Figure 51: Equipment labelling

Next Steps

None required.

2.2.5. Surge arrestors

All surge arrestors were checked for operational status by visual inspection.

Results

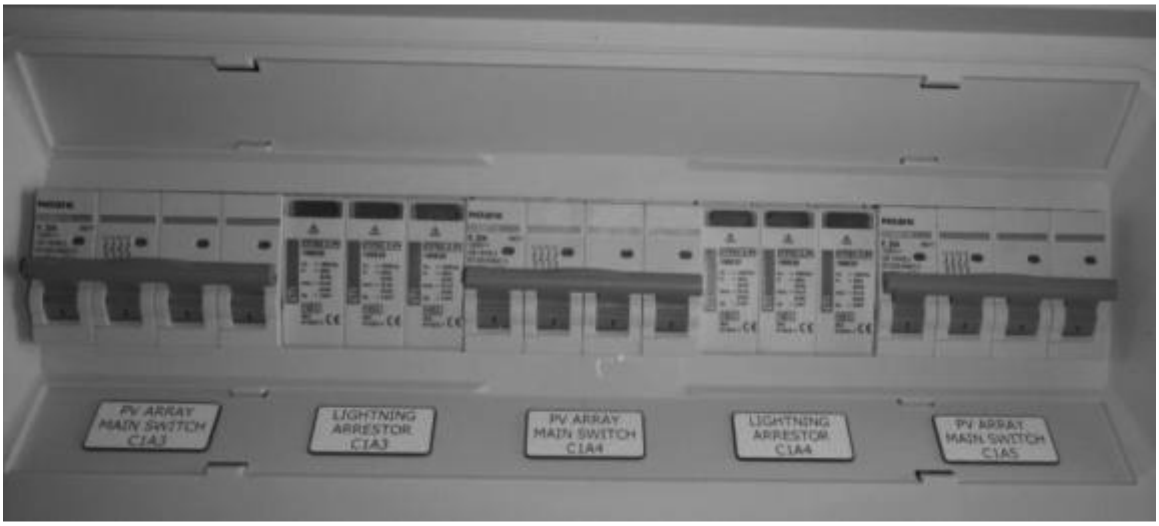

Figure 52: Sunny Boy lightning arrestors intact (red button pops out when tripped)

Figure 53: Lightning arrestors flagged green

Despite a recent lightning strike, all lightning arrestors were intact. It appears that only the communications cabling was affected by the lightning.

All Sunny Island lightning arrestors were flagged green indicating they were operating normally and had not tripped.

All Sunny Boy lightning arrestors were intact (for these arrestors a red button pops out when the arrestor is tripped).

Next Steps

No action is required.

2.2.6. Isolator enclosures

Isolator enclosures were opened and the condition and tightness of cables and circuit breaker terminations was checked manually.

Result

All cables were found in good condition and no loose connections were found.

Due to the layout of the equipment it was not difficult to remove the isolator enclosures.

