

November 22, 2003

Report On the Current Status of the CO² System Onboard The M.V. Queen Of Nanaimo

Report compiled on behalf of the Ship's Officers Component, BCFMWU

Background

The M.V. Nanaimo is the sister ship to the M.V. Burnaby, and is currently the regular service vessel on route 9, Southern Gulf Islands, since 1986. The CO² system was recently modified at refit about 18 months ago, when it was discovered that the capacity of the system was much lower than required by regulations to flood the Engineering spaces. It was apparent that this condition had existed since the vessel was stretched in the mid 1970's due to an oversight at that time of the vessel modification. During the refit of spring 2002, an extension was being added to the engine room console to allow installation of an office area to accommodate the now required computer system that hosts Maximo, the BCFS maintenance tracking program. It was during the calculations of volume for this addition, and its subsequent impact on the CO² flooding requirements for the engine room proper, that it was discovered that the existing system capacity was far too small. A contract (**see note 1**) was let to make the necessary modifications to the fixed CO² system to bring it up to regulatory standards. The Senior Chief Engineer oversaw and approved the entire installation of the CO² system. Upon installation the fitted CO² system was inspected and after correcting deficiencies, approved by representatives of various regulatory bodies which are appropriate for this purpose. During the initial inspection of the completed work, it was discovered quite by accident that the engine room signal siren had been left disconnected. Once it was reconnected, all involved were apparently satisfied with the overall condition of the system. At this point, the vessel was returned to service, and no further problems were anticipated with the newly certified CO² system. The following refit, it was discovered that there was an oversight made during the installations of the aforementioned modifications. Black iron pipe had been used instead of coded piping. The services of Pacific Coast Fire Equipment Ltd. were obtained under contract to make the necessary changes to the pipe work. Again, the Senior Chief Engineer oversaw, and signed off on this work as completed to his satisfaction. The vessel once again returned to service. It is appropriate to mention that Ship's Engineers can visually inspect the system but are not certified to inspect, work on or approve the CO² installation for regulatory approval purposes

In the early summer of 2003, the Queen of Surrey experienced an engine room fire, and subsequently a catastrophic failure of the CO² system when it was deployed at that time. The follow up investigation to that event revealed several deficiencies in the installation of the system on the Queen of Surrey as a result, a fleet wide effort was undertaken to determine if there were similar problems on other BCFS vessels. Engineering staff fleet wide were originally asked via a bulletin to perform a cursory visual inspection on their respective vessels and to report anything obvious. The CO² system inspection process was initially conducted by the ship's Engineering Staff onboard the Nanaimo, it became readily apparent that there was a lot more knowledge required than originally thought about the correct installation of these types of systems in order to properly perform any kind of assessment. Further to this, it was discovered that there were no up to date drawings of any kind on the new system either on the ship's firefighting plans, or in the ship's blueprints. One of the regular Chief Engineers tried to find information on specific

requirements for fixed CO² systems from the various regulatory bodies, but the information was vague and spotty at best. Regardless, he set about to compile as much information as he could from any relevant source associated with North American marine regulations.

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In the middle of November, 2003, some six months after the Queen of Surrey fire, an inspection of the CO² system was carried out by in-house representatives from the BCFS safety management department. This inspection was carried out in the presence of the Senior Chief Engineer while the vessel was underway on her return voyage to Long Harbour on Salt Spring Island. The rest of the engineering crew were aware that the inspection was taking place, but did not participate directly, with the sole exception of the Engine Room Assistant (ERA) who led the two 'inspectors' down to the CO² compartment. Once he got them there, the ERA, of his own volition, pointed out a few problems that he had noted previously. This particular ERA just happens to be a British Columbia trade qualified steam fitter with over 30 years experience, including high pressure applications. It is unknown if the two BCFS persons were similarly qualified, but speculation has it that they are not.



CO² Compartment onboard the M.V. Nanaimo.

