

2013 Occurrence Reports

The Marine Chemist Qualification Board (MCQB or Board) examined twenty-one (21) occurrence reports in 2013. As part of its review process the Board examined the Marine Chemist's Certificate posted on the vessel with other facts provided. The Board advised each involved marine chemist of any findings related to the Certificate posted on the vessel as appropriate. There was no disciplinary action taken by the Board regarding any of the fire or injury events reported in 2013. A summary of the basic details of these 2013 occurrence reports, was presented to the Marine Chemist Association at the 2014 Sectional Technical Seminars. As a follow-up to that presentation this report is provided to all NFPA Certificated Marine Chemists so that it can be used as an education tool for each individual marine chemist or his/her customers during competent person training. Questions concerning the content of this report should be directed to the NFPA Marine Field Service.

Occurrence Types: Fires remain the predominant event with thirteen occurrences reported. Two fires caused personal injuries in addition to property damage. There was one reported explosion which caused significant property damage and serious injuries to workers. Based on marine chemists' reports seven persons were injured (requiring medical treatment) and two people were killed while engaged in shipyard related employment in 2013. There was one report of an accidental release of carbon dioxide from a fixed fire extinguishing system without injury.

There were two complaints made against marine chemists that resulted in disciplinary action by the MCQB.

Table 1-A. Occurrence Type

Fatality	Injury	Fire with Injury	Fire	Explosion	Near Miss	Complaint	CO2 Release
2	2	2	11	1	0	2	1

Vessel Type: As is typically the case, reported accidents occurred more frequently on military vessels, tank vessels and towing vessels.

Table 1-B. Vessel Type

Tug/Tow Boat	Tank Vessel	Military Vessel	Research Vessel	Fishing/Processor Vessel	General Cargo Ship	Cruise/Pleasure Craft
6	4	5	2	2	1	1

Accident Location: The engine room/machinery spaces and fuel tanks are locations where most accidents occurred during the past twelve months.

Table 1-C. Accident Location

Engine Room/AMR	Fuel Tank	Cargo Tank	Wing Void	Forepeak Stores	Ballast Pump Room	Dry Dock
5	3	2	2	1	1	1
Paint Locker	Damage Control Shop	Tow Knee	Ballast Tank	Ammunition Locker	Galley	
1	1	1	1	1	1	

Causal Factors: Information provided with each occurrence report allowed the MCQB to identify accident causal factors. Accumulation of Class A combustible material in the hot work areas and unauthorized hot work were the topped the list. Some incidents had multiple causal factors.

Table 1-D. Causal Factors

Causal Factor Type	Number of Occurrences
Combustible Material (Class A) near Hot Work [28CFR1915.503(b)(1)]	4
Unauthorized Hot Work	3
Equipment (e. g. ventilation fans, etc.) Failure	2
Leaked Product into Hot Work Space	2
Ineffective or No Fire Watch [29CFR1915.504]	2
Change of Conditions that Voided Certificate [NFPA 306-2014 §8.4]	2
Fail to Void a Certificate after Conditions Changed [29CFR1915.15(d)]	2
Failure to Get a Marine Chemist Certificate before Hot Work Began [29CFR1915.14(a)]	2
Pre-existing Respiratory Illness	2
Fail to Secure Work Piece that Was Being Cut with a Torch	2
Improper Hollow Structure Test/Inspection [29CFR1915.54]	1
Competent Person Failure to Test/Inspect a Fuel Line [29CFR1915.14(b)]	1
Leaking Acetylene Cylinder	1
Accumulation of Flammable Vapor Around Vessel	1
Improper Disposal of Unauthorized Smoking Material	1
Use of Non-fire Retardant Vent Ducting	1
Ineffective or No Competent Person Retest [29CFR1915.15(c)]	1
Poor Communication of Hazards [29CFR1915.12(f)]	1
Fail to Remove Combustible Insulation from Adjacent Bulkhead	1
Poor Maintenance of Fire Protective Barrier	1

Was a Marine Chemist's Certificate Posted?

