MONTHLY ELECTRICAL INCIDENTS

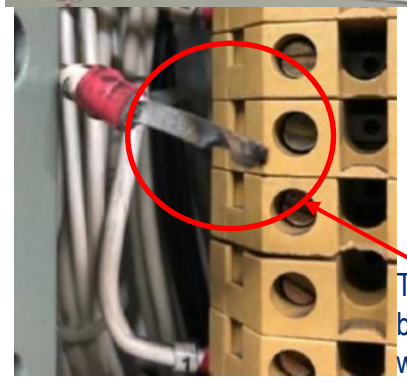
ASP Manufacturing

May 2022

Date: 3/05/2022
Location: Coke Making
Reference: I2100741

After isolating an MCC cell to conduct an audit on 'Red wire syndrome' an electrician has opened the cell door and created an arc flash inside the cell. An investigation has found the door latch tongue had contacted an unterminated energised control wire. The control wire was traced back to a spare MCC in the cell above which had the 240V ac control circuit breaker in the on position. This control wire was lugged and should have been terminated in the control terminals in the cable launder tier. A closer inspection found the dislodged wire was not visible when the door of the cable launder tier was open because it was hidden behind the side flange of the tier.

As per Electrical Safety Manual 1.4.22 incorrectly or inadequately maintained electrical installations can create situations which expose personnel to arc blast or arc flash. Regular inspections and maintenance is required on all electrical installations to ensure safety and satisfactory operation.



The MCC tier showing the two cells and the adjacent cable launder tier. Control wire was hidden behind this flange.

The damaged and burnt lug of the control wire

Two views of the door latch tongue.
- From behind showing the arc burn
- From the front showing the burn mark on the lip

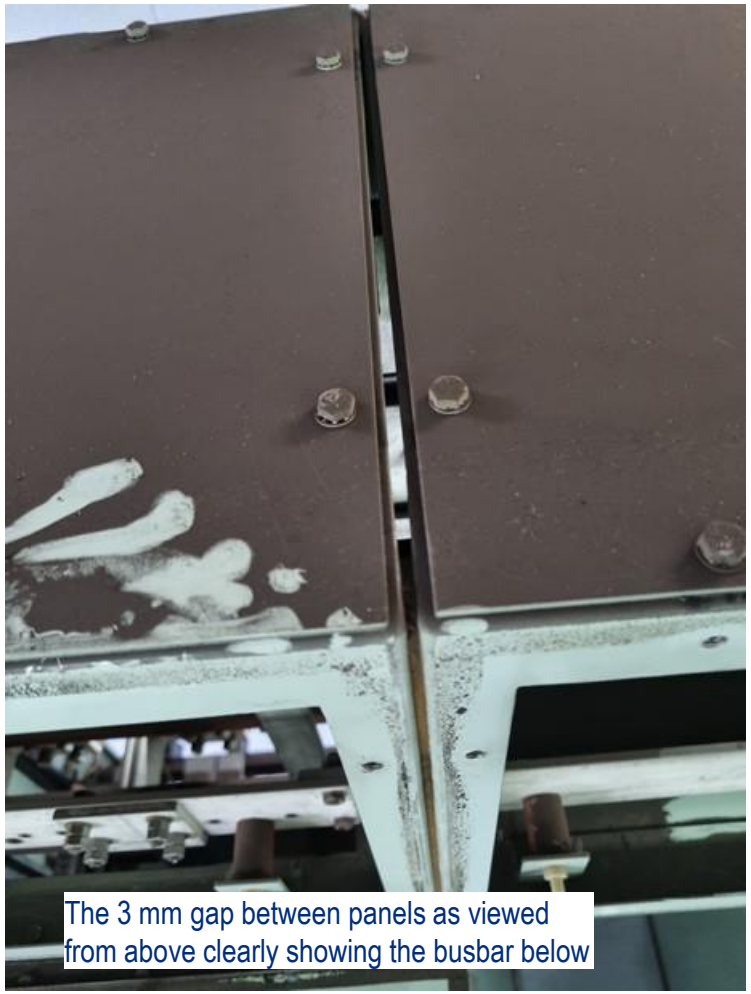
A view from inside the MCC cell with the control wire inside the slot in the metal work where it has made contact with the door latch tongue

Showing the slot in the metal work between the cell and the cable tier with the door latch tongue in place when door is closed

Date: 25/05/2022
Location: No.6 Blast Furnace
Reference: I2110249

Whilst carry out maintenance and inspections of the 415V main distribution boards a gap has been found between the panel sections and covers on the busway chamber. The high fault level 2000 amp busbar could be accessed through this 3mm gap by dirt, moisture, foreign equipment or venom. This board is 25 years old and has been in this state since initial installation.

As per Electrical Safety Manual 1.4.22 all electrical installations are to be regularly inspected and maintained. Electrical owners of the equipment have a duty of care to ensure the installation still complies with the relevant Australian standards and is safe to operate.



