

ARM Nauru Research Station
Site Visit 0807N Report

Visit Duration: 31 July to 10 August 2008

Nauru Island, Republic of Nauru

SV-0807N

Final Report

Site: Nauru **Dates on Site: 31 July - 10 August 2008**

Team Members:
 Krzysztof Krzton
 Mike Ryczek

- Required Items & Other Actions:**
- DS hardware procedures from MacDuff (on site)
 - AWS - procure and ship wind head from Darwin
 - AWS - procure and ship METCONSOLE laptop and USB serial converters for additional serial ports.
 - UPS (in transit)
 - o CSB GP 1272 F2 12V 7.2 Ah - 4 ea
 - o Yuasa REW45-12FR 12V - 60 ea
 - o Yuasa NP1212 12V 12 Ah - 2 ea
 - o CSB GP 1270 F2 12V 7Ah - 8 ea
 - o Yuasa NP 1212 12V 12Ah - 1 ea
 - Electrolyser - KK procure and ship to Nauru:
 - o Tubing, clamps, and fittings
 - o Compressor pulleys,
 - o KOH flakes,
 - o SG plug o-rings,
 - o compressor gaskets,
 - o coalescing filter assembly
 - o sensor-switched outdoor light
 - AERI - Ordered by Meyer
 - Resupply - KK procure and ship to Nauru the following resupply items:
 - o eyewash solution (small bottles),
 - o rust primer and paint,
 - o rubber gloves,
 - o work gloves
 - DC/DC converters - KK procure and ship to Nauru
 - COMMS - KK obtain new patch panel and ship from Darwin to Nauru
 - MET MI70LINK software & RS-232 cable to Nauru (on site)
 - BBSS GCS molecular sieve desiccant - KK to procure and ship
 - BBSS RBL light fitting - Culgan to procure and ship
 - ORG cables - MA to procure and ship

Task Summary:

Safety:
 Major Hazards: Caustic chemicals (KOH), Explosive gas (H2), AC electricity
 Hazard Controls: BOM Electrolyser Handbook, BM Electrolyzer Operations/Maintenance Training, ASNZS 4836/2001-Safe Working on LV Electrical Installations, 2-man rule

When replacing items (e.g., desiccant, filters, etc.), record and report the quantity of spares left on site.

SITE TASKS

High priority / usually non-routine

Low priority / usually routine

Completed

Priority	System	Date Completed (dd/Month)	Service Time (hours)	Tasks <small>For each priority item insert new line (row) for each date/time entry</small>
1	DS			Upgrade DS hardware - Contact mentor (Macduff)
		1-Aug		Hardware unpacked and checked
		2-Aug		New data system hardware installed in DS rack. New memory installed in Old DS 2 as requested by mentor.
		4-Aug		Waiting for further instructions from Matt McDuff
		7-Aug		Task completed. Please confirm that you want the old RAID frame returned as per email from Matt McDuff: <i>The old raid disk tray can probably be shipped out/back to PNNL if desired. The dell system it is connected to should remain as a spare for the collector though.</i>
	MET			Replace ORG cable. Investigate ORG problems.
		8-Aug		ORG cable replaced. Found to be damaged by rodents.
2	BBSS			Review BBSS launch procedure and verify adequate GCS molecular sieve desiccant on site