For Fires/Explosions:	Yes	No
Was there property damage?	7	1
Was a MCC Posted?	6	2

For Personal Injury/Fatality:	Yes	No
Was a MCC Posted?	5	0
Was the MCC a casual factor?	0	5

Areas for Attention for Marine Chemists: Not all of the causal factors in Table 1-D are within the control of the marine chemist. However there are some things the marine chemist can do to improve the level of service provided to the marine industry. The following items were noted when the 2013 incident review is presented to the attendees at the 2014 Marine Chemists Association Sectional Seminars:

- Amending or altering of signed posted Certificates – voids the Certificate
- Understand the meaning of “inspection to the extent necessary for determination that safe conditions exist” and “personally determined”
- Provide sufficient hot work restrictions or exclusions and instructions
- Provide sufficient instruction for fire watches.
- Ensure that fire barriers are properly erected and other safety precautions are in place before the Certificate is signed and posted
- Understand requirements of US Navy Standard Items such as hot work near ammunition spaces (NAVSEA OP-4)
- As applicable, test hollow structures within pump rooms and other spaces or specifically state on the Certificate that hot work in/on or adjacent to the hollow structure is prohibited rather than just note the bilge is *Safe for Hot Work*.

2013 OCCURENCE REPORT NARRATIVES

What follows are brief summations of the nineteen accident events reported to the NFPA Marine Field Service.

FATALITY ACCIDENTS

A shipyard work suffered fatal injuries when a chain holding a 4-ton tugboat propeller parted and the propeller struck the worker. This incident was not related to the Marine Chemist's Certificate that was posted on the vessel at the time of the accident.

A group of eight shipyard workers were engaged in an abrasive blasting operation in a double bottom ballast tank. One worker with an apparent history of asthma complained of shortness of breath and later collapsed in a cargo hold. Efforts to revive the worker were unsuccessful and he was pronounced dead at the scene by emergency medical services (EMS) personnel.

The marine chemist's prior inspection of the space and Certificate posted 16 days earlier was not a factor in this incident. OSHA apparently investigated this workplace fatality.

INJURY ACCIDENTS

A worker was burned when a flash fire occurred in a ballast pump room of a tank ship. The Marine Chemist's Certificate limited hot work to bulkhead repairs and cutting an access hole in the bottom plate in the ballast pump room. The work scope expanded after the Certificate was posted to hot work on and around the ballast pump foundation. The foundation had been previously converted to a hollow structure to contain a leak from the adjacent HFO tank. This was not shown or discussed with the Marine Chemist. The hollow structure contained 2 or 3 gallons of fuel. The competent person drilled the hollow structure, blew air through it and then tested it. He reported finding: oxygen - 20.8% by volume and combustible gas - 0% LEL. The competent person then told the workers it was okay to cut the pump foundation. After flame cleaning the foundation for approximately 20 minutes fuel vapor flashed. Flame and liquid fuel erupted from the drill holes and an open weld seam; hitting the worker and burning his leg. After receiving first aid treatment the injured employee returned to work.

As a corrective action marine chemists were reminded at the 2014 MCA Sectional Seminars to test hollow structures within pump rooms and other spaces or specifically state that hot work in/on or adjacent to the hollow structure is prohibited. Rather than just write pump room bilge is *Safe for Hot Work*.

A worker was burned when he fell into the engine room bilge while cutting a lube oil tank off of a bulkhead. As the lube oil tank was cut from the bulkhead it fell into the bilge. The worker apparently lost his balance or was knocked into the bilge when the lube oil tank was cut away from the bulkhead. The cutting torch caused third degree burns on the worker's lower leg. He received medical treatment and returned to work. This incident was not related to the Marine Chemist's Certificate.

Two (30,000 bbls) tank barges caught fire and exploded during tank cleaning and gas freeing operations in Mobile, AL on 24 April 2013. There was no marine chemist involvement prior to the incident. The accident illustrates the hazards associated with tank cleaning and gas-freeing tanks that previously contained flammable cargoes. The barges had previously carried natural gasoline. It is believed that flammable vapor that was being exhausted from the cargo tanks was drawn into the engine intake of a tug boat that had approached one of the barges. A small fire occurred in the tug boat engine room. A back fire from the tug's engine expelled sparks from the stack which then ignited the flammable vapor surrounding the tank barges. A massive fire erupted on the barges and resulted in several explosions. Three people were seriously burned.

