate ventilation, processing tank vents do not need to go outside the building. This is desirable in the pharmaceutical industry, because of the concern about the cleanliness of air that may enter the vessel through the vent. Is there a code basis for this belief?

Response 8: As discussed in our Responses 6 and 7 above, OSHA does not have specific standards which prohibit **process** tanks to vent inside the buildings. However, venting inside a building is prohibited under the OSHA 1910.106 standard for **storage** tanks containing flammable and/or combustible liquids. 1910.106(b)(4)(ii), which applies to storage tanks inside buildings, in part states that "Vents shall discharge vapors outside the building." In addition, as stated earlier, if process tanks are **part of** a PSM-covered process, at a minimum, the employer would be required to identify, evaluate, and control [§1910.119(e)(1)] the hazard of discharging flammable and combustible materials through an emergency relief device into the inside of a building. As discussed in our responses above, if employers have not properly evaluated and controlled a release inside a building from process tank vents, OSHA may use section 17.15.3 of NFPA 30-2008 as the basis for enforcing the General Duty Clause for process tanks not venting outside the building for not controlling a serious fire/explosion hazard that is likely to cause death or serious physical harm to employees.

Question 9: Is it acceptable for any tank containing Class I flammable liquids to vent inside the building? If so, what kind of local exhaust pick-up and/or LEL monitoring would be required?

Response: Please see our Responses 6, 7, and 8.

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you may consult OSHA's website at http://www.osha.gov. If you have any further questions, please feel free to contact the OSHA Office of General Industry Enforcement at (202) 693-1850.

Sincerely,

Richard E. Fairfax, Director
Directorate of Enforcement Programs

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[1] NFPA, *Flammable and Combustible Liquids Code Handbook* (1st ed.1981) (commenting on Paragraph 8-4.3.1) [back to text]

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Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

Standard Interpretations

02/06/1996 - Applicable regulations and design calculation factors which can be used for tanks and vessels.

Standard Interpretations - Table of Contents

• **Standard Number:** 1910.106

February 6, 1996

Mr. Guy Van Cleve, Jr., P. E.,
Manager, Process Engineering
Petrocon Engineering, Inc.
P. 0. Box 20397
Beumont, TX 77720-0397

Dear Mr. Van Cleve:

This is in response to your letter of June 5, 1995, addressed to Mr. Ray Skinner, regarding applicable regulations (i.e., §1910.106) and design calculation factors which can be used for tanks and vessels. Your letter was forwarded to our office for response. Please accept our apologies for the delay in responding to you.

Following are your specific questions and our responses.

Ql:

The first question concerns the correct guideline to use for sizing fire case relieving scenarios. We have been told that since 1910.106 is referenced as the standard to be used for sizing tanks and it requires the use of NFPA 30, it takes precedence over the API RP 520 method. While this is clear with respect to tanks, is it meant also to apply to vessels? Some of the attendees of the FORUM (including the writer, believe they heard that it was to apply to vessels as well as tanks).

R:

With regard to the hierarchy of standards, The Flammable and Combustible Liquids standard, §1910.106 takes precedence over NFPA 30. Please note however, that an installation in accordance with NFPA 30 is acceptable to OSHA, so long as the guideline for sizing atmospheric tanks and pressure vessels in the NFPA 30 is at least as safe and protective as that of §l910.106. Although the API RP 520 could be used as a guideline, OSHA requires compliance with §l910.106 and may in specific circumstances accept NFPA 30, in accordance with the de minimus policy. Your first question was also concerned with whether the correct guideline for sizing is to apply to vessels as well as tanks. Please note that §l910.106 applies to atmospheric tanks as well as vessels (low pressure vessels and pressure vessels). In regard to pressure vessels, the standard references the ASME Boiler and Vessel Code of 1968 for their

construction. Therefore, you are correct that §1910.106 applies to atmospheric tanks as well as pressure vessels.

Q2:

The second question has to do with design calculations factors which can be used for insulation. API RP 520 and 521 and NFPA 30 all specify that covering must remain intact at 1660 degrees F.

Aluminum sheet obviously will not withstand the specified temperature, so credit could not be taken for either aluminum sheet or aluminum banding. However, some engineers argue that application of insulation using either steel or stainless steel banding or wire, properly spaced, satisfies the guidelines even when covered by aluminum sheet. They argue that, with proper band spacing, the insulation will resist dislodgement with or without the sheet covering.

R:

We regret that at this time, we do not have enough information to be able to determine whether the application of insulation using either steel or stainless steel banding or wire, properly spaced, satisfies the guidelines (even when covered by aluminum sheet). Although the use of aluminum sheathing and bands to secure insulation in place is compromised when sheathing and banding fails due to melting in fires, we could not locate any information regarding design factors associated with the stainless steel banding and spacing. Please note that it is not possible to render our opinion on this issue without detailed information, including design safety factors, previous installations and associated data (recommendations and certifications by professional engineers or associations, testing laboratories, insurance carriers, etc.) and risk assessments of potential failures.

In summary, in order to formulate a practical and effective response to this question, OSHA would need to be provided with the information that consists of the basis for reaching the conclusion that with proper stainless steel band spacing, etc., the insulation would stay intact under all circumstances, and satisfy the guidelines of §1910.106, or NFPA 30, even when covered by aluminum sheet.

Thank you for bringing your concerns to our attention. If you need further assistance, please contact Alcmene Haloftis of my staff at 202-219-8031.

