# National Transportation Safety Board

Washington, D.C. 20594
Office of Marine Safety

## Interview Summary – DCA21FM028

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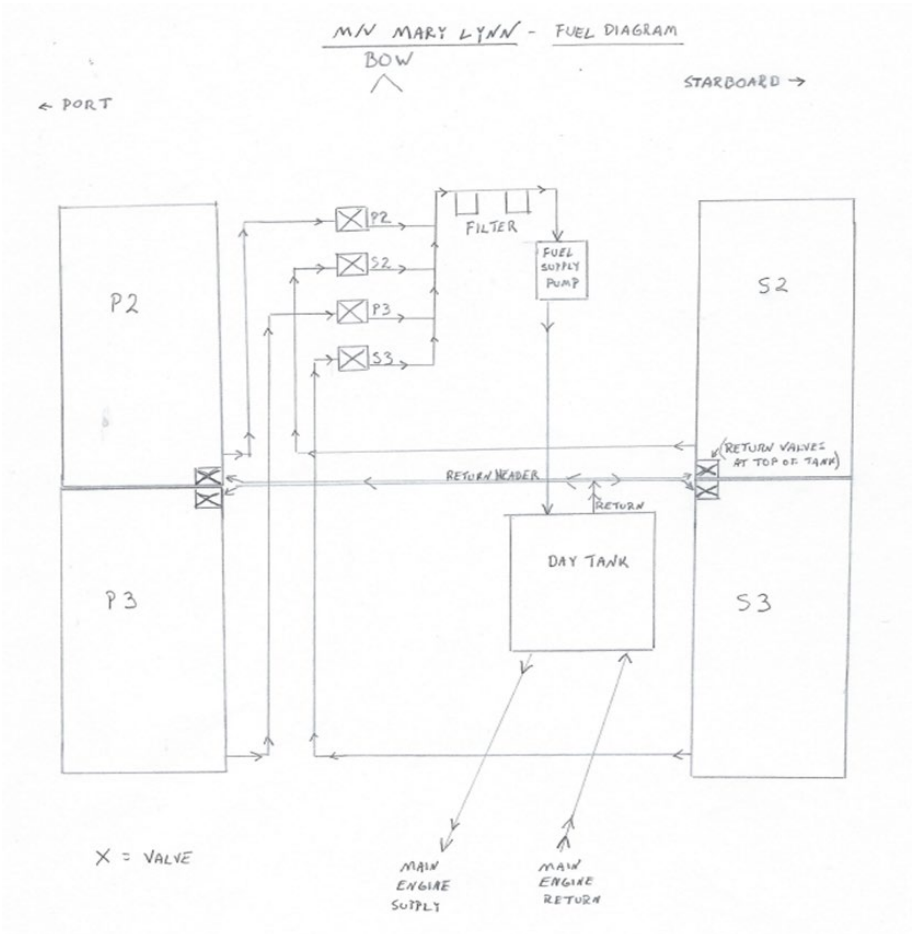
| **Interview of:** | Steven Engermann – President of Hermann Sand & Gravel Inc<br>Missouri River Towing LLC |
| **Date/Time:** | February 4, 2022 – 1005 to 1100 CDT |
| **Location:** | Conference call |
| **Interviewed by:** | Adam Tucker – NTSB and Bart Barnum - NTSB |
| **Attendees:** | None |
| **Accident:** | May 18, 2021, engine room fire aboard the towing vessel *Mary Lynn* at mile 176 upper Mississippi River, St. Louis, Missouri. |

Mr. Steven Engermann, president of Hermann Sand and Gravel, Inc. agreed to answer questions related to the towing vessel *Mary Lynn's* fuel oil system and diagram that he provided to investigators.




*Mary Lynn* fuel oil system diagram provided by Mr. Steven Engermann on February 4, 2022.