A worker received second degree burns on his hand and upper leg requiring medical treatment when vapor from a combustible liquid cargo was ignited by hot work. A Marine Chemist's Certificate was posted on the vessel ten days before the fire occurred. On the day of the

incident prior to hot work in the cargo tank the chief officer and shipyard personnel reportedly observed the cargo sump to be “to be slightly damp”. The competent person apparently did test the tank atmosphere near the tank entry point but he did not check the atmosphere near and in the sump with a combustible gas indicator. The cargo tank level gauging assembly was damaged by the fire. The Certificate limited the hot work to welding brackets in the fuel tank. The worker was using a cutting torch near the cargo sump at the time of the incident.

Evidence suggested that flammable liquid (the previous cargo) got into the cargo sump area from a leak in the float within the tank level gauging assembly. After the fire, ship personnel reported to the shipyard that they had experienced difficulties with leaks in the tank level gauging system floats. This information was apparently not communicated to the shipyard or the marine chemist before the Certificate was written and posted on the vessel.

Causal factors for this incident include but are not limited to: failure to communicate product leak problems with tank level gauging assembly to shipyard and marine chemist, leak of product into/out of tank level gauging system float, failure of the competent person to test the cargo sump with a combustible gas indicator, failure to void Certificate when damp cargo sump was observed and use of cutting torch when only welding was permitted by the Certificate limitations.

A safety alert highlighting this and similar incidents involving this type of tank level gauging system is posted on the NFPA Marine Chemist’s web portal page.

A worker suffered some type of respiratory distress while inside a fuel tank that was designated *Atmosphere Safe for Workers*. The incident was apparently the result of the worker’s pre-existing medical condition and not from the atmosphere in the tank. The test results on the Certificate were satisfactory and the tank was ventilated in accordance with the marine chemist’s written instructions.

OTHER INCIDENTS

A fire occurred in the damage control (DC) shop of the US Coast Guard Cutter. The DC shop is a designated hot work area. There was no Marine Chemist’s Certificate posted on the vessel as permitted by OSHA 1915, Subpart P. The fire reportedly was caused when a worker was using a grinder near an acetylene tank. The acetylene tank apparently was leaking gas which was ignited by sparks from the grinder. The fire spread to other combustible materials in the space and caused extensive damage to the vessel.

A fire occurred when hot work was performed in the forepeak stores area of a pleasure craft/yacht ignited combustible (Class A) material therein. The Marine Chemist’s Certificate was written for hot work to the main deck and bulwark above the fuel tanks. The forepeak store was not part of the work scope and the fire incident was not related to the Marine Chemist’s Certificate.

A carbon dioxide (CO₂) extinguishing system was activated when a cut section of pipe fell onto the trigger mechanism for the CO₂ system. The carbon dioxide was released into an unoccupied space so there were no injuries. This incident was not related to the Marine Chemist's Certificate.

A fire occurred on a decommissioned research vessel when hot work was performed near a paint locker. The paint locker reportedly contained paints and other hazardous materials. The hot work ignited tarps and other (Class A) combustible materials. There was no Marine Chemist's Certificate written for this vessel.

Minor damage to the insulation in a fish processing vessel occurred when hot work was performed on a diesel fuel pipe in a void space. The Marine Chemist's Certificate (issued 2 months earlier) was not for this particular job. The fuel pipe was penetrated when a crewman tack welded it to a bulkhead penetration. Approximately 5 gallons of fuel spilled which was then ignited. The vessel's crew managed to extinguish the fire before it spread beyond the void space.

An incipient stage smoldering fire that occurred in a tow knee of a push boat. Slag fell into the tow knee and began smoke. An alert fire watch extinguished small fire with a portable fire extinguisher.

Sparks and slag in an area of an engine room fell onto a work bench and ignited combustible material on it. The fire spread to the galley and another adjacent space on the tug. The fire watch assigned to the engine room apparently left the space with the rest of the crew at the end of the shift – a violation of OSHA fire watch requirements. The engine space was unattended for two hours when smoke was seen by members of the next work shift.

A corrective action marine chemists at the 2014 MCA Sectional Seminars were reminded to provide sufficient instructions for the fire watch on the Marine chemist's Certificate and to find teachable moments to instruct their customers on basic fire prevention requirements including but not limited to the proper use of a fire watch.

Despite a prohibition of smoking on the job a shipyard worker was apparently smoking near a 6 inch portable ventilation duct. The still burning cigarette was sucked into the ventilation duct. The duct was not a fire resistant type and it began to burn. The resulting fire consumed about 50 feet of ducting and damaged leads and lines that were next to the duct and caused considerable smoke damage in the affected refrigeration/fire-pump room. This incident was not related to the Marine Chemist's Certificate.

