Power Bumps / April 1998 - Present

**2010**

**July 08** -A phase C to ground fault on the 230kV line caused a trip and reclose on the 230kV line between Wallula substation and McNary. The fault cleared within 5 cycles, however this still caused #3PM and #2PM to lose the sheet on both machines, the #3PM winder to shutdown and affected the #2 Recovery Boiler.

**2009 = 0**

**2008**

**June 30 -**One of the two transformers at Wallula substation was down for maintenance making our voltage a little bit low at the time. Storms in the area caused several faults on the 230kV system that pushed the voltage just slightly lower. This caused several drives on #3 PM to drop out on undervoltage. Did not shut #3 PM down but had potential to impact quality.

**January 11** -While cleaning up CT wiring, at Cascade substation, tripped new bus 2 differential relaying scheme opening bus 2 transruptor. This was a result of the new transruptor installation and a new improved relaying scheme for better protection. This was the only bus that shared the metering CTs with the protection CTs. This caught the workers off guard as they thought they were only working on the metering CT circuit. The power to Bus 2 was off at the PP&L side for approximately 15 minutes. The relaying scheme to protect bus 2 transformer also trips our Bus 2 main breaker. It took us approximately another 10 minutes to get our breaker closed after PP&L restored power to the line side of it. The entire lost production time was 2.08 hrs for #1 PD and 2.10 hrs for #2 PM. This equates to lost revenue as follows:

(2.08hrs / 24hrs) \* 384tn/day \* $96.18/ton = $3200.87

(2.10hrs / 24hrs) \* 342tn/day \* $179.84/ton = $5381.71

Total: $8582.58

**January 4** -A wind storm in the Pendleton/Walla Walla area resulted in multiple breaker operations and line trips. At 9:00am we lost all three machines to a line sag. #1 PM was back up in 1 hour, #2 PM in 15 minutes and #3 PM in 2 hours.

**2007**

**September 7, ~7:30am -** A single phase fault occurred on the 69kV Lowden line within a mile of our plant. The fault was cleared by opening 3W20 at Cascade and two breakers at Wallula. No cause was found for the fault, there were no storms in the area, the breakers reclosed within seconds and stayed closed. During the fault we had significant voltage loss on one phase (down to 10% of normal). When the line isolated, we saw an overall voltage sag with the loss of half our supply. As a result we lost #2 PB ID Fan Drive which knocked down #1 PM for 90 minutes for lack of steam. #4 Well also was knocked down when the line isolated. Estimated impact <$10,000.

**September 1, 12:12pm -** A fire started as a result of a lightning storm that passed through the area south of the mill. Smoke from the fire resulted in two rapid succession faults on the McNary to Wallula 230kV line approximately 15 to 18 miles from Wallula Sub. The first fault (as measured at Wallula) was a phase to phase fault that degenerated voltage on those two phases to less than 50% for at least 8 cycles. We lost #2 PB ID Fan drive and #3 PM for 132 minutes. We also had a severe drive failure on #3 PM Winder that eventually took #3 PM down for an additional 363 minutes. There was also a significant parts cost involved to rebuild the drive. Estimated impact <$10,000.

**August 31, 4:51pm -** A lightning storm in the Walla Walla area resulted in a phase to phase fault on the 230kV line between Walla Walla and Wallula Sub. Line voltage at Wallula dropped to 60% for 6 cycles before clearing. The impact at Boise was a loss of #2 PB ID fan drive which resulted in curtailing #1 PD for 95 minutes. Estimated impact <$10,000.

**July 18, 11:22pm -** A lightning strike on the 230kV system between Walla Walla and Lewiston resulted in a voltage sag of approximately 15% as measured at Wallula Sub. The #2 PB ID Fan drive tripped which resulted in shedding #1 PD for 90 minutes. Estimated impact <$10,000.

**July 13, 7:00pm -** Smoke from the same fire as earlier (or it could possibly have been lightning) caused a phase to ground fault on the McNary – Wallula line that resulted in one phase dropping to 15% and the other two dropping to ~75% of normal. The #2 PB tripped causing additional downtime on all three paper machines. #1 was down an additional 301 minutes, #2 was down an additional 105 minutes and #3 was down an additional 72 minutes. Estimated impact <$10,000.