The 3 mm gap between panels as viewed from above clearly showing the busbar below

The same gap between the panels as viewed on the side but filled in with appropriate insulation

The gap between the panels as viewed from below, straight above the 2000 amp busbar

Date: 17/05/2022
Location: Coke Making
Reference: I2106484

A pump which had been in regular service was fully isolated for periodic maintenance. An electrician doing the maintenance has notice the full load isolator in the field had a blacken window over the contacts. A closer inspection has found the red phase contact inside the isolator to be welded closed and had not opened when the isolator handle was placed in the open position. When measured across the damaged contact less than one ohm was recorded. All connections to the isolated we found to be secured and in a good working state.

The field isolator contact cover as found.

Note all the main cable connections to the isolator are secure, tight and show no signs of a hot joint

The red phase contact after the plastic cover was removed. The other two phase contacts are still in working order.

A close up view of the welded red phase contact

Date: 23/05/2022
Location: Plate Processing
Reference: I2109878

An operator attempting to close a roller door by operating a local isolator has heard a bang inside the enclosure for the isolator. An electricians called to investigated has found the roller door control box and isolator to be cover with water from the recent rain. The isolator mounted on the side of the control box has a top entry cable installation. Water has entered the enclosure through this top entry and run down internally onto the isolator. The action of the isolator being rotated has shorted two phases of the power supply. Two 32amp fuses have been found blown. The fuses were in an old style fuseboard with all the cables top entry and again this board had water ingress from the top entry.

As per Electrical Safety Directive 2017-01 and Electrical Installation Manual section 4.5 all electrical installations should have bottom entry for all cabling as to not compromised the IP rating of the equipment and to suit the environment of the installation.

The site of the roller door control box with the isolator on the left hand side.
The whole area and all equipment is covered with rain water.

The local isolator with water evident on the top.
The top entry cable fitting which has allow water to ingress onto the isolator contact block.

The supply fuseboard with all the cables top entry.
Below the internal bottom of the fuseboard with moisture and rust evident.

Date: 25/05/2022
Location: Springhill - CPCM
Reference: I2110799

In the process of removing redundant cabling electricians have found one cable terminated inside a j-box with 2 cores measuring 24V dc. The core numbers indicated from the schematic to be supplied from the exit PLC, however no similar core numbers or cable numbers could be found in the PLC panel. The cable was traced to another j-box in the motor room basement where the cable was joined to another cable with a different cable number. This cable was again traced to a regulator panel where the cores were found to be spare PLC I/O, still terminated and energised. The cores were disconnected and the cable removed.

This is an example of why all redundant electrical equipment should be disconnected and removed at the time of de-commissioning, and finally all the documentation updated to reflect the equipment and cabling being removed.

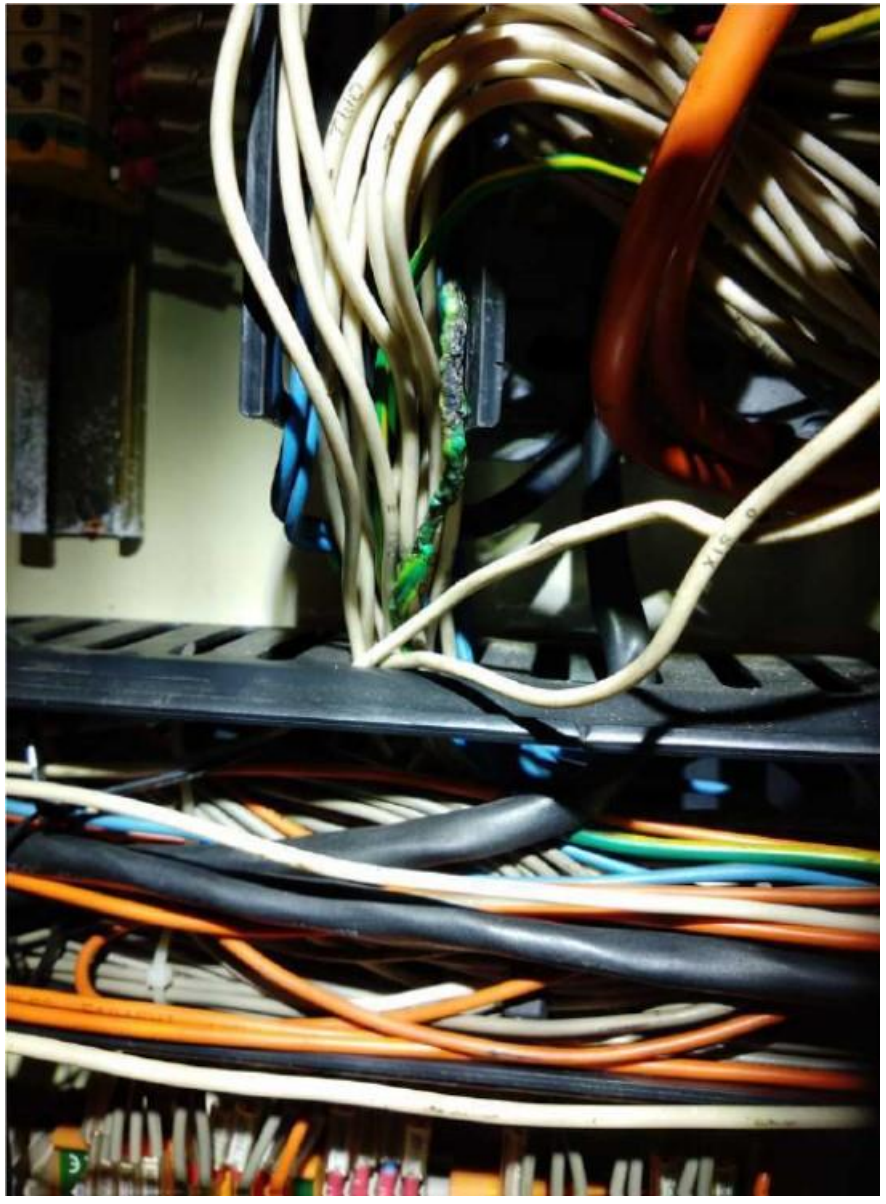
The unknown j-box in the motor room basement where two cables were joined. Note the j-box is not labelled or has an identification and is not mentioned in any of the schematics.