A gap between fire resistant cloth draped over the starboard main engine and the deck was apparently large enough to allow sparks originating from unauthorized hot work above the main engine to get beneath the engine and ignite combustible material. According to the shipyard the fire watch departed the area 30 minutes after the hot work stopped at the end of a shift. Smoke was observed coming out of the engine room before the next shift resumed

working in the engine room. With the use of infra-red imaging the fire department found the seat of the fire under the main engine. The fire was extinguished with foam. The marine chemist reported the bilges were clean but it was impossible to see completely under the starboard engine due to piping, etc. The need to be extra diligent when checking the area under engines and other difficult to see areas cannot be understated.

A shipyard worker assigned to repair broken angle welds on an outboard bulkhead in a wing void tank apparently left a MIG welding gun against the bulkhead of an adjacent cargo tank that previously contained #6 fuel oil residue. A "dime-sized" hole was burned through the cargo tank bulkhead. The worker then apparently departed the shipyard without telling anyone about the incident. Shortly thereafter smoke was observed coming out of the cargo tank. The fire department extinguished the fire. The Board determined that the fire was not the result of the Marine Chemist's Certificate and related inspection.

A fire in a galley of a fishing vessel was the result of electrical equipment and a commercial stove malfunction. The two Marine Chemist's Certificates issued to the vessel for other work in spaces away from the galley were not involved in this fire.

And finally, the Marine Chemist Qualification Board reviewed the shipyard's accident report and photographs concerning an electrical equipment fire in a fuel tank of a military vessel. The fire was the result of an overloaded circuit breaker. The marine chemist's tests and inspections and Certificates were not a factor in this fire.

COMPLAINTS

The MCQB investigated two separate complaints against two marine chemists. The first complaint from a shipyard alleged that a NFPA Certificated Marine Chemist did not test and inspect certain spaces noted on a Marine Chemist's Certificate and that he altered information on a Certificate after it had been signed and posted on a US Naval vessel. During the Board's investigation the marine chemist admitted he did not test and inspect all of the spaces listed on a Certificate because the purpose of the Certificate was to correct (by replacement of the Certificate) an error that was discovered on the Certificate that was written the previous day and he altered the date on a different Certificate for the same vessel. The Board also identified some apparent deficiencies in the marine chemist's knowledge of Navy Standard Items. Disciplinary action was taken by the MCQB.

The second complaint came from local port offices of the American Bureau of Shipping and the US Coast Guard. The complaint alleged that the marine chemist did not physically enter and visually inspect the double bottom ballast tanks of a tank barge and wrote instructions on a Certificate that were contrary the designation *Enter with Restrictions* and could have exposed marine inspectors and repairers to hazards within the cargo tanks of that barge. The Board's investigation determined that there was sufficient evidence to support the complaint and it took disciplinary action.

At about the same time as the Board was addressing the above complaints another incident involving a NFPA Marine Chemist was discovered. In this case the marine chemist was unable to board a vessel due to a preexisting injury. The marine chemist gave his test meter to a crewmember who then apparently tested and inspected the confined spaces on the vessel for the marine chemist. A Certificate was written but not signed by the marine chemist and then delivered to the vessel for posting. This marine chemist was immediately suspended by the MCQB.

Fortunately complaints against marine chemists are rare. However the complaints described in this report are disturbing. All occurrence reports including complaints are investigated to the extent possible by the NFPA Marine Field Service. As necessary the Marine Chemist Qualification Board will take appropriate action.

As a NFPA Certificated Marine Chemist you are reminded that the *Rules for the Certification and Recertification of Marine Chemists* shall be followed at all times when you are acting as a marine chemist. The Rules include but are not limited to:

§ II.A. Be of and maintain good character, and physically able to perform the duties of a marine chemist.

§ II.D. Affirm in writing an intention and ability to practice actively as a marine chemist.

§ II.F. Perform all work in accordance with the requirements of the Standard [NFPA 306] and its official interpretations when acting as a marine chemist.

The integrity of the NFPA Certificated Marine Chemist program and the support of the program by the maritime and shipyard (vessel repair) industries, OSHA, the US Navy and US Coast Guard demands nothing less.