SITE TASKS

High priority / usually non-routine

Low priority / usually routine

Completed

Priority	System	Date Completed (dd/Month)	Service Time (hours)	Tasks <small>For each priority item insert new line (row) for each date/time entry</small>
		3-Aug		There appears to be adequate supply of molecular sieve on site.
		10-Aug		Reviewed BBSS launch procedure performed by Franklin and Equina and found it to be correct. I did not have enough time to check that all staff do it the same way. Observers still use the Stevenson screen step, but perform the Ground Check correctly. Franklin has reported that antennae fall off some sondes. I have instructed him to put any affected sondes aside so that they can be repaired by technicians at next site visit. Additional 3 jars of molecular sieve were handcarried to the site this site visit.
2	BBSS			Investigate sonde failure problems - 7 units failed in week of 06Jun due to loss of telemetry within minutes of first flight
		3-Aug		Observed one release where sonde failed totally. This was most likely due to underinflation of balloon as a result of which sonde was dragged through sea water on release.
		10-Aug		As reported above. This could have been caused by antennae falling of or too low ascent rate. Filling system repaired to ensure consistent fill rates. Instructed observers to test and to put aside any sondes with antennae falling off.
3	H2GEN			Investigate inconsistent fill rate of balloons when filling with helium.
		3-Aug		On inspection found that helium regulator was faulty and very noisy. Found similar unit in store and modified by adding necessary fittings. Regulator replaced and tested ok. There is no spare helium regulator on site.
	H2GEN			Repair Oxygen analyser
		6-Aug		Oxygen analyser sensor cell replaced, batteries replaced. Unit calibrated and working ok.
3	H2GEN			Install suitable circuit breaker for the Electrolyser fan circuit. Old breaker was by-passed by local electrician.
		4-Aug		Breaker was purchased and hand carried to site but due to our luggage being held up in Brisbane is not here yet.
		9-Aug		Circuit breaker installed and tested.
3	H2GEN			Inspect and clean ballon filling valves, replace rusted valves and H2 pipework with stainless steel tubing
		1-Aug		Locating hardware and shipments
		3-Aug		Compressor tubing connections replaced with stainless steel tubing.
		9-Aug		Number of pipe runs replaced with stainless steel tubing. Two new Swagelok valves installed to replace rusted compressor output valve and ballon fill valve. This eliminated quite a number of leak points. Compressor check valve replaced with stainless steel unit.
		10-Aug		All new electrolyser tubing tested for leaks. All ok.
3	H2GEN			Upgrade Electrolyser, install new storage cylinders, and install new tubing, clamps and fittings
		4-Aug		New storage tanks positioned and valves attached. Awaiting tubing clamps which were hand carried and got delayed.
		5-Aug		Awaiting clamps. Modified hydrogen distribution panel to suit new storage tanks.

SITE TASKS

High priority / usually non-routine

Low priority / usually routine

Completed

Priority	System	Date Completed (dd/Month)	Service Time (hours)	Tasks For each priority item insert new line (row) for each date/time entry
		6-Aug		Commenced preparation for installation of Hydrogen tanks pipework. Awaiting tubing clamps
		7-Aug		Commenced storage tanks tubing installation.
		8-Aug		Continuing tubing installation. Tank filling tubing connected, Hydrogen distribution panel connected.
		9-Aug		Electrolyser connection made and tested. Pipework flushed with helium to remove any contaminants. Tanks will not be connected this site visit as there is not enough time to commission them. H2 Storage Tanks commissioning task needs to be added as a task to next Site Visit. Approx 2 days will be required to install pressure relief valve vents, test entire system for leaks and purge the system with helium and hydrogen 7 times before hydrogen can be used for balloon inflation. Task completed for this Site Visit. 1/2 inch tubing bender required for next visit.
3	H2GEN			Install new coalescing filter housing (not done last SV due to lack of spares on site)
		2-Aug		New filter housing located and installed.
		3-Aug		New pipework for filter housing installed. Task completed
3	H2GEN			Move electrical outlet powering the pump and security light on the other side of the van to remove it from the Hazardous Area - currently used outlet not suitable for use in HA (not done last SV). Purchase and install sensor switched outdoor light.
		5-Aug		Electrical outlet for the water pump and sensor activated light installation carried out. Wrongly labelled circuit breakers located and relabelled. When doing electrical work at Nauru (and Manus) never trust circuit breaker labelling and assume all is live. All equipment must be isolated prior to being worked on as per requirements of Electrical License. Only licensed technicians are permitted to perform electrical work.
		6-Aug		Sensor light tested and working ok.
3	H2GEN			Install modified SG plugs on the electrolyser cells.
		9-Aug		No modified SG plugs on site. Postpone till next site visit.
3	H2GEN			Install new electrolyser compressor, modify pipework as required, test.
		2-Aug		When removing old compressor motor minerally insulated cable(Pyrotenax) cracked due to old age. Andrew has organized an electrician who came to the site and said he will be able to redo the connection next week. Old compressor removed and support tray modified to allow installation of new compressor. Support tray rust treated and painted. New compressor installed. When motor inspected a crack found on the motor pulley. Will need replacement as soon as spare is obtained. Monty: Could you please organize a purchase of a pulley to suit new motor you have purchased for the electrolyser. The outside diameter of the pulley required is 5 and 1/2 inches (140mm). Thanks.
		3-Aug		Pipework modified to accommodate new compressor, all gas connection completed. Water(offloading valve)and oil drain pipework installed.