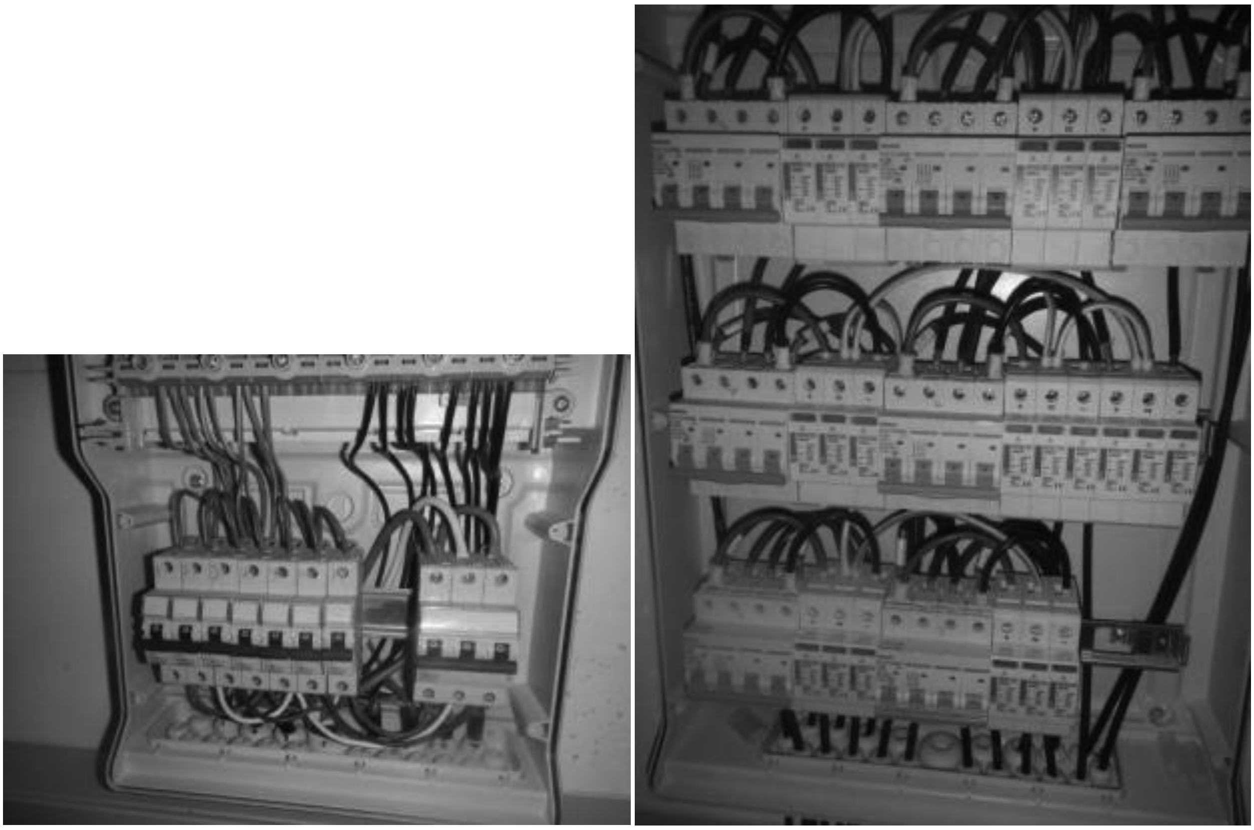

Figure 54: AC isolator enclosure wiring (left) and DC wiring (right)

Next Steps

No action is required.

2.2.7. Webboxes and Internet reliability

Webboxes were checked for operational status. Internet reliability was discussed with system operators. Internet wiring and connections were physically inspected.

Results

At the time of the inspection, all internet wiring was intact and undamaged. However the Webboxes were offline (indicated by the red light for "NETCOM" in Figure 55). This appeared to be due to a Teletok outage. Internal communiations between the Sunny Islands and Webboxes were operating normally. The Webboxes all contained SD cards that were successfully logging data.

Figure 55: Webboxes have no internet connectivity (red light)

The system operators reported occasional internet outages caused by Teletok (the internet provider) being down. The system reportedly came back online once Teletok restored connectivity. They were not aware of any internet connectivity problems occurring internally.

Next Steps

Internet connectivity needed to be restored, but this appeared to be a Teletok issue. Operators need to request that Teletok restore the connection.

2.2.8. Manual and array diagrams readily accessible

The inverter room was visually checked for easy access to the manual and array wiring diagrams.

Results

The complete system manual was located in the powerhouse. A check of the system manual showed it was complete. A laminated system diagram was located on top of a cupboard.

Shutdown procedures were mounted in several locations throughout the room.

Figure 56: Manual and shutdown procedures

Next Steps

The system diagram should be placed on a wall where it can be easily seen.

2.3. Battery Room

2.3.1. Temperature

Temperature at two locations in the battery room was measured with a mercury thermometer at approximately 10:30am.

Results

Temperatures of 31°C were measured at both locations. This was equivalent to ambient temperature so is not a concern.

Next Steps

None required.

2.3.2. Source of distilled water

As the system uses flooded lead acid batteries, the battery room was checked for a source of distilled water.

Results

A deionizer was mounted on the wall in the battery room. The indicator light was green indicating that the unit is operating normally. Operators said they had a spare filter should one be required.

Figure 57: Deionizer in battery room

Next Steps

None required.

2.3.3. Battery damage

Batteries were visually inspected for signs of damage such as sulfation on the plates, excessive lead deposits in the bottom of the batteries, low water level, or physical damage.

Results

No signs of sulfation were observed. Battery water levels were all close to the maximum level. Small lead deposits (up to 5mm deep) could be seen in the bottom of the batteries. These were not considered excessive. No signs of physical damage were observed and all terminals were insulated.

Figure 58: Battery plates and small lead deposits at bottom

Figure 59: Battery water levels close to maximum line

Next Steps

Other than routine maintenance, no further action is required.

2.3.4. Labelling

The battery room was visually inspected for appropriate warning labels and identifiers on batteries.

Results

Appropriate warning labels were mounted on the walls at both ends of the battery room. Each battery was numbered, however there were no string numbers painted on the wall as there were at Fakaofo.

Figure 60: Battery room warning labels

Next Steps

It would be useful to label battery clusters and strings with signs on the wall. However tis is not crucial.

2.3.5. Battery monitoring

State Of Charge (SOC) readings for the batteries were accessible via the monitoring system and on the Sunny Island SD cards. The batteries were tested and equalized by Exide during a visit in April 2013 and results of the testing were available in the battery room. Battery SOC was checked for consistency across battery banks and battery monitoring was discussed with the operators. Battery SOC data for the day was recorded and compared by cluster using Sunny Island SD card data.

Results

SOC data from the Sunny Islands was used to compare SOC across individual battery clusters. Each cluster was compared with the average SOC to find the deviation from the average throughout the day. Figure 61 shows the deviation from the average of each cluster. Note that sharp drops noticeable in the graph are a result of the Sunny Island's algorithm and do not reflect sudden actual drops in SOC. There is considerable variation across the clusters of up to +/-15%, though this varies when the algorithm recalculates. There may also be variation from clusters discharging to equalize other clusters. Cluster 5 appears low throughout the day, but this may not be a concern unless it is found to be consistently lower than other clusters over time.