**July 13, 12:09pm -** A lightning storm passed through the area causing a myriad of minor faults on distant lines. It also started a fire near Juniper canyon south of the mill. At 12:09 smoke from this fire resulted in a 3 phase fault on the McNary to Wallula Sub 230kV line. Voltage at Wallula sagged to 25% and we lost the entire mill. Luckily we were able to get it back up in record time due to having all the right people on site. Downtime incurred was 384 minutes on #3PM, 411 minutes on #2 PM and 418 minutes on #1 PD. Unfortunately after getting the mill back up we saw another lesser bump as detailed above. Estimated impact <$10,000.

**May 12, 7:45pm -** A three phase fault occurred on Bonneville’s 230kV system on the other side of McNary Dam. The result was a three phase voltage sage at Wallula to approximately 50% for about 3 cycles. #1 and #3 PMs were down for the annual shutdown. We lost #1 Power Boiler and #2 PM for about 31 minutes. Estimated impact <$10,000.

**2006**

**December 15, ~4:30am -** A severe windstorm came through the area the night of the 14th and carried through until the morning of the 15th. We saw a multitude of minor bumps; however, the only one that resulted in significant downtime was at 4:30 am when it tripped the PowerBoiler ID fan drive. This resulted in a steam header swing that knocked the machines down briefly. Estimated impact <$10,000.

**August 7, ~8:23 – 8:28pm** - Within a 5 minute period we saw 3 significant faults from lightning strikes on both the 69kV and 230kV lines. The first two occurred on the Lowden 69kV line and the third occurred on the Walla Walla 230kV line. The resulting faults were as follows: the 1st lasted 15 cycles at ~30% voltage, the 2nd lasted 6 cycles at ~25% voltage, and the third lasted 3 cycles (unsure of voltage sag level at Boise). The impact to the mill was significant with all three machines experiencing significant downtime. The air system and boilers were all lost resulting in a complete mill shutdown. Financial impact was ~$280,000.

**May 19, ~6:18 – 6:38 pm -** Experienced two voltage sags both lasting 4-5 cycles and sagging to 60 to 70% voltage. These resulted from lightning strikes, exact location tbd. These caused #2 Recovery Boiler to trip and all three paper machines to break and go down. The air system and rest of the boilers stayed on line. The resulting impact to production was approximately $25,000.

**2005**

**July 1, ~6:41am** - A significant fault occurred in the substation at 9 Mile hill (the wind farm substation) when a bird came in contact with the low side of the step up transformer (34.5kV). The resulting fault, dragged our voltage down to as low as 61% of normal for a duration of 20 cycles. The reason the duration was so long, was because the fault had to be cleared by a current overload relay (as opposed to some type of zone differential relaying). The substation is owned and operated by Florida Power and is not under the direct control of Pacificorp. The impact to the mill was significant with all three machines experiencing significant downtime. #2 and #3 Centacs both shutdown while #1 Centac and the #4 Screw compressor stayed running. The air pressure dipped, but not low enough to lose all the boilers. #4 High Pressure Feedwater pump also tripped, but was restarted within 4 minutes to save #3 Recovery from a low water trip. As a result, the steam header was not lost; however, it took considerable time to resume full production across the mill. W1 was back on Layboy after 49 minutes, with additional 30 minutes of problems. W2 was back on reel after 91 minutes. W3 was back on reel after 161 minutes with additional 107 minutes after hitting the reel. Very lucky to catch feedwater pump and air systems before entire mill went cold. Could have easily been an eight to twelve hour hit. Estimated financial impact of $46,000.

**February 13, ~2:00am –** A fault occurred in the secondary bus of one of the two utility transformers at Dodd road on our 69kV line. The fault migrated to include the secondary bus of both transformers at Dodd road. Power sagged to a low of approximately 78% of normal while both transformer secondary buses were faulted (for approx. 1.6s). The first set of high side fuses cleared after 1.6s and the second set of high side fuses cleared after 5s. The resulting sag knocked all three paper machines down as well as most of the pulp mill. The Hog Fuel boiler and #3 Recovery rode through the dip so the steam header was maintained. #4 High Pressure feedwater pump tripped, but was immediately restarted by an alert operator. #2 Centac went down but #1, #3 and the screw compressor stayed running maintaining the air system. Estimated financial impact was $94,000 lost contribution.