SITE TASKS

High priority / usually non-routine

Low priority / usually routine

Completed

Priority	System	Date Completed (dd/Month)	Service Time (hours)	Tasks <small>For each priority item insert new line (row) for each date/time entry</small>
		4-Aug		Waiting for electrician to replace compressor power connection. Andrew is following up.
		5-Aug		Electrician did not arrive. New compressor working well. Connected compressor motor power using hardware found on site. Compressor motor needs replacing as it does not always start and it appears to have faulty start winding. Monty is purchasing a replacement which will be installed by local electrician. Krzton will purchase suitable SWA cable and glands to replace repaired Pyrotenax runs.
4	MET			Install MI70LINK software & RS-232 cable
		6-Aug		I believe software needs to be installed on a laptop of a technician performing the calibration check. No need to install it on any of the site computers. Could mentor please confirm.
		6-Aug		Mentor confirmed that software is to be installed on technicians laptops. Software and cable received on site.
4	WND			Check anemometer cables to see if Nauru anemometers suffer from AC induction problems.
		6-Aug		Mast lowered and cables checked. It appears that Nauru experiences same problem as Darwin with Wind excitation wire inducing voltages in Wind Speed lines causing erroneous wind speed readings
5	UPS			Install new batteries in APC rack power supply D – Van.
		3-Aug		Batteries replaced.
5	UPS			Install new batteries in Liebert UPS Yuasa REW45-12FR 12V,45W/cell 10 min, wide(normal) spade connectors in UPS - 6 ea; UPS battery pack - 12 ea; This is for 4 Liebert UPS units and 3 battery packs. Total of 60 batteries required for all Lieberts.
		2-Aug		Commenced replacement of Liebert UPS batteries.
		3-Aug		Battery replacement complete.
5	UPS			Install new batteries in MMCR UPS Ferrups; 2 ea Yuasa NP 1212, 12V 12 Ah
		3-Aug		Batteries replaced
5	UPS			Install new batteries in AERI UPS; 8 ea CSB GP1270 F2 12V 7Ah
		3-Aug		Batteries replaced
5	UPS			Install new batteries in Aeri Hatch UPS; 1 ea Yuasa NP1212 , 12V 12Ah
		4-Aug		1 battery replaced. Need another one. AERI Hatch UPS uses 2 of Yuasa NP1212, 12V, 12Ah. Franklin was trained on how to replace battery.
6	LICOR			Inspect LICOR site, replace serial cable, check Licor laptop and install replacement battery in the laptop. Check with mentor if instruments require cleaning.
				Awaiting serial cable which was hand carried to site.
		8-Aug		Licor laptop checked and battery installed. Site inspected and all ok. Could mentor please advise if radiometers require cleaning.
6	LICOR			Fix external cable connection