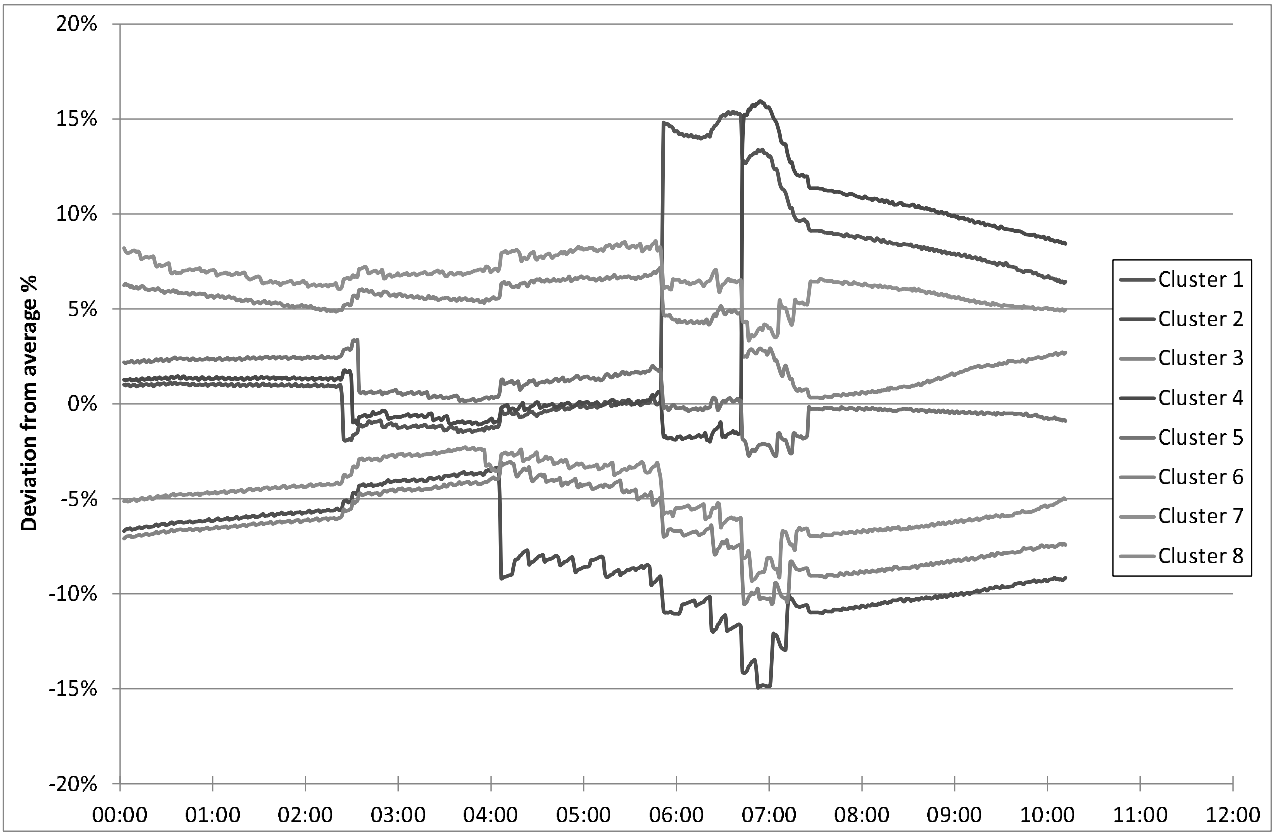

Figure 61: Battery cluster percentage deviation from average SOC (05 June 2013)

The large step changes in SOC may indicate that the Sunny Islands' method of calculating SOC may be problematic, and may make it more difficult to identify battery problems.

Next Steps

There is some deviation in the battery SOC across battery banks although some of the variation may be accounted for by the Sunny Islands readjusting their SOC calculation algorithm. The batteries should be monitored carefully and checked to make sure that one bank is not consistently different from others.

Battery monitoring records, taken during the Exide visit, were kept in the battery room. It is important that staff adhere to the monitoring and maintenance plan and keep accurate records of all testing and maintenance undertaken.

2.4. Maintenance

2.4.1. Cleaning of panels

Panels were visually inspected for signs of excessive soiling.

Results

Overall the panels were clean and free from any signs of excessive build up of dirt or droppings. There were some bird droppings on the panels but these were not excessively stubborn and appear to wash off in rain storms.

Figure 62: Panels generally clean, some bird droppings at top

Next Steps

No action is required.

2.4.2. Vegetation around panels

The system was inspected for general tidiness and any excessive vegetation growth.

Results

The area around the array was very clean and tidy. Vegetation had been cleared recently and there were no obstructions between the rows or shading on the panels.

Figure 63: Area around the array is very clean and tidy

Next Steps

None required, except regular clearing of any new vegetation.

2.4.3. Inverter room cleanliness

The inverter room was visually inspected for general cleanliness.

Results

The inverter room was generally kept clean. There were three boxed spare Sunny Islands in the inverter room, kept to the side where they were not obstructing access to any equipment. Operators told us the spare Sunny Islands were there as they had recently finished trouble shooting the array shutdown after the lightning storm. A few other spare parts such as cabling were piled in the corner, and while these did not present a hazard or hide any other equipment, they should be tidied.

There were no trip hazards or water in the room, and the tool box was stored in a corner near the door where it could easily be found. The tool box was locked and all tools were present.

Figure 64: Inverter room, spare Sunny Islands (left), toolbox and miscellaneous items (right)

Next Steps

None are required.

2.4.4. Battery room cleanliness

The battery room was visually inspected for general cleanliness.

Results

The battery room was generally clean and dry.

Figure 65: Battery room

Figure 66: Spare equipment stored in corner

Next Steps

None required.

2.4.5. Battery electrolyte levels

Battery electrolyte levels were visually inspected and battery maintenance was discussed with the operators.

Results

All battery electrolyte levels were close to the maximum line. Operators reported having topped up the battery electrolyte twice since the system was installed, and checking the electrolyte levels fortnightly.