Sincerely,

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

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Occupational Safety & Health Administration
200 Constitution Avenue, NW

Washington, DC 20210

Standard Interpretations

02/13/1986 - Applicability of 1910.106 to Chemical Plants.

Standard Interpretations - Table of Contents

- **Standard Number:** 1910.106

February 13, 1986

MEMORANDUM FOR: LINDA ANKU
REGIONAL ADMINISTRATOR

FROM: JOHN B. MILES, JR.,
DIRECTOR
DIRECTORATE OF FIELD OPERATIONS

SUBJECT: Applicability of 1910.106 to Chemical Plants

This is in response to your memo of December 23, 1985, same subject.

The art of determining sufficient pressure relief for the storage of unstable liquids is not simple nor even a direct engineering solution. As stated by API 2000 and 521, no one method of sizing the relief ports has gained widespread acceptance, therefore engineers must use their best solution and apply a liberal safety margin. It is generally recognized that only rupture discs can provide the reaction time and volume flow necessary to vent an unstable liquid. Suppression techniques applicable to the situation should also be evaluated.

The referenced Boiler and Pressure Vessel Code-1968, does not provide specific coverage of this issue, therefore only the 1910.106(b)(2)(v) requirement addresses unstable liquid storage pressure relief considerations. In this instance of ethylene oxide storage, it is thought that Union Carbide had an adequate design for pressure relief, as demonstrated at Bhopal, however the handling of the escaping toxic material through a neutralizer of adequate capacity is a primary concern and was an apparent shortcoming of the equipment at Bhopal. Suppression techniques appear to have been woefully deficient.

We recognize that this is a general response to your question. Should you require an analysis of a specific situation, further assistance can be arranged.

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Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

Standard Interpretations

08/16/1996 - Process Safety Management of highly hazardous chemicals standard.

Standard Interpretations - Table of Contents

- **Standard Number:** 1910.106; 1910.119

August 16, 1996

Mr. Michael V. Marchlik S. Cohen and Associates 143 Pershing Avenue Ridgewood, NJ 07450

Dear Mr. Marchlik:

This is in response to your March 29 letter requesting an interpretation of the process safety management (PSM) of highly hazardous chemicals standard, 29 CFR 1910.119. Please accept our apology for the delay in responding. Your workplace scenario and question and our reply follow.

Scenario: A facility operation intends to store flammable liquids, acetone and methanol, in 2500 gallon stainless steel tanks (more than 10,000 pounds of flammable solvent). The flammable liquids are stored under a nitrogen atmosphere and are kept below their normal boiling point without benefit of chilling or refrigeration. The atmospheric storage tanks are located in a covered area, approximately 140 feet from the pilot plant building. The storage tanks are constructed of 304 stainless steel and are designed to withstand a pressure of 14 psi at 200 degrees Fahrenheit. The storage tank relief valves are set at 14 psig and the conservation vents are set at 0.4 psig.

The solvent storage tanks are interconnected to several pilot plant solvent manifold panels. At the manifold panel, each solvent line has double valves and a totalizer.

The solvent is transferred from the manifold to a separate empty intermediate holding vessel (day tank) using temporary flex hose connections. The connection is only made during transfer from the manifold to the day tank. The delivery quantity is monitored with a totalizer and controlled by the dead man valve. At no time does the quantity of flammable materials exceed 10,000 pounds in any of the day tanks. The capacity of the largest day tank is 750 gallons. The flammable liquids are kept below their normal boiling point without benefit of chilling or refrigeration.

After collecting the desired solvent quantity in the day tank, the operator discontinues the flow from the solvent manifold to the day tank by releasing the deadman valve. The temporary hose from the solvent manifold to the day tank is then disconnected.

The day tank containing the desired quantity of solvent is then connected to the process

vessel for material transfer. The distinct two-stage operation ensures that the day tank serves as a storage vessel without any tie-in to the process there will never be direct transfer of solvent from the manifold to the process.

Question: Would the flammable solvent storage and associated transfer as described above meet the exemption of atmospheric storage of flammable liquids under paragraph 1910.119 (a)(1)(ii)(B)?

Reply: Since acetone and methanol are stored in tanks which are subject to a nitrogen inerting pressure of 14 pounds per square inch gauge (psig) or 96.6 kilo pascal (Kpa), the atmospheric tank exception under paragraph 1910.119(a)(1)(ii)(B) would not apply to the preceding scenario. The PSM Standard covers the process(es) you describe. Also, acetone and methanol storage and transfer must meet the flammable liquids requirements under 1910.106.

We appreciate your interest in employee safety and health. If we can be of further assistance, please contact Mr. Ronald Davies of my staff, telephone # (202) 219-8031, extension 110.

Sincerely,

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

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200 Constitution Avenue, NW
Washington, DC 20210

Standard Interpretations

03/05/1998 - Recalculating pressure vessel design; codes "no longer in use."

Standard Interpretations - Table of Contents

• **Standard Number:** 1910.119(d)(3)(iii); 1926.64(d)(3)(iii)

March 5, 1998

Mr.Wilfred B. Barry, P.E., P.L.S., President
SJB Group, Incorporated
P.O. Box 1751
Baton Rouge, LA 70821-1751

Dear Mr. Barry:

Your letter to OSHA's Directorate of Safety and Health Standards related to questions about OSHA's ***Process Safety Management of Highly Hazardous Chemicals*** (PSM), 29 CFR 1910.119, was forward to my office. Specifically, your questions are related to the process safety information (PSI) element, 29 CFR 1910.119(d). We apologize for the delay in our response.