Once the vessel returned to Long Harbour, all passengers were discharged, and the engines were shut down at tie-up for the afternoon layover period. At approximately 1430 hours, the on-watch engineers were sitting in the console awaiting their PM shift counterparts to arrive for the handover, when the Senior Chief Engineer announced that there was a serious problem with the fixed CO² system that became apparent during the inspection. He went on to say how that the system, if deployed, would likely suffer a catastrophic failure quite similar to the failure of the same system on the M.V. Queen of Surrey earlier that year. When he was pressed for details, the Senior Chief Engineer described that many of the whip lines that connected the CO² bottles to the cascade system were very loose, as well as many other problems. Although no paperwork was produced to back up these assertions, the watch members felt quite uneasy about what they had just been told, and unanimously expressed a desire to take action about the situation.

Shortly before the engineering watches (AM & PM) were able to take action, the S/C/Engineer ordered crewmembers to attend the CO² compartment with appropriate tools to rectify the situation. Apparently, if the lines and fittings were tightened to his satisfaction, the vessel would be permitted to sail. One of the engineers placed a phone call to a Transport Canada Marine Safety Inspector to advise him of the situation, at which point it was discovered that the S/C/E had already talked to the same inspector, and gotten permission to proceed as described above. The watch engineers weren't too happy about this, but went along with it anyways mainly because of fear of reprisal. Further to this, during the course of performing adjustments, the S/C/E had overseen the entire operation, but no safety protocols were observed. Although there

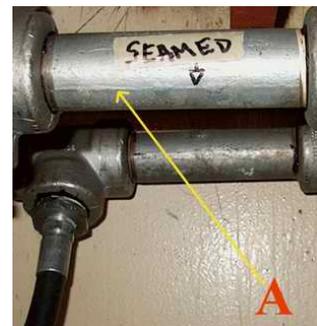
is no downstream valve from the cascade system that could have been isolated, the engine room was manned for the duration of this time. In retrospect, it was decided through discussion that what should have happened, was to shut down all running machinery in the engine room, place the vessel on shore power, and evacuate the engine room until repairs and adjustments were completed. Studies conducted by other organizations in North America, including the EPA, have shown that the majority of accidents with this equipment occur during occasions where adjustments are being performed.

The Transport Canada inspector had also specified that DBC Marine Ltd. (at the recommendation of the Senior Chief Engineer) were to attend the vessel the following morning to perform their own inspection, and the inspector himself would also attend later in the same day. The following morning, (Nov 20th) DBC contractors boarded the vessel at Tsawwassen Terminal, and performed their own inspection of the system at that time. There were still several loose connections found, along with many other problems including valve heads not fully inserted into many cylinders. Some adjustments were performed to the piping work at that time as well. Again, no safety protocols were observed, and the vessel was underway with passengers onboard at the time.

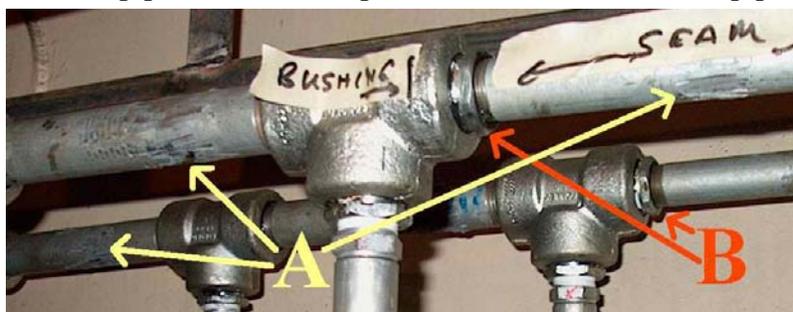
Due to the fact that the report from DBC is still forthcoming at the time of this writing, it was decided by the author to conduct our own investigation into the exact nature of the current status of this critical safety system. The results are alarming to say the least.