- When asked about the *Mary Lynn* chief engineer's statement that the return valves to the fuel oil storage tanks were closed, thus causing an over pressurization in the fuel return line, how would this happen if fuel is being taken out of the day tank, and a lesser amount of fuel is returned to the day tank. Mr. Engermann opined the fuel system was under vacuum for a point in time. He noted that the vessel was being operated at full rpm after taking on fuel and the day tank on the *Mary Lynn* was not very large (he estimated it was 250 to 300 gallons), and if they ran for an hour, they would have burned half or more of the fuel. The day tank was not vented so the system could have been under vacuum. With respect to the starboard main engine and the fuel filter canister that the chief engineer found dry, although he did not know if it was possible or not, Mr. Engermann wondered if the system was under vacuum, and whether that was the cause of the fuel filter canisters for the starboard engine to be dry.
- When asked if the day tank had a vent, Mr. Engermann confirmed there was not an overflow vent to the main deck. It was lined up to utilize the storage tanks vents. He added that if there was a vent to the deck from the day tank that this casualty would not have happened. It would have been the one mechanical device in that system that would have prevented the accident. With a vent, they would have at least been able to rule out vacuum and pressure as causal factors.
- With respect to the sight glass that broke, when he first looked at it after the fire, it was discolored. He had witnessed people in the past starting the engine which instantly blows the glass, but this glass was all still sitting there on the fuel housing with discoloration at the break spots. That is why he thought the system was under vacuum because of how the glass broke but he added that he had no explanation for the fuel spray that followed once the glass broke, if the system was under vacuum. He opined if the chief engineer had the fuel oil supply pump off, maybe he turned it on manually or if it was in auto mode, it may have energized when the day tank level got low.
- When asked when the fuel oil supply pump is energized, what happens when the day tank gets full, would it overflow it to the storage tanks or cut off at a high-level, Mr. Engermann said that if it ran in auto, it would start automatically at a low level and stop at a high level. However, the pump was normally operated in manual mode, and they ran it by cycling through the day tank and then back to whatever storage tank they were taking fuel from. For example, if you were taking fuel out of the no. 2 tanks, fuel would be pumped to the day tank and would return to whatever storage tank that was chosen by having the return valves open to those tanks.
- When asked why they typically ran the fuel supply pump in manual versus auto mode, Mr. Engermann said that typically when they are pushing upriver and consuming a lot of fuel, they would leave the pump on manual and cycle fuel all the time which would clean the fuel and keep the day tank supplied with cool fuel. He noted they had previously had trouble with hot fuel going to the generators, so that is why they ran the pump in manual mode. Back to the original design of the boat, based on past engineers he had spoken to, they ran the supply pumps all the time which kept the fuel cool. The *Mary Lynn* had capacity for about 40,000 gallons of fuel so they kept cycling it, which also cleaned the fuel because it was being pulled through the fuel filters.

- Mr. Engermann reiterated that maybe at some point in time the fuel system was under vacuum and then maybe became over pressurized, but he didn't know how that would happen. The exhaust gas temperatures (EGT) on an EMD are not that high and he questioned if they would even get over 600° F, noting that the engines were roots blown and not turbocharged. He added the exhaust manifolds on the *Mary Lynn* were wrapped with heat shielded lagging and if it was over 500° F, he would be surprised that there would be anything hot enough to cause ignition of the fuel.
- When asked if the EGT's were ever above 600° F, Mr. Engermann said he would doubt it but noted the vessel logs should show what the EGT's were.
- With respect to the fuel oil system diagram drawn by Mr. Engermann, he was asked about the fuel supply pump and specifically if that was the pump that moved fuel from the storage tanks to the day tank. Mr. Engermann confirmed that the pump was for that purpose. When asked of the fuel suction filters, Mr. Engermann was asked if there were two as drawn or three to which he confirmed there were three.
- When asked of how the fuel oil system would over pressurize as per what was described to investigators by the *Mary Lynn's* chief engineer, Mr. Engermann opined that the fuel system was operating under vacuum at some point. After they took on fuel and the *Mary Lynn* was moving from one fleet to another at a high rpm, with a day tank that was not very large, if the boat was run with no fuel supply from the storage tanks to the day tanks, they would have burned through all the fuel in the day tank. He noted that the day tank should have been vented but was not which is the reason he thought the system may have been under vacuum. From the chief engineer's statement, the starboard engine was not revving up, and when the chief engineer checked it, the fuel canister was empty with no fuel in it. If the system is under vacuum, pulling more fuel than what was returning, Mr. Engermann said that it is probable a vacuum existed if the fuel oil supply pumps were off as the chief engineer said.
- When asked to verify if the fuel supply pump referenced in the fuel oil system diagram was the transfer pump that moves fuel from the storage tanks to the day tank, Mr. Engermann said it was.
- When asked of the suction filters on the pump, Mr. Engermann said there were three filters, not the two that were on the fuel oil system diagram.
- When asked to confirm if there were two fuel supply pumps, Mr. Engermann confirmed there were two. He confirmed the discharge of the supply pumps go to the day tank. From the day tank, there was a suction line to the consumers. Mr. Engermann said there was an engine driven fuel pump on each engine as well as on the suction line before the two main engines, there were two more fuel filters. Asked to confirm that the spin on filters on the front of the engines were the ones with the glass bulbs, Mr. Engermann confirmed that was correct.
- When asked about how the spin on duplex filter system with the glass bulbs work, Mr. Engermann said that the way he understands it, is that is what maintains pressure to the fuel injectors and there is a pressure relief valve within the duplex filter. If one of the filters, noting that one was a primary and the other a secondary, if the primary gets clogged, the secondary glass bowl will fill up with fuel which is an indicator that the