Figure 67: Battery electrolyte levels

Next Steps

The schedule for checking and topping up batteries appears to be adhered to. Aside from regular checking and topping up of electrolyte no action is required.

2.4.6. Record keeping

Record keeping was discussed with staff to determine whether accurate maintenance records are being kept. The generator room was also checked to determine whether generator logging had continued after the PV system was commissioned.

Results

Records of battery testing were kept in the battery room. These records were taken by Exide during two tests in October 2012 and April 2013. It did not appear that there were any other maintenance records kept by local operators. We could not locate any generator logs kept since the PV system was installed, with the exception of a note saying that two drums of diesel had been used.

Next Steps

It is very important that staff are trained to keep records of maintenance work. As well as assisting with trouble shooting, good maintenance records will be important to support warranty claims for any equipment that fails during the warranty period. Staff are accustomed to keeping records for the diesel generator as they had been doing this before the PV system was installed, so it must be emphasised to them that record keeping is equally important for the PV system.

2.4.7. Generator maintenance

Generator maintenance was discussed with operators and generator function was observed when the battery SOC dropped close to 60%.

Results

The operators reported that one of three generators was operational and that they were working on repairing a second generator. This repair work was taking place during our visit.

Figure 68: Generator maintenance work underway

Next Steps

Continue repair work on the second diesel generator so that there is redundancy in the event of the PV system going down.

2.4.8. Spares and tools

The site was checked for spares and tools required for ongoing maintenance and replacement of any faulty parts.

Results

The following spare parts and tools were found in on site:

- Battery acid (approximately 14 drums stored outdoors under cover)
- Miscellaneous spare conduit and cable
- Tool box
- General power tools and accessories
- 3 spare Sunny Islands

We were told that there were also 6 spare batteries and 25-30 panels in another store room although we did not see these.

This is an appropriate spare parts inventory and there is no immediate risk of power station downtime due to lack of spares.

After the lightning strike, a new comms board was taken out of a spare Sunny Island, so a replacement will need to be ordered.

Figure 69: Spare battery acid stored under cover

Next Steps

A new comms board for the spare Sunny Island should be ordered.

2.5. Community Freezer

There is a community freezer currently being powered by a mobile generator. The compressor load appears to be less than 3 kW with an approximate energy requirement of 25 kWh/day. This load is well within the capacity of the PV system so there is no reason not to connect the freezer to the network. We recommend that the Energy Department staff log the freezer loads over a 24 hour period to confirm loads, daily energy requirement and any issues with inrush current, and subject to suitability connect the freezer to the grid.

Next Steps

We recommend that the Energy Department staff log the freezer loads over a 24 hour period to confirm loads, daily energy requirement and any issues with inrush current, and subject to suitability connect the freezer to the grid.

2.6. Summary

The system was found to be in good overall condition with no major construction or maintenance issues identified.

After shutting down due to a lightning strike, the system was restored to normal operation within a week after troubleshooting with assistance from Powersmart and SMA. This is good result given that this was the first outage that the staff needed to deal with since the system was installed, and it indicates that they are capable of troubleshooting with support.

However, to ensure the ongoing viability of the system the following items should be addressed:

1. Check for any signs of erosion around foundations and build up soil if required.
2. Check bolts on array frame for any sign of rust spreading. Tea staining should not spread.
3. Tidy spare parts on in inverter room and put system diagram on wall.
4. Investigate internet connectivity problems with Teletok.
5. Record keeping, particularly for battery and generator maintenance, needs to be improved. This is important both for trouble shooting and also for warranty claims.
6. A new comms board for the spare Sunny Island should be ordered.
7. Monitor battery SOC, as there appear to be some significant deviations between banks.
8. Continue repair work on the second generator for redundancy in times of bad weather or when the PV system needs to be shut down for maintenance.
9. Monitor load, energy requirement and inrush current on the community freezer over a 24 hr period. Unless any problems are identified the freezer should be connected to the grid.

3. Atafu System Review

3.1. PV Array

3.1.1. Structural Integrity

The PV array frame was visually inspected for damage, loose parts, movement and any signs of corrosion. Nuts and bolts were randomly checked for tightness. Concrete foundations were visually inspected for any signs of cracking or damage that could compromise the structure.

Results

No signs of movement were observed, and none of the bolts randomly checked were loose. Figure 70 and Figure 71 show typical array frame details including bolts and general condition of the array frame. No structural problems were observed. Some small spot rust (“tea staining”) was observed on some of the bolts. Tea staining on stainless steel usually occurs around joins or edges (such as the lettering on the bolt shown) and is mainly a cosmetic issue unlikely to spread. Nonetheless, bolts should be checked regularly for any signs of more extensive rust

Figure 70: Tea staining on bolts on the array frame

Figure 71: Array frame detail

Visual inspection of concrete footings revealed some small cracks in the concrete around the array mounting points. These cracks do not currently pose a structural risk but they should be monitored in case cracking becomes more extensive.

Figure 72: Small cracks in concrete foundations

Next Steps

Check bolts for signs of rust spreading. Monitor concrete footings in case cracking becomes more extensive.

3.1.2. Condition of panels

Panels were visually inspected for damage, hot spots and signs of degradation such as peeling of sealant and membrane, damage to glass, and brown spots on the underside of the panels.

Results

No signs of damage or hot spots were observed. Figure 73 shows typical panel front and back surface appearance. No dark spots, peeling or cracking were observed on any part of the array.