The following are your specific questions and OSHA's related responses:

Question 1

Is a previous edition of a current code or standard (i.e. 1972 edition of the Section VIII of the ASME Code) considered to be "a code or standard no longer in general use"?

Reply 1

Yes. This question is generated from OSHA's standard 29 CFR 1910.119(d)(3)(iii). The intent of this requirement is for the employer to determine and document that PSM covered equipment which was designed and constructed to codes, standards or practices which are no longer in general use can continue to operate in a safe manner. After the employer makes the determination required by the standard, it will be the basis for the decision to take the equipment out-of-service or to continue operations. If the equipment is to be kept in-service, the determination will be the baseline from which all future operation, inspection, testing and maintenance is conducted. In making the determination the standard requires the employer to evaluate the design, maintenance, inspection, testing and operation of the PSM covered equipment.

When making the determination required by the standard, OSHA intends that the employer

document that PSM covered equipment is consistent with the latest editions of codes and standards. If an employer determines that covered equipment is not in conformance with the latest editions of codes, standards or practices, the employer must document which codes and standards were used and that the design, construction, maintenance, inspection, testing and operation are still suitable for the intended use.

Question 2

Given a pressure vessel designed, constructed, inspected and Code-stamped in accordance with a previous edition of the ASME Code, and for which a manufacturers U-1 form exists, is it necessary to recalculate the vessel's design characteristics (wall thickness, nozzle reinforcement, etc.)?

Reply 2

If the original design and construction is in accordance with the latest edition of design and construction codes and standards for equipment covered by the PSM standard, then OSHA's standard 1910.119(d)(3)(iii) does not require the employer to recalculate design characteristics of PSM covered equipment. However, if there are differences between the original and the latest edition of design and construction codes and standards, then OSHA requires the employer to document those differences. The employer must also show how those differences are consistent with the latest editions of design and construction codes and standards to assure that the equipment can continue to function in a safe manner.

A pressure vessel designed and constructed using any edition of the ASME Code and which posssses a manufacturers' U-1 certification, may have had a change in-service at sometime during its operating history. To assure safe operation the employer when making its determination as required by this standard must also determine and document that the in-service operation, inspection, testing and maintenance of PSM covered equipment considers the change in-service and its impact is consistent with the latest codes, standards and practices so as to assure safe operation.

Question 3

When performing recalculation as a means of establishing suitability for intended service, and given a pressure vessel for which no documentation of material of construction, welding procedures or radiographic testing exists, is it acceptable to assume the lowest value for these variables (i.e. lowest weld joint efficiency factor, lowest allowable stress value for the class of materials involved, etc.) and to incorporate these values into the recalculation?

Reply 3

When an employer conducts an engineering analysis, including recalculation, when no documentation exists for the material of construction, welding procedures or radiographic testing , it is appropriate to assume the lowest value for the listed variables in the engineering analysis as a means of determining that the in-service condition of covered equipment is appropriate for its intended use. The engineering analysis must be conducted in conformance with the latest editions of codes and standards.

If you have any questions related to this letter, please contact Mike Marshall at 202-219-8118

ext. 12.

Sincerely,

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

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Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

Standard Interpretations

01/30/2001 - Determination of safety for existing process equipment is required prior to start-up.

Standard Interpretations - Table of Contents

- **Standard Number:** 1910.119(d)(3)(iii)

OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at http://www.osha.gov.

January 30, 2001

Mr. Rick Durham
Boiler & Machinery Consultant
Marsh Risk Consulting
3475 Piedmont Road, N.E.
Suite 1200
Atlanta, GA 30305

Dear Mr. Durham:

Thank you for your October 31, 2000 letter to the Occupational Safety and Health Administrations's (OSHA's) Directorate of Compliance Programs (DCP). This letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any questions not delineated within your original correspondence. You had questions regarding OSHA's *Process Safety Management of Highly Hazardous Chemicals, Explosives and Blasting Agents* Standard (PSM), 29 CFR 1910.119. Your specific question is related to updating process safety information (PSI) with respect to pressure vessels in a PSM-covered process.

Question: If an employer determines that a vessel is suitable (vessel design, construction, maintenance, inspection, testing and operation) for PSM service to a particular American Society of Mechanical Engineers' (ASME) Code, is it required that all of this information be updated periodically or only if there is a change of service?

Response: Based on your letter, your question is related to the PSI portion of OSHA's PSM standard, specifically 29 CFR 1910.119(d)(3)(iii). The intent of this requirement is for the employer to determine and document that PSM-covered equipment that was designed and constructed to comply with codes, standards or practices no longer in general use can continue to operate in a safe manner. After the employer makes the determination required by the standard, it will be the basis for the decision to take the equipment out-of-service or

continue operations. If the equipment is to be kept in-service, the determination will be the baseline from which all future operation, inspection, testing and maintenance is conducted.

Generally speaking, OSHA intended for the employer determination and documentation required by 29 CFR 1910.119(d)(3)(iii) to be completed prior to the implementation of the original PHA or startup of a PSM-covered process. Therefore, once an employer is in compliance with this requirement, there is no additional requirement per 29 CFR 1910.119(d)(3)(iii) for future determinations/documentation simply because a code or standard related to the covered equipment has been revised. After the employer has made this baseline determination and documentation, other PSM elements such as management of change, mechanical integrity, PHA-revalidation, pre-startup safety review, etc., are intended to address on-going safe operation and maintenance of PSM-covered equipment.