primary filter is bypassing and whenever you see that, then it is time to change the spin on filters. He described it as more of a filter restriction indicator.

- When asked if the primary bulb is always full, Mr. Engermann confirmed it was, and that was an indicator that there was fuel going to the engine. Based on his understanding of how the system works, Mr. Engermann said that when the second bulb fills up, that is an indication of a dirty filter.
- When asked if there is another fuel filter for each individual injector once the fuel leaves the spin on filtration system to the manifold, Mr. Engermann said he did not know but noted maybe there was a screen built into the fuel injectors. He noted there was nothing they could change other than the injector itself.
- When asked after fuel leaves and goes to the return manifold, if it ties back into the spin on filters or anywhere else, or if it goes back through a regulating or check valve, Mr. Engermann said he thinks it returns through the spin on duplex filter but said he did not fully know the system. He thought it returned through the filter housing because that is what sets the pressure on the fuel injectors. He thought there had to be means of restriction on the fuel oil return to maintain the appropriate pressure to the injectors noting that if you don't have a certain amount of pressure on the system, then you don't know how much fuel is going to the injector.
- When asked regarding the fuel return line, once it leaves the spin on filter if the fuel then returns to the day tank, Mr. Engermann confirmed that was correct. He noted he did not know what happens if the glass bulb breaks as to whether that affects the pressure or not.
- When asked about the glass bulb that broke on the *Mary Lynn*, if that bulb was on the supply side and if it should be full, Mr. Engermann said he could not recall exactly.
- When asked if 25 psi was an accurate pressure that was maintained in the fuel supply system, Mr. Engermann recalled that it can't go over 60 psi and that 15 to 25 psi would sound correct.
- When asked of his opinion regarding the fuel system being under vacuum and what the chief engineer described as fuel shooting out of the broken bulb, Mr. Engermann replied if it was under vacuum, he would not expect to see fuel spraying anywhere. He noted that he has seen those bulbs break before when someone was in a hurry and replaced the filters and forgot to close the suction and return valves right by the fuel filters, due to the day tank being above the engines. He said you would have to shut down, spin the old filters off and put the new ones on, and then open the valves again. He has seen it happen where they forget to open the suction and return lines and as soon as they start the engine, it blows the bulb which makes a mess. He noted he has only seen that happen when the engine is at idle and would not know what would happen with the engine at 800 rpms.
- When asked about the fuel oil supply pump, the one they run manually when underway, where it is turned on and off from, Mr. Engermann said it was in the machinery room. There is a motor starter box with a three-way selector for auto off and manual. When asked to clarify where the machinery room was, Mr. Engermann said that was the room forward of the main engine room. It has the fuel pumps, air compressors and fresh water supply pumps there.