Figure 73: Typical panel detail

Next Steps

None required.

3.1.3. Condition of cables and conduit

Array cables and conduit were visually inspected and physically checked for signs of damage.

The design of the array cable reticulation means that most of the cabling is enclosed within aluminium ducting, leaving only small parts of the cable exposed. Cable entries into the ducting are a possible point of wear so cables at these locations were checked closely for damage.

Results

Exposed conduit (Figure 74Figure 8) was in good condition and suitably tied up to prevent accidental damage from movement.

Cable entries to ducting have sharp edge and in some cases the cables were pulled up against these edges (Figure 74). Some scratching on the outer insulation of the cables was observed, but no deep cuts in the insulation were found. Wiggling the cables produced very little movement so it is unlikely that they are rubbing against the edges due to movement. Nonetheless these points on the array should be monitored to ensure that the cable insulation is not damaged over time.

Figure 74: Conduit detail (left) and minor scratches on cables (right)

Next Steps

No immediate rectification work is required. However, cables entries to the ducting (as shown in Figure 74) should be checked regularly for signs of damage.

3.1.4. Isolator enclosures

Isolator enclosures were visually inspected and physically checked both from the outside and with the covers removed. The condition of all isolators and fuses was checked and cables were checked for loose connections. Enclosures were checked for water ingress and infestation from insects.

This inspection took place just after a major storm, so the watertightness of the isolator enclosures had been thoroughly tested.

Results

1. Labelling and general condition

All labels were checked and none were found to be missing, damaged or incorrect.

Screw mounts inside the isolators are showing some signs of wear (Figure 75) indicating that they may need replacing after several years of opening and closing the isolators.

Figure 75: Isolator enclosure labelling (left) and screw mounts (right)

2. Infestation

Two wasp nests were found in enclosure screw holes. These were easily removed with a screwdriver. Infestation does not appear to be a major problem at this site.

Figure 76: Small wasp nest easily removed with screwdriver

3. Operational state of isolators and fuses

At the time of the inspection, the system was fully operational and no isolators or fuses were tripped. All isolators operated correctly when switched off and back on again.

4. Water ingress

The inspection took place just after a major storm and the isolator enclosures were wet and dirty on the outside and under the clear covers. However, when we opened the enclosures they were enclosures were clean and dry inside. There was no evidence of any previous water ingress.

Figure 77: Water and mud on outside of isolator enclosures after a major storm

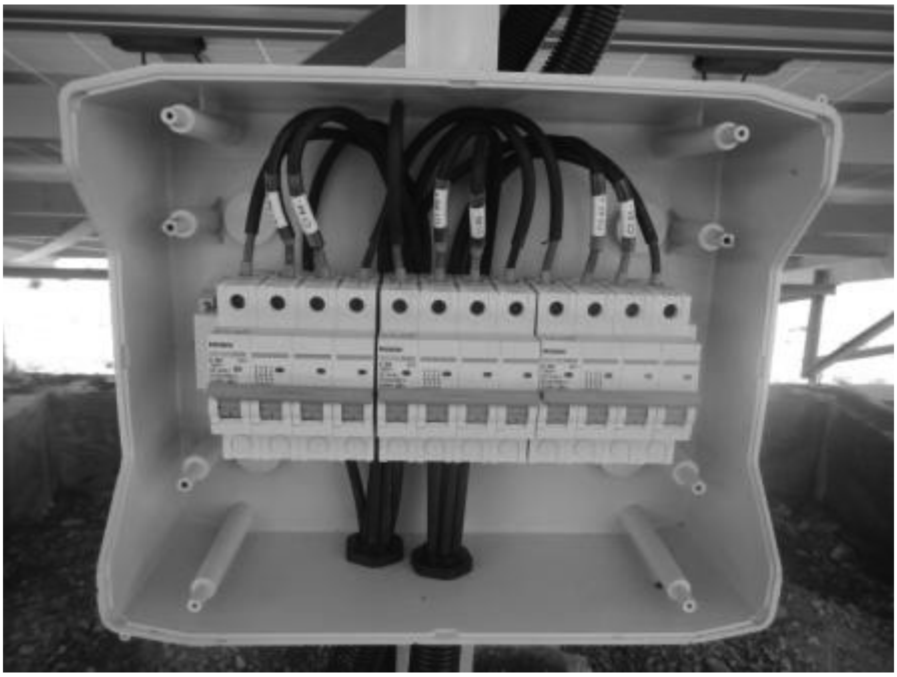

Figure 78: Enclosures were clean and dry inside

5. Corrosion

There were no signs of corrosion on the isolators. Mounting screws used in the enclosures were all stainless steel and showed no signs of corrosion. However, small screws used for the latching mechanism were galvanized steel and were corroding. These should be replaced with stainless steel screws.

Figure 79: Corroded galvanized steel screw on enclosure latching mechanism

6. Loose connections

Cable terminations on the isolators were checked for any movement by wiggling them. No loose connections were found and there was no evidence of any cables having moved since installation. Cable terminations were appropriately done with no sign of exposed copper wire inside the enclosures.

Next Steps

Galvanized steel screws used on the enclosure latching mechanism need to be replaced with stainless steel screws.

Screw mounts are showing some signs of wear and may deteriorate after several years of opening the isolator enclosures. Staff should ensure that spares are available should they be required.

3.2. Inverter room

3.2.1. Temperature

Room temperature was measured using a mercury thermometer at three locations in the inverter room, including areas next to inverters. Measurements were taken between 12:00 and 12:30pm.

