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March 17, 2011

Commandant
Department of Homeland Security
United States Coast Guard
2100 Second St. S.W.
Washington, D.C. 20593-001

Subject: Comments to NPRM of Oct. 21, 2010, pages 65151-65195, Marine Vapor Control Systems Proposed Rule: Docket Number USCG-1999-5150.

Dear Sir:

The present VCS regulations have worked remarkably well. To my knowledge, in over 100 certifications, only two near-miss incidents occurred. One incident is documented here; the other involved compression of vapors to over 100 psig; both were handled in the field.

I estimate the installed MVCS' are curtailing about 100 million pounds of pollution every year.

In the USCG Regulatory Analysis report of August 2010, the engineering time estimate during certification is off substantially. During the physical inspection/testing (dry run) and the witnessed wet load, substantial time is spent waiting for items to be corrected and waiting for the marine vessel to dock and prepare for loading.

In order to more completely understand my comments, I have an e-file available in which the comments are interspersed in the body of the NPRM; request this file at pichler@swbell.net.

The comments and supporting incident report are as follows:

RJP Comment to 154.310(b)(ii):
"Balances" should be replaced with "Moves or controls". "Balances" implies the movement of vapor to or from an additional tank. The revised wording would include not only vapor balancing, but also pigging, purging, padding, (blanketing), inerting, barge cleaning, and gas freeing.

RJP Comment to 154.2000(b):

The start of compliance within three years is okay but recertification every three years is too often. Recertification should take place on the fifth year anniversary of the certification date, with a 90 day window; otherwise recertifications will be bunched up. Presently, every year, the facility must completely inspect their VCS and document their VCS inspection. Many facilities use a third party to do the annual inspection. Additionally the local Coast Guard has an annual dock inspection which includes a bluebook VCS inspection. RJP Consulting distributes to the local USCG a suggested VCS inspection checklist. A VCS equipment list is included with the certification package to the facility and to the local USCG for their annual inspection.

RJP comment to 154.2000(e):

Transfer of vapors from a facility to a marine vessel that is not off loading is difficult unless the vessel is under a hard vacuum or is a pressure vessel.

RJP comment to: 154.2001 Definitions - Diluting:

The diluting gas must also be non-reactive. A mixture of carbon dioxide and amines are reactive.

RJP Comment to 154.2021(a):

The start of compliance within three years is okay but recertification every three years is too often. Recertification should take place on the fifth year anniversary of the certification date, with a 90 day window; otherwise recertifications will be bunched up. Presently, every year, the facility must completely inspect and document their VCS inspection. Many facilities use a third party to do the annual inspection. Additionally the local coast guard has an annual dock inspection which includes a bluebook VCS inspection. RJP Consulting distributes to the local USCG a suggested VCS inspection checklist. A VCS equipment list is included with the certification package to the local USCG for their annual inspection.

RJP comment to 154.2101(g):
The VCS guidelines of May 1, 1992 section 6 says "the insulating flange or insulating hose can (must) be located on the outboard end of the vapor hose ... which connects with the vessel." This insulating device location minimizes the possibility of short circuiting the vessel to the facility and should be included in this section. If an insulating device is used, this location requirement adds about $200 to the installation cost for a connector spool piece to sandwich the insulating device.

RJP comment to 154.2103(a):
The above formula is too complicated and inaccurate to estimate vapor growth. The over design of 25% to handle potential vapor growth has been successful in the vast majority of VCS installations. Other VCS safeguards prevent over pressurization in the event of a high vapor pressure cargo. Vapor Growth is an item that happens during early cargo loading as the cargo evaporates into the vapor space and contributes to the ullage volume. When the vapor space becomes saturated, no more cargo can evaporate and vapor growth stops. High vapor growth cargoes can be handled in the dock procedure by initial slow loading.

For vapor growth estimation, I use an EPA emission formula derived from EPA AP42.vol 1. 5.2. eq 1. for saturated ullage. The derived formula for estimated vapor growth is: Est. % Vap. Growth = P(100)/Po. Where P = true vapor pressure of cargo at cargo transfer temperature and Po = atmospheric pressure in consistent units. Usually vapor pressure at temperature is approximated by linear interpolation of a COX chart.