- When asked about the water removal from the storage tanks the chief engineer said he was doing before taking on fuel, and the reason the system was installed, Mr. Engermann described the manual water removal valve was high in the tank, so a pump was installed with a set of coalescing filters to remove the water from the fuel. The fuel is then returned to the same tank. The manual drain valves, to get the water drained into a bucket, were probably 3 to 4 feet off the bottom of the tank. The bottom water drain valve is a half inch off the bottom. When the tanks were low, they sometimes had trouble getting the water out of the fuel which could cause algae problems. They used the extra filtering system to pull water out and to cycle the fuel to keep it clean. It was ran through a canister that would drop the water out, which there was nothing inside of it, but they could get water to drop out of the fuel and they would then run the fuel through a different set of 10 micron Raccor filters before returning it back to the tank. He noted that doing this for an hour a week would eliminate a lot of problems with changing the filters on the engines. The draining of the water from the fuel tanks was not an everyday task and was something they would do about once a week. They tanks were not leaking water.
- When asked if the water filtration pump was a plug in, Mr. Engermann confirmed it was a plug-in pump. When asked about any subchapter M or third-party organization (TPO) inspections with respect to the water filtering system on the *Mary Lynn*, Mr. Engermann said the *Mary Lynn* did not have a certificate of inspection.
- When asked, based on the submitted fuel oil system diagram, about the pump discharge going into the return header line to whatever tank is open, and if it also goes to the day tank, Mr. Engermann confirmed it goes to the same header line. When asked of the overflow line having a check valve in it, or manual valve to prevent backflow into that tank, Mr. Engermann said they did not run the fuel supply pumps and the water filtration system pump at the same time.
- When asked if there was a way to isolate the day tank return line when pumping fuel back to the fuel header, Mr. Engermann said he could not recall if there was a check valve on the return line to the day tank or not.
- When asked if the return valves to the storage tanks were higher than the day tank, Mr. Engermann said they were not. The return lines at the fuel storage tanks are at the top of those tanks and the day tank is above that on the main deck.
- When asked if the engineer was having a problem with getting fuel to the engine, could Mr. Engermann see the engineer manually turning on the fuel transfer pump to make sure that he has fuel to the day tank, Mr. Engermann said the pump should have been on. He noted he is puzzled as to why the chief engineer said it was not on since they would have run out of fuel. He noted that his personal action, if notified that the engine was not revving up and there was no fuel in the filters, he probably would have gone upstairs to look at the day tank and then he probably would have double checked to make sure the fuel pump was on.
- When asked if there was any way to get out of the machinery room other than through the engine room, Mr. Engermann said there was a passageway that went to the hallway in the accommodation upstairs.

- Mr. Engermann opined that considering that the day tank was one deck above the main engines (head pressure), and if there was no fuel in the Raccor canister filters as the chief engineer reported, if there was a bad o ring, there would still have been fuel coming into the filter.
- When asked if the engine had a low fuel pressure alarm, Mr. Engermann said there was not, they had day tank level, water temperature, low oil pressure and water expansion tank level alarms.
- When asked if the alarms were in the engine room only or in the wheelhouse, Mr. Engermann said they had a repeater alarm in the wheelhouse that would have been audible and visual (red light). The engine room control station would provide indication as to what type of alarm there was.
- When asked of the fuel supply pump control, Mr. Engermann said he thought the control for the automatic mode was on the inside of the electrical box in the machinery room and not on the outside. From one electrical box you would select what pump to use and then from the other box you would start and stop the pump.
- When asked if the supply pump was erroneously or unknowingly in auto mode, if the supply pump would start once the day tank got to a low-level alarm, Mr. Engermann said there are 4 check valves on the suction side of the fuel supply pumps and there are check valves on each tank so typically they ran off both tanks. They would run off both no. 2 tanks or both no. 3 tanks. The check valves where there so that fuel would not run from one side to the other if the boat was leaning. Depending on the workload of the boat, if running upstream for example, they would keep the supply pump running in manual so that cool and fresh fuel went to the engines. When asked if pulling from both tanks if they would also return to both tanks, Mr. Engermann said that is correct.
- When asked if they ever ran into a problem where the day tank return only went to one of the two tanks, Mr. Engermann said with whatever tank was fuller, it seemed like that was where it would come from, and they never had any issues with keeping the tanks at the same level.
- When asked with respect to the fuel system schematic diagram provided, what the no. 4 tanks were used for, Mr. Engermann said the no. 4 tanks were part of the original system of the boat, but they were only using them for dirty oil or slop.
- When asked of the day tank capacity, Mr. Engermann said he did not know what the exact volume of the tank was. It was on the starboard side forward engine room on the main deck.
- When asked of the type of generators on the *Mary Lynn*, Mr. Engermann said one was a 671 Detroit, and the other was a John Deer 6068.
- When asked how long they had the *Mary Lynn* in service with the company, Mr. Engermann said they started leasing it in 2012. When asked of his familiarity with the *Mary Lynn*, Mr. Engermann said he used to operate the boat and most of the time he was the captain but sometimes he was the pilot.
- When asked if the *Mary Lynn* had a CO2 system on board, Mr. Engermann said it did not.

- When asked about why the chief engineer would shut the return valve after draining water from the fuel tank, Mr. Engermann said he did not know. The only reason to close them would be when switching tanks. For example, if you would stop pulling from the no. 3's and go to the no. 2's. He noted that he would have first opened the other return valves to the tank he was planning to use before closing the other ones.
- When asked about the chief engineer's time on the *Mary Lynn*, Mr. Engermann thought it might have been his third hitch on the boat. He had been on board three weeks prior to the fire.

**End of summary**