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at http://www.osha.gov. If you have any further questions, please feel free to contact the [Office of General Industry Enforcement] at (202) 693-1850.

Sincerely,

Richard E. Fairfax, Director
[Directorate of Enforcement Programs]

[Corrected 6/2/2005]

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Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

Standard Interpretations

07/17/2006 - Pressure vessels used at oil and gas extraction/production facilities and applicability of 29 CFR 1910.106.

Standard Interpretations - Table of Contents

- **Standard Number:** 1910.106; 1910.106(a)(19); 1910.106(b); 1910.106(b)(1)(v); 1910.106(b)(1)(v)(B) ; 1910.106(l)(3)(i); 1910.106(i)(3)(ii); 1910.119; 1910.169

July 17, 2006

Mr. Charles H. Morgan
One Atlantic Center
1201 West Peachtree Street
Atlanta, Georgia 30309-3424

Dear Mr. Morgan:

Thank you for your January 12, 2005 letter to the Occupational Safety and Health Administration's (OSHA's) Directorate of Enforcement Programs (DEP). We apologize for the delay in our reply. Our response is based on information you provided in your letter to me and follow-up communication with a member of my staff (phone call — February 22, 2005 and email — March 10, 2005). You have questions regarding OSHA's *Flammable and Combustible Liquids* Standard, 29 CFR 1910.106 related to pressure vessels used at oil and gas extraction/production facilities. Please be aware that this response may not be applicable to any question or situation not delineated within your original correspondence. Your specific issues are related to OSHA's requirements for pressure vessel safety. Please note that some of your scenarios and questions have been paraphrased.

Scenario: The following facts provide the basis for your questions:

- The facilities in question are on-shore oil and natural gas extraction/production facilities;
- These facilities do not fall under the requirements of OSHA's *Process Safety Management of Highly Hazardous Chemicals; Explosives and Blasting Agents* standard (PSM), 29 CFR 1910.119 (i.e., they are not gas plants, nor are they classified under Standard Industrial Classification code — SIC 1321);
- The pressure vessels serve to separate the crude oil/natural gas/water, and at some locations they dehydrate the natural gas;
- The pressure vessels are not used as storage tanks;
- After leaving the pressure vessels the oil and water are piped to storage tanks, and the natural gas is either sold or transported via pipeline for further processing;
- The size of the pressure vessels at these facilities varies from 16 - 60 inches in diameter and from 10 to 15 feet in length;
- The normal operating pressures typically range from 50 to 1,000 psig;
- The contents of these pressure vessels typically are "*flammable liquids*" as defined by 1910.106(a)(19);
- The pressure vessels at these facilities were constructed over a period of many years (1940s to 1990s). As a result, some of the vessels were constructed prior to the promulgation of 1910.106;
- Many of the pressure vessels at these facilities were constructed in accordance with the edition of the ASME Boiler and Pressure Vessel Code (*Code*) that was in effect when these vessels were constructed — each of these pressure vessels possess a manufacturer's nameplate that is properly stamped with the *Code* symbol (generally a "U" stamp).
- Some pressure vessels at these facilities may not have been constructed in accordance with the *Code*. As a result, these pressure vessels may not possess a manufacturer's nameplate stamped with the *Code* symbol; and
- Due to the age of some of the vessels, the transfer of ownership of some vessels, or the closing of offices containing the records related to some vessels, your client is not in possession of all the necessary documentation that would establish that all the vessels in question were built in accordance with the *Code*. You state that it is highly unlikely that your client would be able to obtain the documentation.

Background on PSM and Oil and Gas Production Facilities

OSHA stated in a 2000 memorandum to its Regional Administrators[1] that it would not enforce its PSM standards at oil and gas production facilities pending the outcome of an economic analysis with respect to the

feasibility of compliance with PSM. Following the resolution of this issue, the oil and gas production facilities described above may be covered by the PSM standard.

For these reasons, our responses to your questions below do not address the application of any PSM requirements for pressure vessels.

Question 1: Are the pressure vessels located at oil and gas extraction/production facilities (as described in the scenario above) covered by the requirements of 1910.106 or some other OSHA standard that would require these pressure vessels to be built in accordance with or otherwise comply with the *Code*?

Note: The *Code* requirements relative to flammable and combustible liquids appear in only two provisions in 1910.106: 1910.106(b) and (i). By its terms, 1910.106(b) applies to "*tank storage*." Because the pressure vessels in question are process vessels and not storage vessels, it does not appear that 1910.106(b) would apply to the vessels in question. Similarly, by its terms, 1910.106(i) applies to "*refineries, chemical plants, and distilleries*." The pressure vessels in question are not used in refineries, chemical plants, or distilleries as those terms are specifically defined in 1910.106(a). Consequently, it would seem that 1910.106 does not impose any requirements regarding the *Code* on the vessels in question.

Response 1: We agree with your analysis above. 1910.106(b) and 1910.106(i) do not apply to the design/fabrication/construction/installation (construction) of pressure vessels used for oil and gas production processing purposes such as you described, i.e. separation of oil/water/gas and the dehydration of natural gas. However, if pressure vessels are used to **store** flammable or combustible liquids, 1910.106(b)(1)(v)(b) mandates that *Code* pressure vessel construction requirements apply.

