If you are involved in testing your facilities **critical battery banks**, please read below OR pass this along to the applicable person(s). Below is a $495. half day course for free and takes 2 minutes to read.

ProgUSA is a provider of various Battery Bank testing Equipment and maybe you don't need to buy anything from us!! Here's the **EIGHT levels of competency** in verifying the battery energy is THERE, when you need you it.

1. IGNORE- Believe it or not this is common practice in the US. Batteries are not too exciting, so let's ignore testing them until they fail, then we'll replace them.

2. VISUAL – Looking for acid leaks and verifying electrolyte levels. Leaks and low electrolyte is bad. Some look for deposit accumulation in bottom of jars (age=decomp) and some do a thermal imaging survey to look for hots spots in cells or at terminals (loose connections)

3. CELL VOLTAGE- Measure overall bank voltage and also each individual cell. Better if charger is turned off for this, although a dead individual cell will show up with charger on or off. A simple DMM will do this test. Or a data-logging DMM like DV Power's BVR for $3200. from ProgUSA will do this with nice report writing software.

4. RESISTANCE – (aka impedance or capacitance test and lately agreed to be called OHMIC test by all) – Test with a specialized voltage and resistance tester that draws 20-50A from each cell to measure the resistance accurately. It gives a better health check than just voltage. Problem here is the resistance in healthy battery cells will vary from cell to cell, and manufacturers do not specify this parameter, so this must be a comparison test with previous benchmark test numbers. Also trending impedance can tell if a cell is starting to fail but doesn't tell how bad it really is. (loading will) For this test there are multiple manufacturers that measure resistance, impedance or conductance. The new wording for this testing is OHMIC testing, which encompasses all technologies and <u>trending</u> every so many months is the key to getting value from this test. DV Power has anew IBAR available for under $3K

5. SPECIFIC GRAVITY- Verifies the electro-chemistry of the electrolyte. Used for flooded cells for many years. Usually combined with test 3 above and sometimes with 4. For this test ProgUSA recommends a $4500 accessory that interfaces to various voltage data logging meters. This old school test giving way to Impedance testing.

6. LOAD TEST – Disconnect the charger and even leave the critical load connected and use DV Power BLU200A or other BLU series to stress the battery bank and ensure the specified energy is still there. This can be a long discussion and basically many utilities got away from load testing because it was thought to age or destroy batteries. It only destroys the batteries if you pull down the voltage too low like less than say 85% of the value and certainly if a cell goes low enough through 0V and reverses polarity(except Ni-Cads, as they can go thru 0V without damage). When you look at the discharge graph, most of the AH capacity is within the top 90% voltage of the battery. So why take it below 85%. You need a smart load bank to stop at critical point. The DV Power BLU series from ProgUSA does this. The discharge time minimum recommend time is one hour but some may prefer 2-3 hours to reduce size of loads. An owner's

battery discharge specification charts need to be consulted along with the various BLU units available to select the best discharge time, rate and loading configuration. BLU costs start at $12K. Plus it can be expanded with smart slave units for additional loading capacity. Note: IEEE recommends load testing flooded cells every 5 years, and VRLA's every year. NERC recommendations are similar and new NERC regulation PRC-005-2, accepts load tests every 6 years on flooded cells, more often on Ni-Cad and VRLA's.

7. LOAD TEST and CELL VOLTAGE COMBO– Item 6 plus add the DV Power BVS cell by cell voltage scanning unit. This combo makes it so easy to find bad cells and document the test with handy DV Win PC software control and report writing software. **The ideal solution with the highest battery testing competence**. Both units here from ProgUSA and common software controls the combo. Combo cost starting at $26K.

8. Load test, Cell voltage and OHMIC in one portable fast test system. It's a new combo system that is best of all worlds by simply adding a DC current clamp option (for BVS) to item 7 systems above. It satisfies NERC's impedance test requirement with **added competency** of capacity testing

Congratulations, if you read this far you now know lots more about battery testing. For further tech or sales help go to www.progusa.net to find your local rep or contact as below. All products are on www.progusa.net

How healthy are your battery banks????….a very critical energy source in times of disaster!!

Mr. Kim Etherington, P. Eng.
Tech Services Manager
ProgUSA LLC
356 Harbour Isle Way,
Longwood, FL. 32750
Tel: 407 332 8678
Direct tel: 407 443 9697
kime@progusa.net

NOTES: Always use protective clothing (fireproof overalls are best) and face shields when testing batts with Impedance or loading.
Comments and DISCLAIMER: Any field testing experience comments on above are certainly welcome to the author above. The content herein is based on a collection of experience and discussions with US utilities, and by no means should be adopted as a standard to meet IEEE or NERC standards. A comprehensive battery maintenance plan should be evolved by respective utilities or test companies once NERC and IEEE guidelines have been studied.