Accompanying this report is another report compiled by Ernest Titcomb, who is the certified steam fitter referred to earlier in this document. It details specific concerns with the present status of the piping arrangement of this system. The following pictures will detail some of those concerns, plus a few others worthy of note.

The use of Schedule 40-A53 seamed galvanized piping is inappropriate for this type of application. The pressure shock loading applied to the whole system coupled with the cryogenic shock of CO² being applied can cause this type of pipe to fail easily, thus rendering the system far less effective than intended. Further to this, rapid over-pressurization of the CO² compartment can cause unexpected injuries to unaware personnel that would likely be in the vicinity during system deployment. The seam in this particular pipe nipple is clearly visible as referenced by the arrow "A" in the picture at the right.



The amateurish installation of some of these nipples via excessive force has caused significant damage to them. These bite marks from the pipe wrench used, penetrate the sidewall of the pipe, and set up stress risers that can significantly reduce the safe working pressure. These are referenced by "A" in this picture. "B" is showing reducer bushings that are not properly rated for this type of service, as well as



the fact that reducer bushings shouldn't be used to begin with.

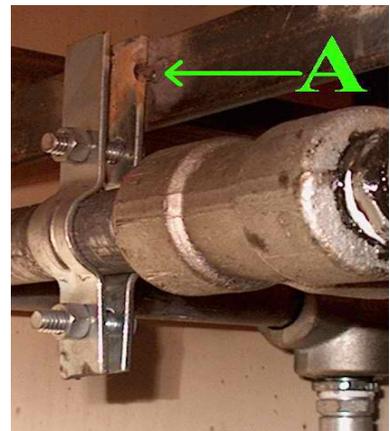
During one of the inspections, it was discovered that a significant number of valve bodies that are not properly installed into their respective CO² cylinders. This is evident by the fact that threads are visible. In the picture at the left, "A" indicates a valve head that is incorrectly installed, while "B" shows what a correct installation looks like. In the picture below, one can see that the majority of the cylinders are marked with an "L" in felt pen, presumably by one of the inspectors. This is to denote a loosely installed valve head. This particular bank is located in the paint locker, and if you look closely, you will notice that the majority of this bank of cylinders is marked in this fashion. Further to this, one can see that there are extreme bends in the flexible whip lines that connect each cylinder to the cascade system manifold.



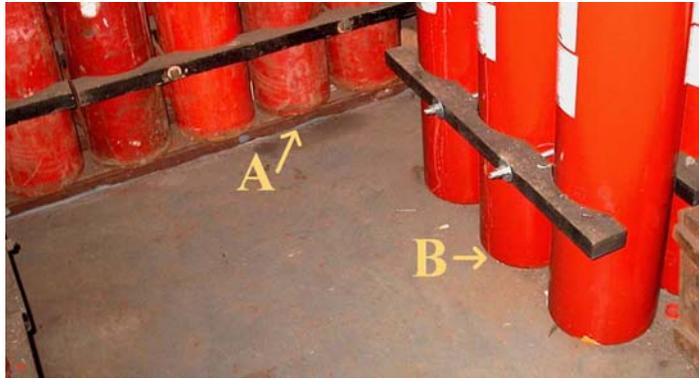
At one point during this inspection, it was discovered that there is corrosion on one of the release assemblies. The particular assembly in question is the "B" handle for the bow propeller compartment flooding system, and the corrosion is on the back side of the mechanism. It is unknown exactly why this corrosion is present, and to what extent it is present on the interior of the assembly. However it is noteworthy that several qualified people have performed inspections on this equipment, and apparently passed it as serviceable despite this seemingly glaring defect. The substance is depicted by the red arrow "A" in the picture at the right.



The bracketing used to support the new installation is rather lightweight given the magnitude of the shock loading that can occur upon deployment of the CO² gas. In the picture at the right, one can see that this particular bracket is only tacked on to the support steel as denoted by the green arrow "A". Failure is certain to occur at this location. These brackets should be replaced with units of heavier construction.