However, due to the serious hazards employees may be subject to as a result of the failure of pressure vessels used for oil and gas production processing purposes, an employer may be subject to Section 5(a)(1) of the OSH Act which requires employers to furnish a place of employment which is free from recognized hazards that are likely to cause death or serious physical harm to their employees.

The serious hazards related to the catastrophic failure of pressure vessels include being struck by high energy materials from the vessel and its contents, fire/explosion, and, depending on the vessel's contents, the release of toxic or corrosive materials. Pressure vessels can fail due to hazardous conditions related to their design, construction, operation, or in-service degradation. As a result, these production facilities, including the pressure vessels you describe, must be constructed properly to reduce the potential of a fire/explosion, high energy event, and/or a toxic or corrosives release from causing likely serious harm or death to employees. The mechanical integrity of production system equipment, including pressure vessel's construction is a recognized safe guard, especially in the petroleum industry, for protecting employees from serious hazards associated with the use of these vessels.

ASME and the American Petroleum Institute (API) have long recognized the serious safety considerations associated with the construction of pressure vessels. Both ASME and API recognize the *Code* as a recognized safe practice or good engineering practice for the construction of pressure vessels. Some API documents which acknowledge the *Code* and its construction requirements as a primary safeguard for the mechanical integrity of pressure vessels include:

1. API RP 74[2], Section 2 — *References* list the *Code* as an industry code, practice or standard. This section also refers to API Spec 12J[3] and API Spec 12L[4]. Section 7 — (*Design*), identifies the design of pressure vessels as critical equipment which are essential in preventing the occurrence of, or mitigating the consequences of an uncontrolled event;

2. API 12J is an industry specification which covers among others the minimum requirements for the design and fabrication of oilfield type oil-gas-water separators used in the production of oil and/or gas. This specification contains many references to *Code* requirements such as construction, materials, testing, nameplate, stamping, etc;

3. API 12L is an industry specification that includes the minimum requirements for vertical and horizontal emulsion treaters. These treaters are pressure vessels used in the production industry for separating oil-water emulsions and gas. The function of these treaters is to dehydrate or dewater the produced crude oil to a specified level. This specification also contains many references to *Code* requirements such as construction, materials, corrosion, testing, inspection, nameplate, etc;

4. An API pressure vessel inspection code[5] (API 510) applies to among others, pressure vessels constructed in accordance with the API/ASME Code for *Unfired Pressure Vessels for Petroleum Liquids and Gasses,* Section VIII of the *Code*. Additionally, API 510 applies to pressure vessels used for "*Exploration and Production*" for example producing, lease processing and treating liquid petroleum, natural gas and associated salt water. API 510 includes definitions for *ASME Code* and *construction code.* In these definitions, API states that the *ASME Code* was written for new construction of pressure vessels. *Construction Code* is said by API to be the code or standard to which the vessel was originally built, such as API/ASME.

   API 510 states that in 1931, API and ASME created a joint committee to formulate and prepare a code for safe practices for pressure vessels in the petroleum industry. These safe practices include the design and construction of pressure vessels. That code was titled the API/ASME *Code for Unfired Pressure Vessels for Petroleum Liquids and Gasses* and was first published in 1934. API/ASME stated that they believed the *Code* actually applied to pressure vessels in most services.

The hazards related to the catastrophic failure of pressure vessels due to unsafe construction are recognized by the oil and gas industry (upstream and downstream) and by the petrochemical and refining industries. This hazard is the same whether the pressure vessel is used for *exploration and production* or is used in a refinery/chemical plant. To control the hazards related to the catastrophic failure of pressure vessels, employers must assure the mechanical integrity of their pressure vessels. One feasible means of abating this hazard would be to construct pressure vessels to *Code* requirements.

Question 2: What are the effective date(s) of any OSHA standard(s) that would require pressure vessels located at oil and gas extraction/production facilities to be built in accordance with or otherwise comply with the *Code*?

Response 2: Without more information about the specific nature and purpose of the pressure vessels located at oil and gas extraction/production facilities we cannot list all the standards that would apply in these situations. However, specific OSHA standards that might apply to the operations you describe, based on factors such as the material contained in the vessel or the specific use of the vessel, may include, but are not necessarily limited to, 29 CFR 1910.106 and 1910.169. For pressure vessels required to comply with 1910.106, *Flammable and Combustible Liquids*, and those required to comply with 1910.169, *Air Receivers*, the effective date was February 15, 1972 [36 FR 10466].

Question 3: Do the applicable standards, if any, apply retroactively to pressure vessels constructed before the effective date of the standard or are any such pressure vessels grandfathered; i.e., exempt from the specific requirements that the pressure vessels be built in accordance with or otherwise comply with the *Code*?

Response 3: Any pressure vessels built before the effective dates of any applicable OSHA standards must comply with the 1968 edition of the *Code,* where *Code* compliance is required by a specific standard. OSHA addressed this issue in a previous Memorandum[6] to one of its Regional Administrators in which it stated all pressure vessels must comply with the 1968 edition of the *Code*.

Question 4: What do the standards specifically intend when they require a vessel to "be built in accordance with the *Code*"? Is it OSHA's intention that "*built in accordance with the ASME Boiler and Pressure Vessel Code*" means that the vessel shall have a manufacturer's nameplate with a valid *Code* symbol stamp (such as the "U" stamp), or just that the vessel must have been built in accordance with the principles of the *Code*?

