Darwin-Katherine Power System

System Black

12 March 2014

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Executive Summary

This report outlines the System Black event in the Darwin-Katherine System on 12 March 2014. The incident resulted in the majority of customers in the region losing electricity supply at approximately 01:19. Remaining customers lost supply over the next ten minutes. Katherine and Pine Creek were reconnected at 03:00. The first customers in the Greater Darwin area were re-connected at 07:49 with gradual restoration of the system over the following six hours with the majority of customers re-connected by 14:30. The last customers in Adelaide River were reconnected between 17:25 and 17:45.

The trigger for this event was a circuit breaker malfunction at Hudson Creek Terminal Station during switching to isolate a 66kV transformer for routine inspection and planned maintenance. Routine planned maintenance was scheduled on one of the 132/66kV transformers at Hudson Creek Terminal Substation. During isolation switching to safely allow for this maintenance work to proceed, the protecting circuit breaker malfunctioned. The circuit breaker is made up of three separate units called poles. These poles are required to operate in tandem. The malfunction locked two of the three poles in position and this caused an imbalanced power flow in the network. The powerline protection detected this imbalance and operated as designed to protect itself from catastrophic failure.

Event Summary

At approximately 01:19 on Wednesday 12 March 2014, a 132kV circuit breaker at Hudson Creek Terminal Station did not operate as required. This caused the transmission line protection relays to operate, isolating both 132kV transmission lines between Channel Island Power Station and Hudson Creek Terminal Station.

Generating sets automatically disconnected from the system due to the disturbance, shutting down all plant at Channel Island Power Station.

The remaining generating set at Weddell Power Station was unable to carry the load of Greater Darwin causing it to shut down resulting in no electricity being available at Weddell Power Station.

No power was available at Channel Island Power Station, requiring generating sets to be re-started using the small emergency (black-start) generating sets. Both emergency (black-start) generating sets did not operate correctly after numerous attempts to start. Emergency power from one black-start set was available at 03:50. The first large generating set at Channel Island was started at 04:00, this then came off line at 04:30 due to a loss of gas supply. By 05:00 attempts at Weddell to bring a unit on line were unsuccessful.

Gas supply was restored at Channel Island at 06:40 with the first generator available at 06:52. Another two units were brought on line by 09:49. Generation progressively brought units on line as required to support the restoration process. The station supply was transferred from the black-start generator to normal configuration by 13:00. Until this transfer was completed there was a high risk that a fault in that single black-start generator would cause all generation to go off line. Restoration of customers was slowed while this risk was mitigated.

All supply was restored between 17:25 and 17:45.

At 20:55 the two separated systems (Pine Creek/Katherine and Darwin) were re-joined.


**Duration of Event**

The majority of customers were restored by 14:30 with the remaining customers restored between 17:25 and 17:45.

**Customers impacted**

The event caused an interruption to all customers in the Darwin-Katherine System.

**System Conditions before Event**

At 00:38, Power Networks crews, in association with System Control operators commenced the required switching at Hudson Creek (HC) Terminal Substation to isolate 132/66kV transformer (T1) from service.

Prior to the event the following generators were operating:

- Channel Island Power Station (CIPS): C4, C5, C6 and C8
- Pine Creek Power Station (PCPS): P1, P2 and P3
- Weddell Power Station (WDPS): W1

**Internal protocols, internal and external communications and stakeholder management**

In response to the system black, PWC activated its crisis management arrangements to manage the event. Communication among the executive leadership team was continual until the crisis management and recovery team (CMRT) came together at 05:00 at Hudson Creek System Control Centre. The CMRT met seven times between 05:15 and 15:30.

Immediately following the first CMRT meeting, a number of external communications were made. This included notifications to the Treasurer and Minister for Essential Services, the Commissioner of Police and Director Northern Territory Emergency Services. These notifications were made as early as possible to allow time for decisions and communication regarding the closure of schools and government offices.

The Territory Emergency Management Council (TEMC) met at 07:00 and the Regional Emergency Management Committee at 08:00 to coordinate the whole of government response to the event. The TEMC met again at 13:00 at which time advice was provided that all power was expected to be restored within the next 90 minutes. WebEOC, the NT’s emergency management coordination system was used to share information, provide critical updates and coordinate tasking among agencies and functional groups.

PWC provided continuous updates to WebEOC throughout the event, ensuring situational awareness for NTG organisations and emergency management functional groups. Specific information about the possible length of the outage was provided to the Health Group (one of the functional groups that forms part of the NT emergency management arrangements) about 06:00 to ensure appropriate arrangements for life support/vulnerable persons could be put in place.
The CMRT followed procedures as per the PWC Crisis Management & Recovery Manual. The CMRT functioned well throughout the day coordinating tasks and making decisions when required. The generator issues were addressed and the CMRT remained at Hudson Creek until the conclusion of the event.

Communications

Contact was made with the government’s Public Information Group (one of the functional groups that forms part of the NT emergency management arrangements) to inform them of the situation. This enabled them to activate secureNT and advise the general public throughout the day of the restoration process. PWC’s Communications team worked closely with the Chief Minister’s department on key messaging. Replacement media personnel were also provided to relieve PWC’s media team who had been on site and responding to media since 02:00.

Messages via Twitter commenced at 02:09 once accurate information on the situation was made available and continued throughout the day until restoration was complete.

At 08:36 the first internet news item was posted on the PWC website and these continued throughout the day until restoration was complete. This information was used by media for their updates on Facebook, on air and in editorial. A number of media interviews occurred from 06:13 until 10:30 with Jim Bamber as PWC spokesperson. The Treasurer and Chief Minister provided talk back radio interviews throughout the day. As the PWC website was updated with current information, internal bulletins were sent to staff with the same information and published on the intranet.

Remaining Issues

Power Networks, Water Services, System Control and Retail business units are now operating normally.

Generation is in the process of rectifying known faults.