

## *Detailed Transmission Events Log*

A chronological account of the transmission events that occurred during Arthur is included below. A summary table of transmission events is included at the end of the section.

**L5532, L5541, L5544:** The first transmission event occurred at 5:59 AM on Saturday, July 5 between substations 13V Gulch and 50W Milton, affecting 2,285 customers. L5532, L5541 and L5544 both tripped off due to 69kV leads connection failure just outside the 3W Big Falls substation. A transmission crew was dispatched to isolate and repair the leads at 3W. At 6:00 PM the 91W-503 switch at Middlefield, was opened by Field Technicians and L5532 was re-energized at 9:30 PM from 3W Big Falls to 91W Middlefield once the patrol was complete to ensure there were no other issues on the line. L5532 from 91W to 13V Gulch remained out, as multiple trees and structure damage were identified during the patrol. The 69kV line was isolated, trees were removed, repairs were made to the structures, and the line was re-energized to the open 91W-503 switch at 91W Middlefield at 8:30 PM, Sunday July 6. All substations with customers along L5532 were re-energized at this time. L5532 was fully re-energized at 7:29 PM on Sunday, July 6. L5541 and L5544, were fully re-energized on July 5, at 3:06PM.

**L6013:** At 7:42 AM on Saturday, July 5, L6013 tripped off, no customers were affected at that time, as it is one of two 138kV lines into the valley. Through automatic fault location and transmission inspectors, it was determined that a fallen tree caused the outage and plans were made to isolate the line and remove the tree. At 5:00 PM, Saturday, July 5, L6013 was re-energized

**L5035, L5019, L5020, L5547, 4049:** L5035, L5019 and L5020 which feed small hydro sites and the Acadia University distribution substation all tripped off at 7:48 AM, Saturday, July 5. A patrol was started on L5035 to determine the cause of the fault. L5547 tripped at 8:27 AM on Saturday, July 5, causing an outage to 2,814 customers; the subsequent patrol found an osprey's nest to be the cause of the fault. L5547 was re-energized at 9:32 AM on Saturday, July 5. Helicopter patrols of lines L5035/L5019 found many trees and structure damage along the 69kV lines. Repairs were started on lines L5035/L5019 and were completed at 4:18 PM on July 7. Once work was complete on L5035/L5019, trees were also removed from the 25kV line L4049 that feeds Acadia University. Once all three lines were clear, Acadia

University was re-energized at 4:18 PM on Monday, July 7. L5020 was intentionally left out of service as the Methals Hydro Station was beginning a month long maintenance outage.

**L5021:** On Saturday, July 5, low voltage SCADA alarms in the Coldbrook/Klondike area came into the Control Center just before 8:30 AM on and a technician was dispatched to the 50V Klondike substation. It was determined that two power fuses on the 50V-T1 transformer had tripped, so to avoid further voltage issues, the breaker at 43V Canaan Road feeding L5021 to 50V Klondike was remotely tripped at 8:32 AM July 5. The technicians proceeded to test the 50V-T1 transformer to see if any damage was caused, but all of the tests came back negative. L5021 was re-energized at 1:01 PM.

**L5015:** At 8:57 AM, Saturday, July 5, L5015 tripped off affecting 7,737 customers. The line was patrolled near the fault location but nothing was found in the vicinity. Crews were sent to the area and a switching procedure was lined up to transfer all of the 79V Three Miles Plains customers over to an adjacent 69kV line, L5016. Switching was completed at 3:30 PM. Once the switching was completed, the entire line was patrolled and a broken conductor and multiple trees were found near the mid-point of the line. Plans were made to make repairs. L5015 was returned to service at 8:35 PM on Monday, July 7.

**L5536:** L5536 tripped off at 9:44 AM on Saturday, July 5 due to multiple trees on the line, affecting 8,613 customers. The trees were located and removed by the transmission inspectors and L5536 was re-energized at 2:50 PM.

**L6012:** A second 138kV line, L6012, tripped at 9:57 AM, Saturday, July 5, but once again no customers were affected as L6004 was still in service. A tree was found on the line, so plans were made to isolate the line and remove the tree. At 6:55 PM on July 5, L6012 was re-energized.

**L5535:** At 11:26 AM on Saturday, July 5, L5535 tripped off affecting 1,083 customers. The 69kV line was isolated at 34W Moody's Corner and re-energized from the 15V Sissiboo end, but tripped off again. Throughout the day the line was sectionalized at the Rio Algom tin mine and 92W Carleton to try to find the fault, but the transmission line continued to trip off. A patrol of the line identified many trees and structure damage on L5535. Trees were removed and repairs made on the section of the line between 9W and 92W Carleton first and switch 92W-504 was opened at Carleton to isolate the line from 92W to 15V so the rest of the repairs could be made. At 8:30 PM on Sunday, July 6, L5535 from 9W Tusket to 92W Carleton was re-energized, which left the Rio Algom tin mine as the only customer affected by the remaining outage on L5535.