SITE TASKS

High priority / usually non-routine

Low priority / usually routine

Completed

Priority	System	Date Completed (dd/Month)	Service Time (hours)	Tasks <small>For each priority item insert new line (row) for each date/time entry</small>
		8-Aug		New weatherproof cable installed, connection tested and data downloaded. Logger .dld (program) file downloaded and sent to mentor together with data. This will ensure we can prepare and ship replacement logger should Licor unit fail.
7	AERI			Receive and put in storage the following AERI items: filters, intake filters.
		4-Aug		Filters located and put in storage.
7	AERI			Clean cooler expander fan - use pipe cleaner in holes in bottom of fan
		4-Aug		Cooler fan found failed. No replacement on site. Cooler assembly cleaned. Required cooler fan ; Panaflo DC brushless 1G24CZ Model FBK04F24H, DC 24V 0.15A
		6-Aug		Substitutue cooler expander fan constructed and connected as per D Heckel's request.
7	AERI			Photograph mirror
		4-Aug		Mirror cleaned and photographed. Photos sent to mentors Denny Heckel, David Turner)
7	AERI			Inspect and repair AERI fan blower assembly
		4-Aug		On arrival on site AERI AIR INTAKE fan motor assembly was very noisy possibly due to faulty bearings. Replaced with spare blower assembly and with motor from assembly installed. V Belt changed.
7	AERI			Install Radmin - contact Tim Grove at grover@ops.sgp.arm.gov
		4-Aug		Radmin file placed on the desktop is corrupted and cannot install. Tim Grove advised. Awaiting response.
		5-Aug		Radmin installed and tested operational from site network. Could mentor please test and confirm that all ok.
		6-Aug		Mentor installed time keeper software. This would mean Radmin is working. Task completed.
7	AERI			Remove property tag (WD00274) from AERI computer, and report s/n.
		6-Aug		There is no property tag WD00274 on AERI computer. There is an US government asset id F033077, computer also has a University of Wisconsin asset ID of SSEC 003626, Manufacturer : Industrial Computer Systems, model 415P-33V, serial number 2378300011
8	GENSET			Verify that genset water pump replaced and grease applied as per manufacturers specifications
		5-Aug		Verified that water pump has been replaced by David Jacob (local diesel mechanic). He had also applied additional grease to fan bearing as per manufacturers specifications. Water pump does not require grease to be applied as it is lubricated by the engine oil. Grease needs to be applied to fan bearing housing. Grease nipple on the fan bearing housing was reported to be stuck and was replaced by diesel mechanic performing the service (Paul Smith of Askensmith) some time ago.
9	RBL			Prepare empty cylinders and cylinders w/ stuck valves for shipment back

SITE TASKS

High priority / usually non-routine

Low priority / usually routine

Completed

Priority	System	Date Completed (dd/Month)	Service Time (hours)	Tasks For each priority item insert new line (row) for each date/time entry
		5-Aug		Observers located 2 cylinders with stuck valves. I had managed to get one of them open. Other one is to be returned to manufacturer. Cylinders prepared and waiting for shipping.
9	RBL			Repair RBL light. Source suitable light fitting in Darwin
		2-Aug		Light fitting was in our checked in luggage. Expected arrival Sunday afternoon.
		4-Aug		As our luggage and handcarry got lost on the way here light fitting purchased in Darwin did not arrive on site. I have located a suitable Explosion rated light fitting in the store and installed it. Light fitting purchased in Darwin to be kept as spare on site. Both fittings use standard 36Watt bi-pin fluorescent tubes. Light fitting installed was shipped to site by BoM stores more than 5 years ago. Hazardous Area Compliance Certificates will be taken to Darwin to set up Hazardous Area Verification Dossier for the site.
9	RBL			Install light for ballon inflation/safety shower area
		4-Aug		Light installed.
9	GENSET			Install a sensor activated light to provide adeqate lighting in the fuel tank/toilet walk way area.
		6-Aug		Sensor activated light installed. This light can be operated in either sensor mode or constantly ON mode for the site security purposes.
9	RBL			Build shade structure for RBL aspirator pipe
		7-Aug		Sourcing material for shade structure and to replace roof cladding.
		10-Aug		Andrew and Franklin will attend to this task once suitable material can be sourced locally.
10	OTHER			Install Radmin on Observers PC
		8-Aug		Radmin installed and functional.
11	COMMS			Install patch panel in E-Van
		10-Aug		Harware on site. Not enough time to complete this task this site visit. Low priority.
12	AWS			Replace Wind head (not done last SV)
		8-Aug		AWS anemometer replaced.
12	AWS			Replace METCONSOLE laptop with a dedicated computer. Computer to be built and tested in Darwin
		4-Aug		Met console computer not on site yet. Handcarry equipment delayed as airline lost our luggage.
		9-Aug		Metconsole PC installation completed. Software kept crashing after install. Working ok now. Old laptop left on site as backup.
13	POWER			Wire E-Van UPS to existing power outlets – oversee local electrician (not done last SV)
		6-Aug		Not able to find electrician as they are all occupied at the phosfate loading facility.
		10-Aug		Insufficient time to complete this site visit. Postpone.
14	TSI			Note and confirm serial number of TSI camera - Contact mentor (Morris) for additional information
		7-Aug		Imager serial no C042, TSI 880 s/n 107. Mentor advised.
15	LGR			Replace CD/DC converters - ref. ECO-615
				Postpone. Hardware required for this not on site yet.