Vapor Growth during loading, in practice, is a combination of evaporation and temperature change. For example: At an initial certification, I have experienced a high vapor growth loading. During a VCS controlled loading of a hot, high vapor pressure cargo (C5 mix), initially the vessel pressure rose rapidly to the pressure alarm level. We stopped the loading, but continued the VCS system, and the pressure fell (presumably) as the vapor space (ullage) became saturated with cargo vapor and became warmed up to the cargo temperature. Later (approximately 1 hour) the VCS controlled cargo loading was resumed at normal full cargo rate; there was no abnormal pressure increase.

RJP comment to 154.2103(f):

Normally the safe vent is the vapor control system. I object strenuously to closing the only safe vent in the event of a high pressure. I have personally been involved where the safe vent was shut down for a high pressure. Subsequently the dock was enveloped with flammable isopropyl alcohol vapor; which persisted for a substantial time after the cargo loading was stopped. One spark would have resulted in the loss of lives (mine included) and a ship. The near-miss report is attached. Only the horn, light, and cargo loading valve should be activated in the event of a high pressure.

RJP Comment to 154.2103(n)(3):

It is not clear what is "downstream"; is it downstream of the inerting gas or downstream of the vapor flow from the marine vessel? I suggest, word the placement of the pressure sensors, to always sense the vessel pressure.

RJP comment to 154.2104(c):

The automatic valve required by this section must close within 2 seconds or better because the marine vessel can be over pressured in 4 seconds while pigging.

RJP comment to 154.2104(d):

A valve position sensor on the manual cargo block valve or the automatic cargo block valve would serve the same purpose.

RJP comment to 154.2104(e):

The means to detect the pig arrival must be an automatic detection device as well as specifically trained personnel to operate a manual quick closing valve.

RJP comment to 154.2105(a)(1):
This new distance requirement of 6 meters would require nearly all the gas injecting facilities to rework all the vapor piping and perhaps the DA size. The present regulation requires a 10 meter distance (33CFR154.824(b)). The exemption distance requirement that is usually granted for the analyzers is 10 meters beyond the DA requirement, otherwise the DA has to be 30% larger as the DA has to handle both the cargo vapor and the injected gas.

RJP comment to 154.2105(b)(1):
This new distance requirement of 6 meters would require nearly all the gas injecting facilities to rework all the vapor piping and perhaps the DA size. The present regulation requires a 10 meter distance (33CFR154.824(b)). The exemption distance requirement that is usually granted for the analyzers is 10 meters beyond the DA requirement, otherwise the DA has to be 30% larger as the DA has to handle both the cargo vapor and the injected gas.

RJP comment to 154.2105(f):
For inerted, partially inerted, or combinations of inerted, partially inerted and non-inerted cargoes, the facility must use the lowest MOCC of all cargoes being transferred.

RJP comment to 154.2105(g):
For inerted, partially inerted, or combinations of inerted, partially inerted and non-inerted cargoes, the facility must use the lowest MOCC of all cargoes being transferred.

RJP comment to 154.2105(h):
For inerted, partially inerted, or combinations of inerted, partially inerted and non-inerted cargoes, the facility must use the lowest MOCC of all cargoes being transferred.

RJP comment to 154.2105(j)(2):
Before the "flame arrester" insert "end-of-line". The in-line flame arrester may not be effective.

RJP comments to 154.2105(j)(2)(i):
Insert "or MOCC" after "lower flammable limit" as appropriate.

Oftentimes an inerting system uses nitrogen for carbon beds; nitrogen inerting should take the place of an exit analyzer. An exit analyzer would be a hydrocarbon analyzer which is expensive ~$100,000! A MVCS using nitrogen always operates below 60% of MOCC. Correct operation of a carbon bed system requires careful design to eliminate hot spots in the carbon bed.

For scrubbing systems, proof of medium flow does not assure there is no flammable vapor leaving the scrubber. The media can become saturated with cargo vapor and then it becomes ineffective even when flowing. An exit vapor analyzer, media analyzer, inerting system, and/or an end-of-line flame arrester are needed.

RJP comment to 154.2105(j)(2)(ii):
Add "close the automatic liquid cargo loading valve" after "33CFR 154.2101(a)".

Omit "and shut down any vapor-moving device"

Shutting down the vapor mover may disrupt other docks that may be using the same vapor mover. I have seen as many as 5 docks using a single vapor mover. Closing the remotely operated cargo vapor valve also activates the light, horn, and closes the automatic liquid cargo loading valve.

RJP comment to 154.2107(a):
Insert in front of "volume" the word "system". This would insure the vapor piping, condensate removal vessels, and hydrolyic seal vessel are considered.