Response 4: Your question highlights the difference between building a pressure vessel "*in accordance*" with the *Code* and building a pressure vessel to the "*principles*" of the *Code*. Your question suggests that an employer could use a pressure vessel which was constructed to all the requirements of the *Code* for the pressure retaining portions of the vessel, but if the pressure vessel did not include a manufacturer's nameplate, other required records and a valid *Code* symbol stamp (nameplate, records and stamping denoted from this point forward as "NRS") it would still comply with the *Code* because it is built using its principles.

NRS = Nameplate, Records, & Stamping

The manufacturer's NRS serves a safety management and hazard control function and is part of the quality control system for construction of a *Code* vessel. The *Code* NRS assures employers that they are using pressure vessels that have been constructed to a nationally recognized consensus standard/good engineering practice. Without the quality control system required by the *Code* through its specifications for NRS, employers cannot determine if they have pressure vessels which have been constructed to a recognized standard, and they cannot assure that their vessels are safe to operate.

OSHA therefore interprets the statement "*built in accordance with the ASME Boiler and Pressure Vessel Code*" to require that employers use pressure vessels that at least conform with the requirements of the *Code*, including the proper maintenance and display of NRS.

"...Built in accordance with the ASME ..." requires proper maintenance & display of NRS (nameplate, records, & stamping)

Scenario: Even though a pressure vessel does not display any NRS information, the employer believes the pressure vessel meets all other requirements under OSHA standards.

Question 5: To determine and document that such vessels are suitable for their intended use, and in doing so, bring the vessels into full compliance with applicable OSHA standards, is it acceptable to conduct an evaluation that would include: 1) appropriate nondestructive testing (for example, radiography, ultrasonic thickness testing, hardness testing, pressure testing, etc.) to ascertain the current condition of the vessel; and 2) detailed code calculations (using appropriately conservative safety factors) for each vessel component to establish the allowable operating parameters for the vessel (specifically, the maximum allowable working pressure and maximum allowable operating temperature)?

Response 5: Pressure vessels which are required by a specific OSHA standard, such as 1910.106(b)(1)(v) or 1910.106(i)(3)(i) and (ii), to be constructed in accordance with the *Code* must meet all requirements, including NRS requirements of the 1968 version of the *Code,* as stated in Response 3. Consequently, the employer would not be in compliance with specific OSHA "*Code construction*" standards when the *Code*-required NRS is not available.

OSHA recognizes that there are pressure vessels in use, especially older vessels, that do not have the *Code*-required NRS. We understand that there are some requirements of the *Code* that cannot be satisfied when the NRS is not available to the employer. For example, it may not be possible to retroactively obtain design and construction aspects such as welding procedures and use of certified welders.

However, an employer may still come into compliance with applicable OSHA standards requiring *Code* construction where the stamping on a pressure vessel becomes indistinct or the nameplate is lost, illegible, or detached, but traceability to the original data is still possible. Where there is traceability, the owner/employer must have the stamped data replaced. The National Board of Boiler and Pressure Vessel Inspectors provides a

procedure[7] to restamp pressure retaining items/vessels where stamping or nameplate problems exist.

In cases where traceability is not possible, OSHA will treat as a *de minimus* violation any pressure vessel that is required by a specific OSHA standard, such as 1910.106(b)(1)(v), 1910.106(i)(3)(i) and (ii) to be built in accordance with the *Code,* but that does not have the *Code*-required NRS, provided that the criteria below are met:

1. The employer can demonstrate that it has taken reasonable steps to obtain or retain the required NRS. For example, did the employer contact the previous owner in an attempt to obtain the pressure vessel's NRS; if the employer has the pressure vessel number, did it contact ASME or the National Board of Boiler and Pressure Vessel Inspectors to obtain the required records; does the employer have a procedure in place to assure that any new or used pressure vessel it purchases or takes control of has the required *Code*NRS; does the employer routinely purchase used pressure vessels without the NRS; and

2. The employer verifies the fitness-for-operations integrity of the vessels by utilizing the procedure contained in API 510, Section 6.7. This procedure is for pressure vessels with no "traceability," such as those with no nameplate and minimal or no design or construction documentation. This procedure includes items such as: performing inspections and making necessary repairs; defining design parameters, and preparing drawings and calculations; basing calculations on applicable codes/standards; evaluating unidentified materials; use of radiography; marking with nameplate or stamping; and performing pressure testing.

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at www.osha.gov. If you have any further questions, please feel free to contact the Office of General Industry Enforcement at (202) 693-1850.

Sincerely,

Richard E. Fairfax, Director
Directorate of Enforcement Programs

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[1] OSHA Memorandum to Regional Administrators: Subject: OSHA will not enforce the PSM standard at oil and gas production facilities Dated: 04/11/2000(http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=23727) [back to text]

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[2] API RP 74, *Recommended Practice for Occupational Safety for Onshore Oil and Gas Production Operations*, 1st Edition, October, 2001, API [back to text]

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[3] API Specification 12J (Spec 12J), *Specification for Oil and Gas Separators*, October 1, 1989, API [back to text]

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[4] API Specification 12L, *Specification for Vertical and Horizontal Emulsion Heaters*, 4th Ed., Nov. 1, 1994, API - Exploration and Production Department [back to text]

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[5] API 510, *Pressure Vessel Inspection Code: Maintenance Inspection, Rating, Repair and Alteration*, Addendum 4, August 2003, API [back to text]

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[6] OSHA Memorandum to Regional Administrator - Linda R. Anku, From: John B. Miles, Jr., Director, Directorate of Field Operations, 12/16/85, Q&A #5(http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=19361) [back to text]

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[7] What to Do When a Nameplate Is Lost, National Board of Boiler and Pressure Vessel Inspectors; (http://www.nationalboard.org/NationalBoard/NBIC/NamePlate.aspx) [back to text]

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Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

Standard Interpretations

04/06/1981 - ASME Boiler and Pressure Vessel Code - Stop valves upstream of relief valves.