**2004**

**August 4, 4:40pm, 8:20pm** – A lightning strike hit one of the two 69kV lines between the mill and Wallula Sub. Voltage on our 69kV system dipped to 15kV for 9 cycles. Took down large number of drives and starters. Wound up losing the whole mill for 12 hours but did not lose air or steam initially. No damage to equipment, resets on most VFDs. Extensive lost production.

**July 6, 11:45 am** – The 230kV line from McNary was out of service and voltage appeared to be fine with Wallula being fed from the Walla Walla line and the wind farm. When the wind died down, the 230kV started dropping off and the tap changers at Wallula sub tapped all the way up to maintain voltage at Cascade. They were not able to tap high enough to maintain 69kV and bus 4 which was likely the most heavily loaded bus saw the worst of the sagging voltage. Voltage sagged until numerous VFDs began dropping out in the Lime Kiln and Hog Fuel areas. PP&L reported line voltage on the 69kV line was at 68.1kV. Specific drives that tripped included 543-041-052, 543-041-010, and 324-041-010. MCC voltages in LI and LX read as low as 430 Volts. Atleast one medium voltage starter tripped as a result of the phase loss relay (461-041-049). During this time we saw voltages at Bus 4 incoming as low as 10.5 to 11 kV (by the analog meters, the digital meter is failed and out of service). Bus 5 was observed down below 12 kV.

**April 15, 9:49 am –** A fault occurred inside PP&L’s Bus 1 transformer located at our site, that resulted in the 69kV system tripping at breakers 3W176 and 3W180. The relaying could not specify the location of the fault so PP&L after a single reclosure attempt, began tracing lines and subs for the problem. We called and let them know that smoke had been reported at our sub and crews were dispatched to investigate. A primary fuse had dropped on the feed to bus 1 transformer on the reclose. PP&L completed a walk through of the substation to look for any visible fault conditions. It was noted that in addition to the primary fuse dropping, the sudden gas pressure switch on bus 1 transformer was indicating. They then proceeded to isolate the bus 1 transformer on both the primary and secondary side. Power was restored to the 69kV system in several steps until bus 1 was the only de-energized section. We then closed our bus tie between bus 1 and 2 after opening the bus 1 incoming breaker. Power was off the entire mill for approximately 1 hour. The MOST UPS system held for the full hour maintaining the PLCs and Honeywell DCS. We then proceeded to start up the mill. The spare transformer in PP&L’s sub was then switched in to feed bus 1 (12:30 pm). At this point full power was restored. Startup took slightly less time as it went more smoothly with the recent practice. Lost opportunity is still being calculated and a claim will be submitted to PP&L.

**April 8, 10:33 am -** A line protection relay on the 230kV line between McNary Dam and Wallula Substation failed, causing breakers 1W42 and 1W20 to operate isolating the 230kV line. At this point, power was still being fed from the Walla Walla 230kV line to Wallula and on to the mill at 69kV. A tech was dispatched to Wallula to investigate. When the failed relay was discovered, the tech disabled the trip circuit from the relay and closed the two breakers to reenergize the line. A separate circuit on the failed relay enabled a ‘breaker failure relay’. When the original two breakers were reclosed, the ‘breaker failure relay’ saw enough current through 1W42 to initiate a breaker failure trip of breakers 1W42, 1W20 and 1W40. PP&L is investigating whether this relay initiated a trip correctly or if it may have experienced a failure as well. This isolated both the 230kV lines to Wallula sub and put us completely with out power for approximately 30 seconds to 1 minute. The UPS’ kept all control systems up. We lost the mill and instrument air systems and water to the Centac compressors. There was no equipment damage from the Electrical perspective; however, the mill lost close to 8 hours of production. The estimated impact from the outage is $183,200.

**February 21, 7:04 am -** PP&L was doing maintenance on the 69kV overhead line between Touchet and Walla Walla. A switching error closed a grounding switch on the energized line. This caused a significant dip in the 69kV feed to the mill until breaker 3W20 cleared leaving us on the single 69kV feed from Wallula. Virtually all variable speed drives tripped throughout the mill. None were damaged. Most 480V and 4160V starters stayed in (including the Centac starters). As a result the entire mill went down except the power house. This allowed us to start back up relatively quickly. Estimated lost revenue $22,000.