RJP comment to 154.2107(b):
The distance measurement should be consistent from the facility vapor connection to the detonation arrester it was 18 meters in see 154.2107(f).

The present regulation requires a 10 meter distance (33CFR154.824(b)), maximum, from the DA to the gas injection point and than mixing within 20 pipe diameters 33CFR154.824(b) and sampling within 30 pipe diameters after gas injection (33CFR154.(e)(3). The exemption distance requirement that is usually granted for the gas injection is 10 meters beyond the DA requirement. If the gas injection and analyzer sampling is before the DA, the DA has to be 30% larger as it has to handle both the cargo vapor and the injected gas. I suggest the distances for the gas injection and sampling requirements remain as presently written.

RJP comment to 154.2105(h)(2)(ii):
Add "close the automatic liquid cargo loading valve" after "33CFR 154.2101(a)".

Omit "and shut down any vapor-moving device"

Shutting down the vapor mover may disrupt other docks that may be using the same vapor mover. I have seen as many as 5 docks using a single vapor mover. Shutting off the remotely operated cargo vapor valve also activates the light, horn, and closes the automatic liquid cargo loading valve.

RJP comment to 154.2105(j)(2)(ii):
Add "close the automatic liquid cargo loading valve" after "33CFR 154.2101(a)".

Omit "and shut down any vapor-moving device"

Shutting down the vapor mover may disrupt other docks that may be using the same vapor mover. I have seen as many as 5 docks using a single vapor mover. Shutting off the remotely operated cargo vapor valve also activates the light, horn, and closes the automatic liquid cargo loading valve.

RJP comment to 154.2107(i)(3):
Add "close the automatic cargo loading valve" after "33CFR 154.2101(a)".

Omit "and shut down any vapor-moving device"

Shutting down the vapor mover may disrupt other docks that may be using the same vapor mover. I have seen as many as 5 docks using a single vapor mover. Shutting off the remotely operated cargo vapor valve also activates the light, horn, and closes the automatic liquid cargo loading valve.

RJP comment to 154.2107(j)(2):
Add "close the automatic cargo loading valve" after "33CFR 154.2101(a)".

Omit "and shut down any vapor-moving device"

Shutting down the vapor mover may disrupt other docks that may be using the same vapor mover. I have seen as many as 5 docks using a single vapor mover. Shutting off the remotely operated cargo vapor valve also activates the light, horn, and closes the automatic liquid cargo loading valve.

RJP comment to 154.2107(k)(2)(ii):
Add "close the automatic cargo loading valve" after "33CFR 154.2101(a)".

Omit "and shut down any vapor-moving device"

Shutting down the vapor mover may disrupt other docks that may be using the same vapor mover. I have seen as many as 5 docks using a single vapor mover. Shutting off the remotely operated cargo vapor valve also activates the light, horn, and closes the automatic liquid cargo loading valve.

RJP comment to 154.2107(l)(3):
Add "close the automatic cargo loading valve" after "33CFR 154.2101(a)".

Omit "and shut down any vapor-moving device"

Shutting down the vapor mover may disrupt other docks that may be using the same vapor mover. I have seen as many as 5 docks using a single vapor mover. Shutting off the remotely operated cargo vapor valve also activates the light, horn, and closes the automatic liquid cargo loading valve.

RJP comment to 154.2107(m)(4):
Add "close the automatic cargo loading valve" after "33CFR 154.2101(a)".

Omit "and shut down any vapor-moving device"

Shutting down the vapor mover may disrupt other docks that may be using the same vapor mover. I have seen as many as 5 docks using a single vapor mover. Shutting off the remotely operated cargo vapor valve also activates the light, horn, and closes the automatic liquid cargo loading valve.

RJP comment to 154.2111(c):
Several of my certification clients use the dock flare to service other facility vapors such as from truck or railcar loading. The alternate facility vapors enter the flare after all the two quick closing valves, the DA, and the liquid seal are in place. Current practice eliminates the liquid seal and substitutes by exemption an antiflashback burner, temperature sensors, and reverse flow detection on the DA. In this case, if the facility wanted to pass vapors to the dock flare from a truck or railcar loading they would use the flare antiflashback burner part of the marine vapor control system; in these cases, will a written exemption from the Commandant be needed? To my knowledge, nobody has requested to use part of the MVCS vapor lines before the flare DA and the two quick closing valves to handle other plant vapors; in this case, I feel a careful design and an exemption would be required to prevent other facility vapors from entering the marine vessel.