The inverter room is naturally ventilated and has no ceiling extractor fans. Ventilation is in the form of windows at the top of the room.

Results

Temperature measurements were 41°C throughout the room. A measurement taken above an inverter heat sink read 45°C. Ambient temperature (outside in semi-shade) was 34°C. This room temperature is too high and forced ventilation is recommended for the room.

Figure 80: Inverter room with natural ventilation (top left)

Next Steps

Large extractor fans are recommended for this room.

3.2.2. Operational status

Inverters, Sunny Islands and chargers were visually checked for correct operation by inspecting display screens. The inverter room computer display was also checked.

Results

All inverters, Sunny Islands and chargers were operating normally at the time of the inspection.

The inverter room display computer was not working. Attempts to reboot the computer revealed that the hard drive was damaged. This computer needs to be sent for repair or replacement. This is the second hard drive failure of the inverter room computer at this site and there was also a previous hard drive failure at Fakaofo. Both these sites had excessive temperatures in the inverter room so this is a likely cause of the failures.

There is another display computer in the generator house and this was working normally.

Figure 81: Inverter room computer failed to boot due to hard drive failure

Next Steps

The inverter room computer needs to be sent back for repair or replacement. Heat is a likely cause of this failure, so it is important to reduce the inverter room temperature.

3.2.3. Erroneous tripping of alarms

Frequency of alarm tripping was discussed with the operators on site. The state of system alarms was visually checked. No tripping occurred during the site visit.

Results

Operators reported no erroneous tripping. The Sunny Island Fault Mute Switch was in the “OFF” position.

Figure 82: Fault mute switch in OFF position

Next Steps

None required.

3.2.4. Labelling

Labelling on all inverters, Sunny Islands and Chargers was checked.

Results

All labelling was attached to equipment and was correct.

Figure 83: Equipment labelling

Next Steps

None required.

3.2.5. Surge arrestors

All surge arrestors were checked for operational status by visual inspection.

Results

All Sunny Island lightning arrestors were flagged green indicating they were operating normally and had not tripped.

All Sunny Boy lightning arrestors were intact (for these arrestors a red button pops out when the arrestor is tripped).

Figure 84: Surge arrestors intact

Figure 85: Surge arrestors intact

Next Steps

No action is required.

3.2.6. Isolator enclosures

Isolator enclosures were opened and the condition and tightness of cables and circuit breaker terminations was checked manually.

Result

All cables were found in good condition and no loose connections were found.

Due to the layout of the equipment it was not difficult to remove the isolator enclosures.

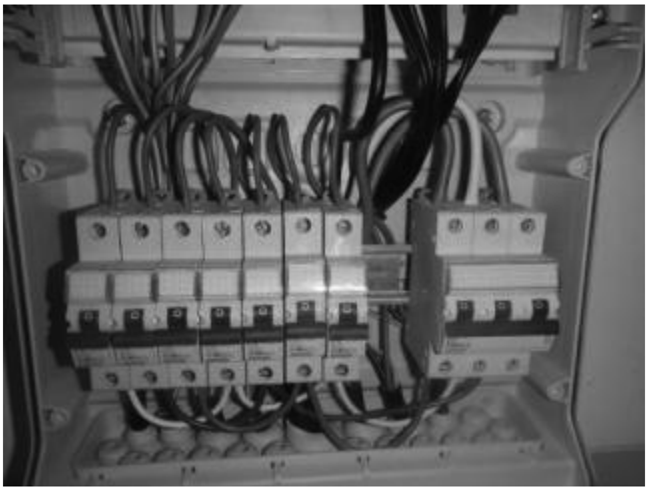

Figure 86: AC Isolator wiring

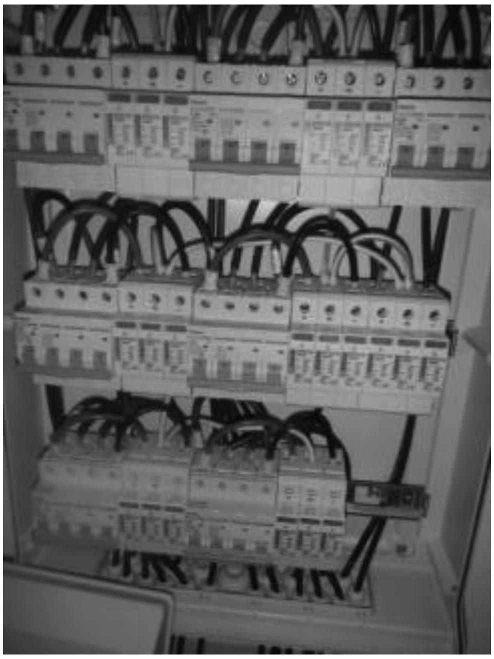

Figure 87: DC isolator wiring

Next Steps

No action is required.

3.2.7. Webboxes and Internet reliability

Webboxes were checked for operational status. Internet reliability was discussed with system operators. Internet wiring and connections were physically inspected.

Results

At the time of the inspection, all internet wiring was intact and undamaged and the Webboxes were online. The Webboxes all contained SD cards that were successfully logging data.

Figure 88: Webboxes online and logging

The system operators reported occasional internet outages caused by Teletok (the internet provider) being down. The system reportedly came back online once Teletok restored connectivity.

Next Steps

None required.

3.2.8. Manual and array diagrams readily accessible

The inverter room was visually checked for easy access to the manual and array wiring diagrams.