**2003**

**September 17, ~11:00 am** - PP&L was performing maintenance on one of the two 69kV breakers that feed the ring bus at our mill. When they isolated the 69kV line, voltage started to sag at the mill. By the time they realized what was happening we lost 3 medium voltage starters which resulted in downtime in the Bleach plant.

**June 29, ~3:00 pm** - A fault occurred on the 230kV line between Wallula sub and McNary sub as a result of a fire which burned a pole on that line. This resulted in a significant voltage sag causing the entire mill to go down. We lost a variable speed drive in the Lime Kiln due to a board failure. It took the mill approximately 9 – 10 hours to start back up.

**2002**

**June 20, ~7:22 am -** A fault occurred on the secondary side of transformers 3W184 and 3W188 at Dodd road substation. The fault resulted in a voltage sag on the 69kV line and eventually 3W20 operated clearing the line. We lost a number of 4160V motors on UV trips throughout the mill. For the most part, the equipment was all able to be restarted with minimal impact on production. One day later we lost a 1000Hp Raffinator motor with very suspicious winding damage that suggested it may have seen a significant voltage spike. Plots of the waveform at our substation during the fault showed no spikes, only a general sag.

**April 23, ~4:00 am –** Maintenance and an upgrade modification were being done on one of the two transformer tap changers at Wallula Substation. These tap changers have a control feature that has them adjust taps on each transformer to share the load between the two transformers. They also control to maintain a set line voltage. The load sharing control was not disabled when the transformer was taken out of service. The remaining in service transformer continued tapping down to try and have the out of service transformer pick up load. Our voltage dropped at the mill to a level where two variable speed drives (530-041-080 and 530-041-081) tripped on low bus voltage and a 4160V starter (461-041-007) dropped out on phase loss. This resulted in short durations of downtime in Recaust and the Bleach Plant. Voltage at LI was measured at 439V and PP&L reported their PTs in our Sub were as low as 112V (normally 120V). Also recorded voltage at Hog Fuel of 3885V on the 4160V sub. As soon as PP&L was contacted, they manually tapped the system back up to normal levels.

**2001**

**December 27 -** Over the course of the last several months we had been experiencing VFD trip outs during the start up of #3 PM on High bus voltage. Among the drives tripping were drainage aid pumps that immediately affect the runability of the Paper Machine. On this occasion it happened twice during the start up and caused significant downtime and damage to the machine. At this time Dan Young contacted PP&L and discovered the overvoltage trips coincided with PP&L’s Bus 5 Cap Bank switch closing. Bus 5 Cap Bank switches in and out based on Power Factor and during shutdown days (when bus 5 is lightly loaded) the switch opens. During startup when the inductive load comes up on bus 5, the switch closes and the caps come back on line. We did subsequent testing (15 Jan 02) during a #3 PM S/D and discovered an extreme spike and oscillation that occurs in the line voltage when the cap bank switches on. For the time being we have asked PP&L to leave the cap bank switch closed and in manual control until we can collectively come up with a solution to this problem. The negative side of this approach is that the line voltage during a PM outage exceeds PP&L’s power delivery spec. because with minimal load on the bus, the voltage exceeds 5% above nominal.

**July 29, ~5:30 am** - A wildfire at Wallula Junction burned a number of poles on the 230kV line between McNary and Wallula substations. When the relaying operated we saw severe distortion on the lines to the mill. We experienced downtime mill wide with damage to drives in the following areas: #3 PM 4th section dryer drive – failed board, IV Outlet Device drive – failed SCRs, Baldor drive in MCC M – failed board, Eaton drive for Kiln Reburn Screw – failed board. We also had to reset most drives on high bus voltage trips. Following this occurrence we had issues around our incoming voltage to the mill being too low. PP&L wound up putting tap changers at Wallula in manual and tapping up to get our voltage back to a reasonable level. PP&L had some issues around the remote operation of these tap changers (appeared to be reverse operating).