Standard Interpretations - Table of Contents

- **Standard Number:** 1910.169

April 6, 1981

Local jurisdiction may authorize stop value upstream of a relief value ⇒ de minimus violation

Jerry D. Smith, P.E.
Principal Mechanical Engineer
NUS Corporation
South Central Operations
11511 Katy Freeway, Suite 500
Houston, Texas 77079

Dear Mr. Smith:

This is in response to your inquiry regarding OSHA Standard 1910.169(b)(3)(ii), which was forwarded to us for reply from our Dallas Regional Office. Please accept our apology for the delay in response.

29 CFR 1910.169(b)(3)(ii) clearly states: "No valve of any type shall be placed between the air receiver and its safety valve or valves," while 29 CFR 1910.169(a)(2)(ii) states, in part: "All safety valves used shall be... installed... in accordance with the A.S.M.E. Boiler and Pressure Vessel Code, Section VIII Edition 1968."

Your reference to the ASME Boiler and Pressure Vessel Code, Section VIII, allowing a full-area stop value between the vessel and the relief device is contained in Appendix M, Installation and Operation, Paragraph UA-354(a)(copy enclosed). Note that the reference to Appendix M is in Paragraph UG-134(e)(2) (copy enclosed), which states the exception as: "Under conditions set forth in Appendix M.", and that Paragraph UA-350, Introduction to Appendix M, indicates that any rule contained in Appendix M is for general information only, not a mandatory part of Section VIII, but may be permitted when granted by the authority having legal jurisdiction over the installation of unfired pressure vessels.

Therefore, the jurisdiction in the state or municipality operating under the ASME Code Section VIII may authorize a stop valve between the pressure-relieving device and the unfired pressure vessel. (Note the definition of "Jurisdiction" or "Jurisdictional Authority" in Chapter I Glossary of Terms (copy enclosed) of the National Board Inspection Code - A Manual for Boiler and Pressure Vessel Inspectors.) Such an **authorized** stop valve should be considered a de minimis situation, provided the conditions set forth in Paragraph UA-354(a) or (b), whichever is applicable, are met.

~~For your information, 29 CFR 1910.170 indicates that~~ [T]he source for 29 CFR 1910.169 is the 1938 ANSI B-19 Safety Code for Compressed Machinery, which refers to the 1937 edition of the ASME Code for Unfired Pressure Vessels. The 1937 edition did not contain the exception for a stop valve indicated above in Paragraph UG-134(e)(2) of the 1968 edition.

[This document was edited on 11/09/00 to strike information that no longer reflects current OSHA policy.]

Should you have any further questions, please feel free to call or write.

Sincerely,

Bruce Hillenbrand
Deputy Director,
Federal Compliance and State Programs

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Standard Interpretations

01/24/1980 - Requirements for off highway vehicles being exported from the UK to the USA.

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• **Standard Number:** 1910.169

January 24, 1980

Mr. D. T. Steadman
Senior Section Engineer
Project and Development Section
British Standards Institute
Maylands Avenue
Hemel Hempstead
Herts HP2 4SQ

Compressed air on vehicles is not subject to 1910.169

Dear Mr. Steadman:

This is in response to your inquiry concerning OSHA's technical requirements for off highway vehicles being exported from the UK to the USA. Your letter addressed to Mr. Dave Hadden was forwarded to this office for response.

29 CFR 1910.169 is not intended to apply to compressed air machinery and equipment used on transportation vehicles such as steam railroad cars, electric railway cars, and automotive equipment. It applies to compressed air receivers, and other equipment used in providing and utilizing compressed air for performing operations such as cleaning, drilling, hoisting, and chipping.

In addition to the above boilers and piping systems which are a part of or used with pile driving equipment, shall meet the applicable requirements in 29 CFR 1926.603. Also, the American Society of Mechanical Engineers Pressure Vessel Code and the Department of Transportation, Bureau of Motor Carrier Safety regulations may be used to support alleged violations of Section 5(a)(1) of the Act (copy enclosed).

The sections you identified from the Code of the Federal Register as being relevant to OSHA's technical requirements for equipment manufacturers are accurate with the exception of 29 CFR 1910.169.

If we may be of any further assistance, please feel free to call or write.

Sincerely,

Grover C. Wrenn Director,
Federal Compliance and State Programs

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Occupational Safety & Health Administration
200 Constitution Avenue, NW
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Standard Interpretations

06/16/1982 - The ASME Pressure Vessel Code.

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• **Standard Number:** 1910.261

June 16, 1982

TAMPELLA Ltd.
Machinery and Engineering Group
Mr. Matti Hukki, Chief Metallurgist.,
P.O. Box 267
33101 Tampere 10
FINLAND

Dear Sir:

Your May 4, 1982 letter to Administrator Price of the State of Florida regarding the ASME Pressure Vessel Code was referred to this office for reply.

The Occupational Safety and Health Administration standards for pulp, paper, and paperboard mills are contained in section 29 CFR 1910.261 (copy enclosed), which incorporates by reference the ASME Boiler and Pressure Vessel Code, Section VIII in subparagraph 1910.261(a)(4)(i).