The Regulator panel PLC I/O terminal strip where the redundant cores were terminated.

Date: 26/05/2022
Location: Springhill - MCL
Reference: I2111372

An electrician investigating why the circuit breaker supplying the PLC I/O to a pump motor starter was tripped, has found the circuit shorted to earth. The wiring for the circuit was traced to find a burnt and melted earth wire had melted itself to the I/O supply core. This had created a short circuit to earth. The earth core was found to be part of a cable to a pressure switch in the field for different pump. An inspection of the area near where the pressure switches are mounted has found welding had recently taken place.

As per Electrical Safety Manual section 1.4.15.2 the return lead of a welding machine shall be securely connected to the work piece and the connection point shall be located as close as physically possible to the welding work.



The badly melted and burnt earth wire melted to the PLC I/O power supply core.

Date: 27/05/2022
Location: Western Port
Reference: I2112310

An electrician attempting to verify an isolation inside a blower motor terminal box has caused an arc flash when one of the supply wires has come from its lug and shorted to earth. Previously the electrician had isolated the motor at the motor starter main isolator. Then had conducted Test Before You Touch by verifying the testing meter at a known energised location, followed by testing the load side of the isolator to be de-energised. However, the electrician has failed to recheck the testing meter to be fit for duty. An investigation has found one of the leads of the meter to be open circuit not allowing TBYT to be conducted properly. The investigation also found the white phase of the main contactor of the blower to be welded in, contacts of the main isolator did not open during isolation, there was only the white phase connection at the motor terminal box energised and this wire shorted to earth which tripped the motor protection.

Test Before You Touch is an essential procedure used by electrical workers to confirm the electrical installation they are about to touch is de-energised. It is a three step process involving testing the test equipment to be fit for duty, testing the work site with the test equipment to confirm de-energised and finally re-testing the test equipment to confirm it is still fit for duty. If all three steps are not properly followed the TBYT process cannot be stated as conducted correctly or completed.

The common main contactor for multiple motor starters which had the white phase contact welded in

The panel with all the motor starters which has its main isolator on the door

Date: 17/05/2022
Location: Slab Caster
Reference: I2106106

An electrician doing routine maintenance on a motor has opened the terminal box to find water at the bottom of the box. There was approximately 100mm clearance between the pooled water and the motor terminals which had allowed the motor to remain in service. A inspection of the installation has found the bottom cable entry into the terminal box was by a fixed Anaconda fitting which had not allowed the water to escape. The motor cable had come off overhead cable rack into water pipe which is run all the way to the motor. The high end of the water pipe is open to the elements allowing rain water to enter and fill up the pipe. With the water pipe high enough there is sufficient head pressure on the water in the pipe to allow it to run up inside the motor terminal box.

As per Electrical Installation Manual section 4.5.1 the integrity of the IP rating all field enclosures shall not be compromised by additional protection, which should be installed to suit the environmental conditions. All cable entries should be from the bottom and all conduits (fixed or flexible) have an allowance to let water exit before in enters the electrical installation.

The full view of the motor and cable installation. The water pipe on the wall is open at the end allowing water to enter. With enough pressure water in the pipe can enter the motor terminal box.

The original installation on the left with no means of water exiting the conduit.

The correct installation on the right with the conduit cut short to allow any water to exit and the bottom cable entry is via a compression gland which does not allow water entry.