**July 6, 6:34 am -**  A lightning strike occurred on PP&L’s 69kV line between our substation and the Wallula Sub. This resulted in operation of breaker 3W20 at our sub and 3W174, 3W180 at Wallula sub. These breakers all auto closed in less than a second; however, the resulting voltage swing tripped most of our drives and starters particularly in the Kraft mill and Power/Recovery area. There was no damage to any drives but most of the Kraft mill and Power/Recovery drives had to be manually reset. The mill was down close to 12 hours.

**May 14, 7:04 am -** A faulty metering component on PP&L’s Bus 4 Capacitor bank, caused the 4800 kVAR cap bank to switch on and off 8 times between 7:04 and 7:09 am. This caused spiking and severe harmonic distortion on bus 4 loads. The hardest hit were the Bleach Plant Washer DC drives D1, D2, E1, and E2 suffering blown fuses, blown SCR packs, and blown diode packs. We also lost the #2 M&D Presteamer Feeder AC Drive (replaced) and the Kamyr Chip Meter Drive (diodes). The Kamyr High Pressure Feeder required card replacements, fuses and a field supply replacement. Several other drives on Bus 4 required resets as they faulted on high bus voltage. The Bleach Plant, Kamyr, and #2 M&D suffered extensive downtime as a result. The remainder of the mill was unaffected.

**April 27, 4:36 pm** - A lightning strike occurred on the interstate 230 kV line between McNary Dam and the Wallula Substation. To clear the fault, breakers 1W20 and 1W42 opened at Wallula Substation. We did not trip completely off line but saw line voltage dip to approximately 50% for 6 cycles (0.1 seconds). This resulted in all starters, HID lights, and drives shutting down. While there were few cases of damage caused by the Power Bump, the entire mill was lost. The lost production time was in excess of 24 hours.

**2000**

**May 9, 1:24 pm** - A lightning strike occurred on one of the 69kV lines between our mill and the Wallula Substation which dragged the voltage down to approximately 70% of normal voltage for 6 to 7 cycles before breakers 3W176, 3W174, and 3W22 operated isolating the line. Two of the three breakers auto-reclosed and the system was returned to normal operation. The third breaker 3W174 was manually reclosed at Wallula Sub. We experienced a handful of drives tripping which resulted in brief downtime on #3 PM, #2 PM, B-Row, and #1 M&D. There was no equipment damage and the areas affected started up smoothly within minutes.

**1999**

**August 6, 6:39 pm** - A lightning strike occurred on the 69kV Lowden line between Touchet and the Wallula Mill resulting in this line isolating and causing a voltage spike and dip at Wallula mill. The breakers reclosed and the system was back to normal within 23 cycles (or less than 0.5 seconds). Several of our old Eaton VFDs lost fuses and two lost control cards. The remaining downtime was due to issues around startup. There are lightning arrestors on this line and they had operated.

**1998**

**December 15, 8:48 am -** A switching error occurred as a result of the recent relocation of the control center from Union Gap to Portland. The switch and feedback signals on breakers 1w40 and 1w42 were reversed, as a result, the wrong breaker was opened during a maintenance isolation causing a complete power outage to Wallula for approx. 13 – 14 minutes. This would have been a shorter outage except operator infamiliarity extended it when the operator attempted to close the synchronizing breaker at Cascade Kraft before the non-synchronizing breaker.

**October 31, 10:50 pm -** Transformer T-3220 at Cascade Kraft faulted tripping its Sudden Gas relay which caused the main incoming breakers 3W20 and 3W22 to open. This removed all power to the mill for 11 seconds while MOD 3W24 operated. Then 3W20 and 3W22 reclosed leaving only Bus 1 down until the spare transformer was put into service. In the interim, limited power was restored to Bus 1 via the bus tie from Bus 2.

**July 8, 3:12 am -** A lightning strike occurred on the Lowden 69kV transmission line tripping breakers 3W174, 3W180, and 3W20. While this did not completely remove power from Wallula, it caused a large enough disturbance on the transmission lines to trip multiple drives through out the mill and cause extensive downtime.

**July 3, 2:00 pm -** A lightning strike occurred on the Interstate 230 kV line tripping 1W20, 1W42, and A-400. Once again, power was not lost at Wallula but significant damage was done to our VFD Drives causing extensive downtime and lost production.