All of the trees were removed and the structures were repaired along the remaining section of L5535, an extremely remote and environmentally sensitive area. At 9:02 PM on Monday, July 7, the open switch at 92W was closed and L5535 (and the Rio Algom tin mine) was re-energized.

**L5530:** L5530 tripped at 11:47 AM Saturday, July 5 affecting 2,626 customers. A broken conductor was found approximately 60km from 50W Milton. The line was isolated between 30W and an open switch at 36W Green Harbour. The 69kV line was re-energized from the 50W end up to the open switch and all substations were re-energized at 11:30 PM, Saturday, July 5.

**L7003:** The only 230kV line to be affected by Arthur, L7003, tripped off at 11:51 AM Saturday, July 5, due to an off right-of-way tree falling into the line. No customers were affected by this outage. The line was isolated, the tree removed, and re-energized at 7:15 PM.

**L5025, L5026, L5531, L5533, L5538, L5050:** At 12:51 PM Saturday July 5, multiple 69kV lines in the Valley tripped off simultaneously between 51V Tremont and 15V Sissiboo. At the time, the 69kV ties between the Valley and South Shore (L5532 and L5535) were open due to the events mentioned above, and L5025 tripped off at the 11V end (the 51V end remained in service until 5:00pm, when it tripped as well) resulting in a lack of supply to L5533, L5581, L5531, L5538, and L5050. There were 20,397 customers affected by this outage. Trees were identified and removed from L5025 which was then re-energized at 12:10 PM and L5026 at 3:02PM July 6. L5531 was re-energized at 3:10 PM and L5538 was returned to normal at 4:40 PM July 6. L5533 was isolated, the repairs were made from 15V Sissiboo to 77V Conway, and the section of line from 13V to 77V was re-energized at 10:39 PM July 6. Gulliver's Cove wind farm stayed off until Monday, July 7. There was nothing identified requiring repair on L5026, L5531, or L5050.

**L5053, L5024:** At 3:15 PM on Saturday, July 5, L5053 tripped and the 51V-551 breaker failed, which caused L5024 to trip as well. Together, these two 69kV lines caused outages to 9,777 customers. Once it was determined that the failed 51V-551 breaker caused the outage to L5024, 51V-551 was isolated and L5024 was re-energized at 4:30 PM. A patrol of L5053 was then initiated to determine the original cause of the fault. Two trees were found and removed. L5053 was re-energized at 10:45 AM, July 6, from the 92V end up to an open switch at 57V-503 Berwick.

**L5031:** L5031 tripped at 6:00 PM, Saturday, July 5, resulting in an outage to 1,744 customers. A tree was found on the 69kV line just outside the 87W Hubbards substation, was removed, and L5031 was re-energized at 6:35 PM July 5.

**L5022:** The alternate 69kV feed to 92V Michelin Waterville, L5022, tripped at 6:59 PM, Saturday, July 5. Michelin Waterville was the only customer affected by this outage. Automatic fault location was available and a transmission inspector found a tree on the line near the fault location recorded. The line was isolated, the tree removed, and L5022 was re-energized at 9:21 AM on July 6, Sunday, restoring power to Michelin Waterville.

**L5017:** The final transmission lines to trip off during the storm were L5017 and the L5046, which affected 3,434 customers, at 9:51 PM, Saturday night. The line was patrolled first thing the morning of July 6, and multiple trees were found on the line. The line was isolated, the trees were removed, and L5017 was re-energized at 2:02 PM on Sunday afternoon.

In summary, Post-Tropical Storm Arthur caused 29 transmission lines (69kV, 138kV and 230kV) to trip off on July 5. By 10:30 PM on Sunday, July 6, all transmission lines feeding substations with customers were back in service, with the exception of a portion of the transmission line feeding Acadia University and a portion of the transmission line feeding the Rio Algom tin mine. Both of those lines were back in service by 9:00 PM on Monday, July 7.

There were five transmission lines affected by Arthur, but did not trip off during the storm; they were L5545, L5546, L6021, L6024 and L8001. A detached overhead ground wire was identified on L8001 lying on the tower arm, which was found during proactive helicopter patrol after the storm on Wednesday, July 9. The repair was completed under a hold off on the same day the deficiency was found. L5545 and L5546 had trees removed under a hold off on July 11. L6024 and L6021 had structure arms and insulators replaced during a maintenance outage on Wednesday, July 16 and Thursday, July 17.