In regards to the point of your letter i.e., whether your pressurized wood grinding machine (PGW) comes under this code, it appears that rule u-l (c)(3), Section VIII, Division I of this code would exclude the PGW from being a pressure vessel and, hence, from being within the scope of the code.

Should you have any further question, please do not hesitate to contact us.

Sincerely,

Patrick R. Tyson
Director,
Federal Compliance and State Programs

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Occupational Safety & Health Administrations
200 Constitution Avenue, NW
Washington, DC 20210

Standard Interpretations

02/07/1995 - Evaluation of Variance #2272, application for permanent variance and interim order.

Standard Interpretations - Table of Contents

• **Standard Number:** 1910.261

February 7, 1995

MEMORANDUM FOR: CHARLES E. ADKINS, DIRECTOR
DIRECTORATE OF TECHNICAL SUPPORT

THROUGH: JOHN B. MILES, DIRECTOR DIRECTORATE OF COMPLIANCE PROGRAMS

THROUGH: RAYMOND E. DONNELLY, DIRECTOR OFFICE OF GENERAL INDUSTRY COMPLIANCE ASSISTANCE

FROM: ALCMENE HALOFTIS, CHEMICAL ENGINEER OFFICE OF GENERAL INDUSTRY COMPLIANCE ASSISTANCE

Subject: Evaluation of Variance #2272, Re: Rayonier Inc.

The application of Rayonier Incorporated for permanent variance and interim order from the requirements of 29 CFR 1910.261(g)(17)(i) has been evaluated. It is recommended that the application be denied for the following reasons.

OSHA Standard, 29 CFR 1910.261(g)(17)(i) states, "A safety valve shall be installed in a separate line from each pressure vessel; no hand valve shall be installed between this safety valve and the pressure vessel. Safety valves shall be checked between each cook to be sure they have not become plugged or corroded to the point of being inoperative. (See the ASME Boiler and Pressure Vessel Code, Section VIII, Unfired Pressure Vessels-1968, with Adenda)."

The digesters are pressure vessels. The standard requires a safety relief valve on each vessel. Reliance on one safety relief valve from the main source of steam does not comply with the requirements of 1910.261(g)(17)(i).

The purpose of the standard is to provide independent protection for each pressure vessel. The following scenario may shed light on the importance of providing a separate relief valve for each digester. Reliance on the main relief valve at the source of the steam would definitely result in a disaster, in case of its failure. However, if each of the vessels is provided with an independent relief valve, this relief valve would be functioning as a stand-by safety device, hence preventing potential disaster in case of the failure of the main valve.

According to the documentation provided by Rayonier, the digesters are supplied steam from a "single dedicated source," however, each digester is not provided with a separate relief

valve. Therefore, each digester must be provided with a safety relief valve at the digester, or at the connecting piping, according to the Standard.

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Standard Interpretations

07/07/1975 - Clarification of 29 CFR 1926.350(b)(4) to Permit Cylinders Containing Oxygen, Acetylene or Other Fuel Gas to be Taken into Tunnels.

Standard Interpretations - Table of Contents

- **Standard Number:** 1926.350; 1926.800; 1926.21

July 7, 1975

MEMORANDUM FOR: DAVID H. RHONE
ASSISTANT REGIONAL DIRECTOR/OSH

Subject: Clarification of 29 CFR 1926.350(b)(4) to Permit Cylinders Containing Oxygen, Acetylene or Other Fuel Gas to be Taken into Tunnels

This is in response to your memorandums of April 9, and May 19, 1975, regarding the above subject. Addressing our rationale to 29 CFR 1926, Construction Standards, the following is offered:

1. 29 CFR 1926.350(b)(4) states: "Cylinders containing oxygen or acetylene or other fuel gas shall not be taken into confined spaces." 29 CFR 1926.350(j) adopts and references ANSI Z49.1-1967, Safety in Welding and Cutting. Section 7.4.1 states that a confined space is intended to mean a relatively small or restricted space such as a tank, boiler, pressure vessel or small compartment of a ship. Section 7.4.3 states that when welding or cutting is being performed in any confined space, the gas cylinders and welding machine shall be left on the outside.

2. 29 CFR 1926.800(e)(1)(v) states: "Gasoline or liquefied petroleum gases shall not be taken, stored, or used underground."

3. 29 CFR 1926.21(b)(6)(ii) states: "Confined or enclosed spaces include, but are not limited to, ...sewers, underground utility vaults, tunnels, pipelines, and..."

The definition of confined space is: "...any space having a limited means of egress, which is subject to the accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere." When welding or cutting is being performed in any confined spaces, the gas cylinders shall be left on the outside. Fuel gases that are liquefied petroleum gases shall not be used underground in tunnel construction.

In conclusion, a tunnel can be a confined space or an enclosed space or have a confined space in it based on 29 CFR 1926.21(b)(6)(ii) and the evaluation of the CSHO. When a tunnel, due to its size and means of egress is considered an enclosed space, cylinders contained oxygen

or fuel gas (except LP) may be taken into this enclosed space. However, under these conditions other applicable tunnel standards would be considered.

A proposed change to 29 CFR 1926.21(b)(6)(ii) will include a deletion of the word "tunnels". In addition, an amendment to the construction standards, Subpart S, Tunnels, is being finalized and will be published in the Federal Register shortly. This amendment will cover the taking of compressed gas cylinders into tunnels.

Barry J. White
Associate Assistant Secretary for
Regional Programs

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