RJP comment to 154.2112(a):
After the loading is complete, the system that controlled polymerizing vapors must purge / clean the VCS, including hoses or vapor arms, with at least two-system volumes of non-reactive gas ie. nitrogen, or air. This should be a standard procedure for all cargoes so that the VCS is left in a safe condition for any potential maintenance or incompatible cargoes.

RJP comment to 154.2113(c):
In addition to the certifying entity, a marine chemist or a properly trained, third party surveyor should be allowed to determine if the VCS has been adequately cleaned.

RJP comment to 154.2150(c)(4):
To properly calibrate an analyzer a "zero gas" must also be used in addition to a span gas
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RJP comment to 154.2150(c)(6):
This section should be removed.

The testing of the vacuum relief valve teaches the operator how to circumvent the pressure sensors, the analyzer system, and the inerting, enriching, or diluting systems. The proper, third party, testing of the vacuum relief valve should be done annually; this is standard industry practice for a simple mechanical device. Rough, in place, testing of capacity and set point is done during the certification process by pulling maximum air through the sensor / analyzer / gas injection disabled system and observing the maximum vacuum produced which approximates the vacuum relief valve set points. Normally, the set point is certified by the manufacturer as indicated by an attached name plate. The set points are under seal and are not easily changed.

On site capacity and set point testing of the pressure relief valve is not to be done as this would release natural gas onto the dock making the dock deliberately unsafe. For certification, the field capacity test involves observing the valve size. Set point, in the field, is determined by reading the name plate data or by pressurizing the relief valve with metered nitrogen or air which is not ordinarily piped into the VCS.

The set point is not easily changed and usually the pressure relief valve has a seal to indicate tampering. Annual offsite set point testing can involve bench testing using certified gauges and capacity testing uses a railcar of pressurized air. Documented, annual testing of pressure relief valves by a third party is an industry standard. Failure of the pressure relief valve is backed up by the required dual pressure sensors, the reverse flow sensors on the DA and the relief valve on the marine vessel.

RJP comment to 154.2180(g):
To properly calibrate an analyzer a "zero gas" and "span gas" must be used.

RJP comments to 154.2250(c)(4):
To properly calibrate an analyzer a "zero gas" and "span gas" must be used.

RJP comments to 154.2250(c)(5):
To properly calibrate an analyzer a "zero gas" and "span gas" must be used.

RJP comment to 154.2250(c)(6):
This section should be removed.

The proper testing of the vacuum relief valve teaches the operator how to circumvent the pressure sensors, the analyzer system, and the inerting, enriching, or diluting systems. The proper, third party, testing of the vacuum relief valve should be done annually; this is standard industry practice for a simple mechanical device. Rough, in place, testing of capacity and set point is done during the certification process by pulling maximum air through the sensor / analyzer / gas injection disabled system and observing the maximum vacuum produced which approximates the vacuum relief valve set points. Normally, the set point is certified by the manufacturer as indicated by an attached name plate. The set points are under seal and are not easily changed.

On site capacity and set point testing of the pressure relief valve is not to be done as this would release natural gas onto the dock making the dock deliberately unsafe. For certification, the field capacity test involves observing the valve size. Set point, in the field, is determined by reading the name plate data or by pressurizing the

relief valve with metered nitrogen or air which is not ordinarily piped into the VCS. The set point is not easily changed and usually the pressure relief valve has a seal to indicate tampering. Annual offsite set point testing can involve bench testing using certified gauges and capacity testing uses a railcar of pressurized air. Documented, annual testing of pressure relief valves by a third party is an industry standard. Failure of the pressure relief valve is backed up by the required dual pressure sensors, the reverse flow sensors on the DA and the relief valve on the marine vessel.

RJP Comment to 46CFR35.35-5:

The shielded wire in the overfill system of 154.2102(b) is attached to a ground connection pin which is grounded by the facility but should not be grounded to the marine vessel. This section would then comply with the proposed change as indicated in 46 CFR 35.35-5 of not grounding the marine vessel to the dock.

This new proposed rule making for Marine Vapor Control Systems is an improvement over the current regulations. I am available to talk about the above changes. I stand ready to assist in implementing the proposed rule.