## Transmission Summary of Events

Line	Outage	Substations	Customers	Outage Start	Outage Restored
L5532	Yes	3W Big Falls to 13V Gulch	2,285	7/5/14 5:59 AM	7/6/14 7:29 PM
L5541	Yes	3W- Big Falls to 50W Milton		7/5/14 5:59 AM	7/5/14 3:06 PM
L5544	Yes	3W Big Falls to 1W Upper Lake Hydro		7/5/14 5:59 AM	7/5/14 3:06 PM
L6013	Yes	51V Tremont to 43V Caanan Rd.		7/5/14 7:42 AM	7/5/14 5:00 PM
L4049	Yes	43V Caanan Rd to 3V Hells Gate 6V Hollow Bridge 49V Acadia		7/5/14 7:48 AM	7/7/14 4:18 PM
L5019	Yes	43V Caanan Rd to 3V Hells Gate 6V Hollow Bridge 49V Acadia		7/5/14 7:48 AM	7/7/14 4:18 PM
L5035	Yes	43V Caanan Rd to 3V Hells Gate 6V Hollow Bridge 49V Acadia		7/5/14 7:48 AM	7/7/14 4:18 PM
L5547	Yes	76W Mahone Bay, 77W Mahone Bay tap, 80W Indian Path, 79W Lunenburg, 81W Lunenburg, 82W National Sea	2,814	7/5/14 8:27 AM	7/5/14 9:32 AM
L5021	Yes	43V Canaan Rd to 50V Klondike		7/5/14 8:32 AM	7/5/14 1:01 PM
L5015	Yes	17V St. Croix to 79V 3 Mile Plains	7,737	7/5/14 8:57 AM	7/7/14 8:35 PM
L5536	Yes	9W Tusket to 11W 88W 16W	8,613	7/5/14 9:44 AM	7/5/14 2:50 PM
L6012	Yes	43V Canaan Rd 17V St. Croix		7/5/14 9:57 AM	7/5/14 6:55 PM

Line	Outage	Substations	Customers	Outage Start	Outage Restored
L5535	Yes	9W Tusket to 15V Sissiboo	1,083	7/5/14 11:26 AM	7/7/14 9:02 PM
L5530	Yes	50W Milton to 30W Siroquois	2,626	7/5/14 11:47 AM	7/8/14 4:35 PM
L7003	Yes	67N Onslow to 3C Port Hastings		7/5/14 11:51 AM	7/5/14 7:15 PM
L5026	Yes	13V Gulch to 11V Paradise		7/5/14 12:51 PM	7/6/14 3:02 PM
L5581	Yes	98V Gullivers to 77V Conway		7/5/2014 12:51	7/7/2014 15:50
L5053	Yes	51VTremont to 92V Michelin	9,777	7/5/14 3:15 PM	7/6/14 10:45 AM
L5024	Yes	51V Tremont to 63V Kingston		7/5/2014 15:30	7/5/2014 16:30
L5025	Yes	51V Tremont to 11V Paradise	20,397	7/5/14 5:14 PM	7/6/14 12:10 PM
L5050	Yes	15V Sissiboo to 91V Fourth Lake		7/5/14 5:21 PM	7/6/14 3:20 PM
L5531	Yes	15V Sissiboo to 13V Gulch		7/5/14 5:21 PM	7/6/14 3:10 PM
L5538	Yes	15V Sissiboo to 16V Weymouth		7/5/14 5:21 PM	7/6/14 4:40 PM
L5533	Yes	13V Gulch to 77V Conway		7/5/2014 17:24	7/6/2014 22:39
L5031	Yes	87W Hubbards to 84 W Robinson's Corner	1,744	7/5/14 6:00 PM	7/5/14 6:35 PM
L5022	Yes	43V Canaan Rd to 92V Michelin Waterville	1	7/5/14 6:59 PM	7/6/14 9:21 AM
L5017	Yes	20V Five Points to 43V Canaan Rd	3,434	7/5/14 9:51 PM	7/6/14 2:02 PM
L5046	Yes	20V Five Points to 43V Canaan Rd		7/5/14 9:51 PM	7/6/14 2:02 PM

Line	Outage	Substations	Customers	Outage Start	Outage Restored
L6004	Yes	43V Canaan Rd to 90H Sackville		7/8/2014 6:11	7/8/2014 10:45
L5020	Yes	6V Hollow Bridge to 7V Methals Hydro			
L5545	No	99W Bridgewater to 70W High Street			
L5546	No	99W Bridgewater to 75W Westhaver's Elbow			
L6021	No	9W Tusket to 30W Souriquois			
L6024	No	9W Tusket to 50W Milton			
L6552	No	93N Glen Dhu to 4C Locater Rd			
L8001	No	67N Onslow to New Brunswick			