SITE TASKS

High priority / usually non-routine

Low priority / usually routine

Completed

Priority	System	Date Completed (dd/Month)	Service Time (hours)	Tasks <small>For each priority item insert new line (row) for each date/time entry</small>
16	OTHER			Receive and put in storage the following resupply items: eyewash solution (small bottles), rust primer and paint, rubber gloves, work gloves.
		10-Aug		Could not locate these items.
17	H2GEN			Receive and put in storage the following Electrolyser items: KOH flakes, SG plug o-rings, compressor gaskets, coalescing filter assembly
		9-Aug		Located and received coalescing filter assembly and filters and compressor gaskets. No KOH flakes found.
18	COMMS			Organize into pairs and label serial to fiber converters.
				Not enough time to do it this visit. Postpone. This is a low priority task.
19	CIMEL			Get s/n of CIMEL robot arm
		4-Aug		Cimel robot arm s/n 98 asset id WD35515
20	OTHER			Review Monthly Resupply Checklist w/ Observers
		10-Aug		Checklist reviewed.
21	WND			Check all anemometer s/n's
				Mast lowered and anemometers inspected. Serial numbers checked. Mentor and Charles Brinkmann advised.
22	OTHER			Perform routine maintenance per Maintenance Checklist
		7-Aug		MMCR maintenance carried out. SKYRAD, GNDRAD and SMET routine maintenance carried out.
		10-Aug		Routine maintenance completed.
	SHIPPING			List items to be shipped following visit
				Replaced ORG to SGP for repair
				Helium cylinders (empty and ones w/ stuck valve)
				? Old AERI blower fan assembly
				?Old RAID frame
	FUTURE NEEDS			List items needed for future visits (spares, etc.)
				Paint to paint VSAT dish
				Water pump
				Socket set with 1/2 inch drive.
				Patch cables
				Drill bit sets
				2 Helium regulators with Type 10 inlets (Australia)
				AERI cooler expander fan 2 off; Panaflo DC brushless 1G24CZ Model FBK04F24H, DC 24V 0.15A
				additional battery for AERI hatch controller: Yuasa NP1212, 12V, 12Ah
				electrolyser compressor motor
				2 toilet flashing cisterns. Lids are missing from toilet cisterns which allows mosquitoes to breed.
				SWA cable and glands (2 core and 4 core)
				sensor cell for O2 analyzer
				batteries for O2 analyzer
				tools
				computer monitors - no spares on site.
				Tasks for next visit
				Replace electrolyser compressor motor and pulley

SITE TASKS

High priority / usually non-routine

Low priority / usually routine

Completed

Priority	System	Date Completed (dd/Month)	Service Time (hours)	Tasks <small>For each priority item insert new line (row) for each date/time entry</small>
				Install pressure relief valve vents on new Hydrogen Storage Tanks
				Commission new Hydrogen Storage tanks.
				Decommission old Hydrogen storage pressure vessel, drain, plug all ports and label.
				Move electrolyser air intake away from the Hazardous Area.
				Investigate lower AC unit in D-van. Replace if necessary.