Results

The system manual and array wiring diagram were found on top of the main electrical cabinet.

Shutdown procedures were mounted in several locations throughout the room.

Figure 89: Manual and array wiring diagram on top of cabinet

Next Steps

The system diagram should be placed on a wall where it can be easily seen.

3.3. Battery Room

3.3.1. Temperature

Temperature at two locations in the battery room was measured with a mercury thermometer at approximately 11:30am.

Results

Temperatures of 34°C were measured at both locations. This was equivalent to ambient temperature so is not a concern.

Next Steps

None required.

3.3.2. Source of distilled water

As the system uses flooded lead acid batteries, the battery room was checked for a source of distilled water.

Results

A deionizer was mounted on the wall in the battery room. The indicator light was off and operators told us they had removed the battery as the light kept flashing. The battery was located nearby and the light was green when it was inserted. Operators said they had a spare filter should one be required.

Figure 90: Deionizer

Next Steps

Ensure that working batteries are available for the deionizer.

3.3.3. Battery damage

Batteries were visually inspected for signs of damage such as sulfation on the plates, excessive lead deposits in the bottom of the batteries, low water level, or physical damage.

Results

No signs of sulfation were observed. Battery water levels were all close to the maximum level. Small lead deposits (up to 5mm deep) could be seen in the bottom of the batteries. These were not considered excessive. No signs of physical damage were observed and all terminals were insulated.

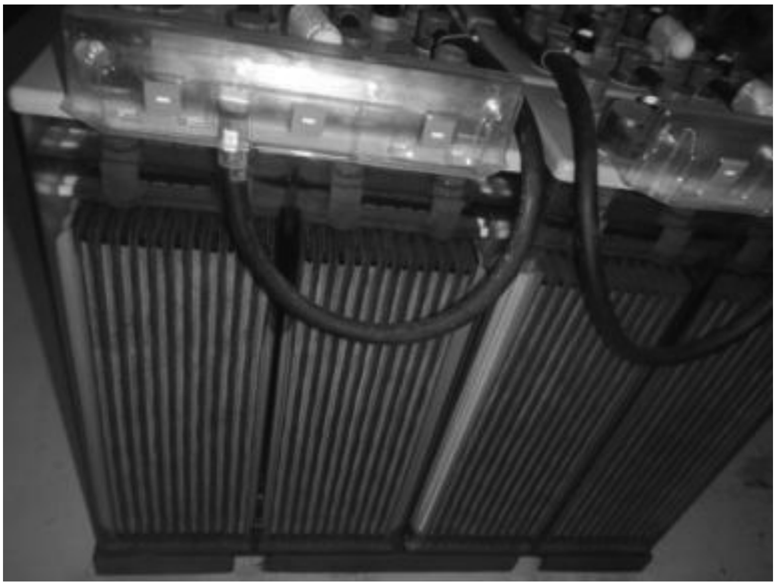

Figure 91: Battery plates free of sulfation

One new battery had been swapped into Cluster 2 String A after a dead cell was found during the Exide visit in April. This battery had some orange debris floating in the top and noticeably more condensation than the other batteries. The water level was also slightly lower. The extra condensation is caused by gassing within the battery as it attempts to equalize with the rest of the bank. The water level should be monitored as this battery may need topping up earlier than others. Exide have advised that the orange debris is a small amount of Darak (a type of polymer material used between the plates) which is inert and not a cause for concern.

Figure 92: New battery with some orange debris floating in the water

Next Steps

Battery 19, Cluster 2 string A should be monitored for water level, damage and battery health as it is still equalizing with the rest of the string.

3.3.4. Labelling

The battery room was visually inspected for appropriate warning labels and identifiers on batteries.

Results

Appropriate warning labels were mounted on the walls at both ends of the battery room. The new battery (Battery 19, Cluster 2 string A) was missing a number and this should be added. There were no string numbers painted on the wall as there were at Fakaofo.

Figure 93: Warning labels in battery room

Next Steps

The new battery should be numbered.

It would also be useful to label battery clusters and strings with signs on the wall. However this is not crucial.

3.3.5. Battery monitoring

State Of Charge (SOC) readings for the batteries were accessible via the monitoring system and on the Sunny Island SD cards. The batteries were tested and equalized by Exide during a visit in April 2013 and results of the testing were available in the battery room. Battery SOC was checked for consistency across battery banks and battery monitoring was discussed with the operators. Battery SOC data for the day was recorded and compared by cluster using Sunny Island SD card data.

Results

Overall battery bank SOC was at 75% upon arrival at the power house. Operators advised that they switched on the generator manually when the SOC dropped close to 60%.

SOC data from the Sunny Islands was used to compare SOC across individual battery clusters. Each cluster was compared with the average SOC to find the deviation from the average throughout the day. Figure 94 shows the deviation from the average of each cluster. Note that sharp drops noticeable in the graph are a result of the Sunny Island's algorithm and do not reflect sudden actual drops in SOC. Cluster 3 is 1-4% higher throughout the day than the average, while Cluster 5 is 1-3% lower than the average. These deviations are small enough not to be considered problematic. The step changes in SOC may indicate that the Sunny Island algorithm for calculating SOC is problematic.

