



**To:** Canadian Pacific  
**From:** Spill-X  
**Date:** 07-16-2010  
**Subject:** July 13<sup>th</sup>, 2010 SpillX Testing Results

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## **Background**

The SpillX system was developed to significantly improve fueling rates, reliability and safety associated with locomotive fueling. The system uses a mil spec standard for dry break fueling connections used in the aviation industry for decades. SpillX is comprised of a nozzle attached to the fueling crane, a receiver installed in the fill tube of the locomotive and a fuel shut off valve connected to the receiver via a flexible stainless hose. Installation of the system takes approximately 15 minutes and requires no modification to the locomotive or the fuel crane.



## **Testing**

Testing was conducted on July 13<sup>th</sup>, 2010 at the CP Moose Jaw facilities using both east and west cranes on the shop service track. Currently, the facility uses a standard fueling system operating at 55 psi. Operation at higher pressures is not possible due to excessive fuel foaming and nozzle shut down as a result of the high pressure.

### **Current System – 55 psi – 800 LPM (210 U.S. GPM)**

The pressure of the facility is measured at the end of a 10” fuel pipeline immediately prior to the main line distribution fuel cranes. Testing was conducted on the shop track, which is located 30% down the 600 meter pipeline. The pressure stated here represents the pressure in the 10” diameter pipeline header.

### **East Crane Platform - Unmodified**

The east crane was not modified in any way other than removal of the current nozzle and installation of the Spill X nozzle. The infrastructure at the crane platform had a flow limiter installed.

The components on the locomotive were also exchanged for the SpillX receiver and fuel shut off valve. The system was brought up to pressure gradually to ensure safe fueling events, and to check for system functionality, inspection for foaming, and record the fluid hammer of the system shutdown. The following data was collected:

**SpillX System – 25 psi – 720 LPM (190 U.S. GPM)**  
**SpillX System – 35 psi – 1020 LPM (270 U.S. GPM)**  
**SpillX System – 45 psi – 1200 LPM (315 U.S. GPM)**

#### **West Crane – Flow limiter By-Passed**

The west crane was modified to remove flow limiters so that higher flow conditions could be reached. The following represents the flow rates achieved with the modified crane and existing pumps:

**SpillX System – 45 psi – 1450 LPM (380 U.S. GPM)**  
**SpillX System – 55 psi – 1500 LPM (395 U.S. GPM)**  
**SpillX System – 60 psi – 1650 LPM (435 U.S. GPM)**

We were unable to increase pressure beyond 62 psi due to pump performance problems. It is believed that the system is capable of increased flow rates up to 70 psi pressure. We believe that Lukay Research has identified and solved the pump problems; however further flow testing would be required to demonstrate the maximum pump and nozzle flow.

The flow rate of 435 GPM represents a pressure of ~35psi at the nozzle of the SpillX system.

#### **Conclusion**

Test results indicate that the SpillX system is capable of fueling a locomotive in nearly half the time of the existing system without any modification to existing infrastructure. Under the same given line pressure, the SpillX system was able to flow 88% more, provided the pump capacity is available and no other flow limiting devices hinder flow. (current system 55 psi @ 210 GPM vs SpillX 55 PSI @ 395 GPM).

In addition to increased fueling rates, the dry break connection ensures spillage is kept to a minimum upon disconnect. The smooth controlled shut down minimizes pressure surge through the fueling facility. Also, the SpillX system eliminates the problem of fuel foaming as there is no air introduced into the fuel stream. This was also verified through an inspection port in the fuel tank by CP personnel.