Sincerely,

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August 9, 2010

Ms Sara Ju
United States Coast Guard Headquarters
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Washington, DC 20593-0001

Subject: NEAR-MISS INCIDENT; MVCS REGULATIONS CONTRIBUTING

This is a description of what happened during a marine vapor control certification where a near-miss incident occurred. The short term follow up is indicated and the longer term recommended actions are discussed.

NARRATIVE OF NEAR-MISS

The MVCS unit was in the final part of the certification process; all the MVCS shutdown systems had been operated satisfactorily, a short cargo loading test had been performed; only the loading rate determination was needed to complete the certification. At 2:00 AM, I checked in with the operations supervisor who indicated the MVCS was in an alarm condition. I picked up my maintenance escort and went out to the dock.

The MVCS was found to be in the shutdown condition with the automatic vapor valve closed. Cargo loading of isopropyl alcohol (IPA) had been continued after the marine vapor control system shut down. The horn safety system had been silenced (acknowledged) and the flashing light safety system was still operating. Cargo loading had been continued until the dock safety spool pressure relief valve opened and was releasing flammable IPA vapor into the air. The pressure in the ship's tank continued to build as the dock pressure relief valve is designed to handle only 30% of the cargo loading rate (it is designed to release at the natural gas addition rate).

The cargo loading was stopped; excess IPA vapor continued to vent into the air. The MVCS pressure shutdown system was manually disconnected from the MVCS by a maintenance man climbing up on the unit to disable the pressure sensors. He was about 1-2 feet from the venting IPA vapors (pipe pictures available). Based on ambient temperatures, the IPA vapor concentration was calculated to be in the

explosive range of 5% through out the vapor piping and the ship's tank. The entire vapor space in the ship's tank was not inerted; it contained only air and IPA vapor. The venting IPA vapor had a calculated heat content of nearly 1,000,000 BTU/hr. Engineering tables list 3,000 BTU/hr can be tolerated only briefly. If the venting vapors had taken fire, the maintenance man probably would have lost his life. It would be like standing inside an operating thermal oxidizer.

The only safety device protecting the ship from a flash back was a flame screen on the relief valve. I have personally used flame screens many times; I have found them to be repeatedly unreliable particularly when the fuel supply is being shut off. If the venting IPA had taken fire, probably, the ship's crew would try to shut off a vapor line on the ship as these are the only valves available in the line. Manually closing a ship's vapor valve may not prevent a flash back into the ship's tank, because the usual gate valve may close too slowly to stop a flash back flame and subsequent explosion. Inerting the ship's tank would exacerbate the overpressure problem.

After the pressure sensors were disabled, the MVCS vapor valve opened automatically. The manual vapor valve was closed at this time. The manual valve was opened very slowly to keep the oxygen sensors from tripping out the system. The excess pressure was manually relieved into the operating flare system. The slow venting took about 45 minutes. When the venting was complete, the pressure safety system was restored and the cargo loading was completed under vapor control.

FACILITY FOLLOW UP

Later a conference was held with the facility's safety manager, safety trainer, and maintenance supervisor where the incident was reviewed. They said they will incorporate this incident into their training program where the operations supervisor or the dock PIC must stop cargo loading when the MVCS shuts down. They also agreed to install an automatic cargo shutoff system which activates when the MVCS shuts down. This installed cargo valve shutdown system was tested under flowing cargo conditions. The cargo valve closed in 4 seconds after MVCS shutdown was activated.

REGULATION DISCUSSION

Many of the certifiers have known about the defect in 33 CFR 814(f) where the MVCS regulations require the only safe vent (flare) to close in the event of just an overpressure. Good engineering practice would not deliberately obstruct a safe pressure vent. CTAC in its suggested MVCS revision has eliminated the closing off of the safe MVCS vent system in the event of an overpressure. Because of the delay in issuing the new regulations, I suggest we issue a "white paper", NAVIC, etc. to remedy this problem or please speed up issuing the revised MVCS regulations. In a PLC controlled MVCS, removing the overpressure valve closing command takes about 30 seconds.

CONCLUSION

The facility's inspected docks are satisfactory for certification of the MVCS including automatic cargo shut down.

I stand ready to assist in revising the MVCS regulations.

Please call me if you need more information. The facility where this incident happened indicated they would like to remain anonymous to avoid future enhanced inspections. I will abide by your requirements.

You have my permission to use, copy, modify, or publish this letter.

Sincerely,

Richard J. Pichler, P.E.