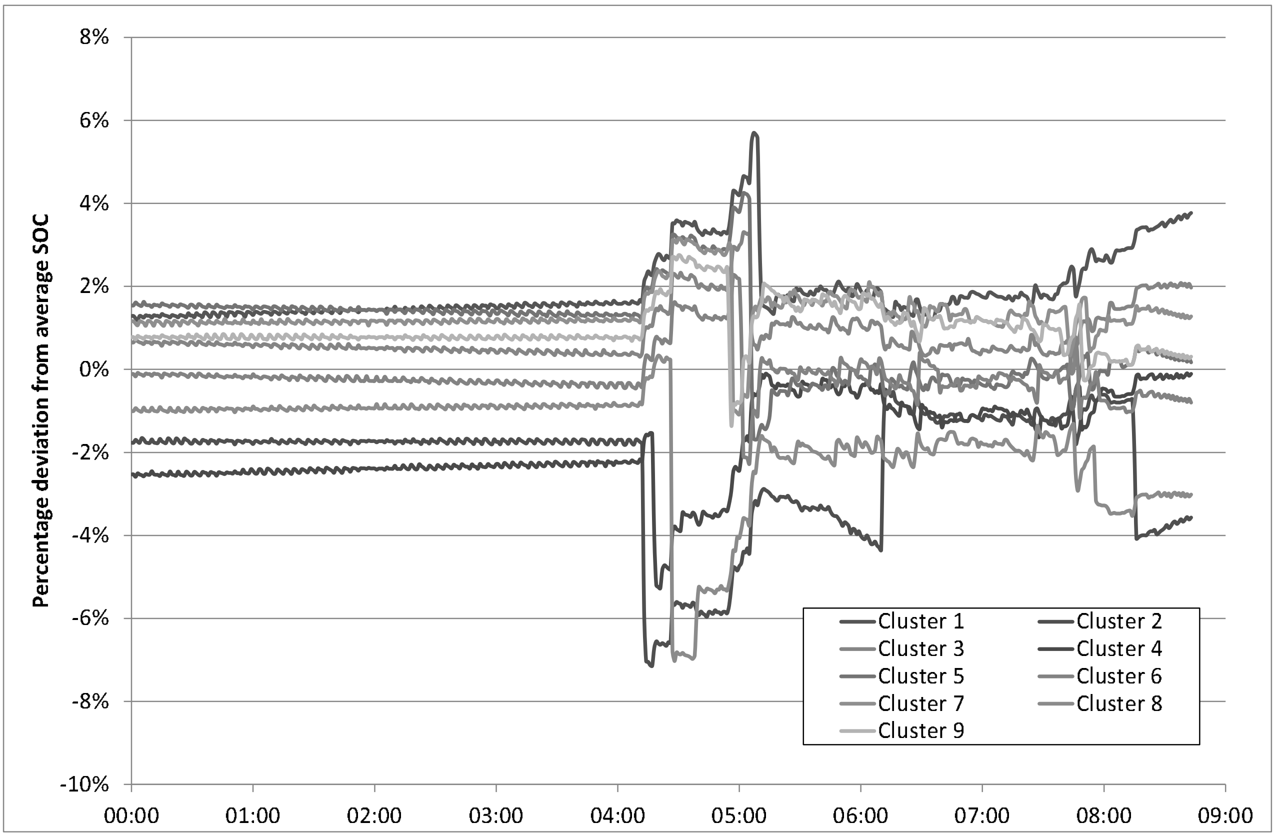

Figure 94: Deviations in battery cluster SOC from average over a day (07 June 2013)

Next Steps

There do not appear to be major deviations in the battery SOC across battery banks. General battery monitoring and testing should continue according to the schedule, and Battery 19, Cluster 2 string A should be monitored for water level, damage and battery health as it is still equalizing with the rest of the string.

It is important that staff adhere to the monitoring and maintenance plan and keep accurate records of all testing and maintenance undertaken.

3.4. Maintenance

3.4.1. Cleaning of panels

Panels were visually inspected for signs of excessive soiling.

Results

Overall the panels were clean and free from any signs of excessive build up of dirt or droppings. There were some bird droppings on the panels but these were not excessively stubborn and appear to wash off in rain storms.

Figure 95: Panels generally clean

Next Steps

No action is required.

3.4.2. Vegetation around panels

The system was inspected for general tidiness and any excessive vegetation growth.

Results

There is minimal vegetation around the array and no large plants growing near the panels. However, trees on the land adjacent to the site are shading the front row of the array until about 10am. There are also new trees growing in the area of land that was cleared in front of the array.

Shading on the front of the array is likely to get worse as the new trees growing in the cleared area become taller. As this land does not belong to the power station, permission from the landholder will be needed to remove the new trees. This should be investigated before the trees get too large.

Figure 96: Minimal vegetation around panels; shading on front row from trees on adjacent land

Figure 97: New trees growing on cleared land adjacent to array

Next Steps

3.4.3. Inverter room cleanliness

The inverter room was visually inspected for general cleanliness.

Results

The inverter room was generally kept clean. There were no trip hazards or water in the room.

Figure 98: Inverter room

Next Steps

None are required.

3.4.4. Battery room cleanliness

The battery room was visually inspected for general cleanliness.

Results

The battery room required some cleaning. Water had spilled on the floor (apparently from the deionizer) and had not been cleaned up. A drum of battery acid was stored between the rows of batteries, restricting walking access to that row. The dead cell previously removed was sitting next to the door. The toolbox and some miscellaneous equipment was stored on top of a pallet of spare panels in the corner of the room.

Figure 99: Dead cell, and storage area in battery room (left), water on floor (right)