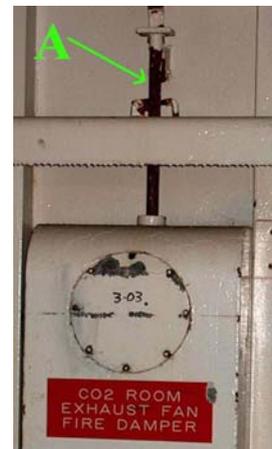


These pictures illustrate a shortcut taken in the installation of the extra cylinders. It is common practice to mount cylinders on a wooden base if a steel deck is present. This is to prevent fretting of the base of the cylinders induced by vibrations from normal ship operations, which can therefore weaken a cylinder, risking potential failure of said cylinder. The picture at the right shows the wooden base below cylinders as indicated by “A”, while “B” shows direct mounting on the steel deck. The lower picture shows the entire bank of new cylinders in the paint locker on the steel deck.



This is a picture of the most recent service tag. As indicated by the red arrow “A”, the area inside the circle only contains a felt pen scribble that is the “signature” of the technician who last inspected this system at the refit in the spring of 2003. What is significant is that there is in fact supposed to be a numbered stamp here instead, the number being used to identify the technician by his certificate, and his initials to verify its authenticity.

One of the findings in the BCFS investigation of the fire on board the Queen of Surrey was that at the previous refit, the ventilation damper for the CO₂ compartment had accidentally been left in the closed position. This fact contributed to the violent explosion that occurred when the compartment was over-pressurized due to the accumulation of leaking CO₂ from the system that failed upon deployment. Among other things, the closed 4 dog hatch was violently blown off due to this buildup of pressure. If anyone had been near the hatch at that time, they could have easily been seriously injured or even killed. For this reason, there was a directive issued to remove the dampers from the CO₂ compartments on affected vessels fleetwide in order to reduce the possibility of re-occurrence. As you can see referenced by “A” in the picture, the damper is



still in place on board the M.V. Nanaimo.

Conclusion

This report was created in an attempt to help illustrate the magnitude of the safety problems onboard this vessel. This is by no means the only safety issue onboard this vessel, and in the case of the rest of the fleet, is consistent with what one can expect to find on almost any other vessel. The Ships Officers have been trying for years to get many of these compelling safety issues dealt with, but are continually stonewalled by management mainly because of financial reasons. The favourite tactic of Management is to complain to the press and regulatory bodies that the pressing safety issues raised by the Ship's Officers that these are not safety issues but Labour/Management issues. The Regulatory Agencies then immediately back off and refuse to deal with these issues. Further to this, Ships Officers are frequently labeled as whiners and complainers for even broaching these issues despite the well publicized claims by management that "Excellence in Safety is our Number One Priority". Unfortunately, the only action taken with regards to safety issues at BC Ferries is reactive and that reaction is only created when we manage after huge effort to bring the points across in the media. A case in point was the fatal loading accident aboard the Queen of New Westminster over ten years ago. The outcome of the Nemetz inquiry cited many recommendations which were only implemented due to the high public profile that accident generated. Regulatory bodies are as much to blame here for allowing political interference to take precedence over legitimate safety concerns. The sheer amount of variances to regulations granted to BCFC then BCFS over the years are in a word staggering. These variances allow a vessel to operate in contravention to regulatory controls on the understanding that the specific issues will eventually be corrected, but are often just further delayed, or in some cases, are ignored completely. The irony is that foreign flagged vessels attending Canadian ports or transiting our waters are frequently shut down completely for even one seemingly minor infraction, yet one of the largest ferry operators in the world is allowed to sail around in sheer hypocrisy.

Note 1 In the original report DBC Marine Ltd. was **incorrectly** identified as the contractor of record that supplied and installed the expansion to the Queen of Nanaimo CO2 system. We apologize for any confusion this incorrect statement has caused.