Value of Battery Monitoring For Flooded (Wet) Cell Battery Systems

June 30, 2005

Introduction

BTECH has Battery Monitoring Systems installed over hundreds of Flooded (wet) Cell battery systems in critical data center applications. This short report will detail a number of case studies to demonstrate the importance of battery monitoring for these applications.

What We Have Found

As is generally known in the industry, flooded (wet) cell battery systems have a longer service life and have fewer failure modes than sealed (VRLA) batteries. BTECH has found many problems over these years with these battery systems and has helped users to take action proactively. This report will list five major benefits.

1. Detecting early failure with a rise in impedance

One of the principal features of BTECH's Battery Impedance Monitoring Technology is the ability to detect small rises in impedance in advance of a problem occurring. The example in Figure 1 below details an impedance rise on a flooded cell battery of approx. 15% over a three month period. Once identified, the unit was tested, verified to be in its failure mode, and replaced.

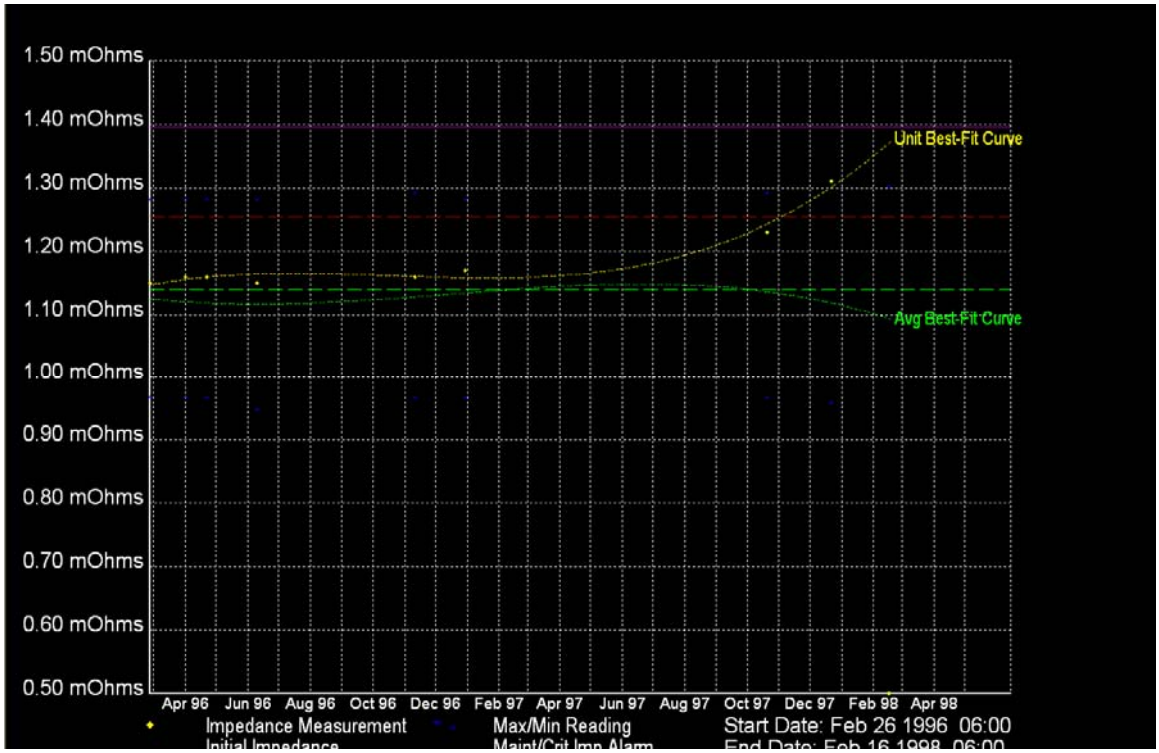

Figure 1 – A Flooded (Wet) Cell Impedance Failure

There are some important points to make about this example:

a) The baseline measurement is a low 1.15 mOhms and is used as the baseline on this individual battery. This measurement is consistent over 9 months of readings until the rise begins.
b) The small impedance rise detected - relative to typical VRLA batteries - is a common failure mode in large wet cells. Such a small rise in impedance is not easily detectable with hand-held test equipment for the following reasons:
    a. Hand-held equipment is not generally sensitive enough to track such small rises in impedance over time.
    b. Most hand-held test equipment is affected by electrical noise on the battery system if testing is done while the battery system on-line (our latest white paper details this well).
    c. Differences this large can easily be introduced by operator error or inconsistency in physical measurement techniques.

2. Detecting interconnection problems with a rise in impedance

One of the common problems that BTECH's Battery Impedance Monitoring Technology can find is loose battery connections. This example is shown in Figure 2 with a sudden rise in impedance over a two week period. These are often introduced by battery service personnel. If undetected, these could cause a battery fire if the battery is placed under load.

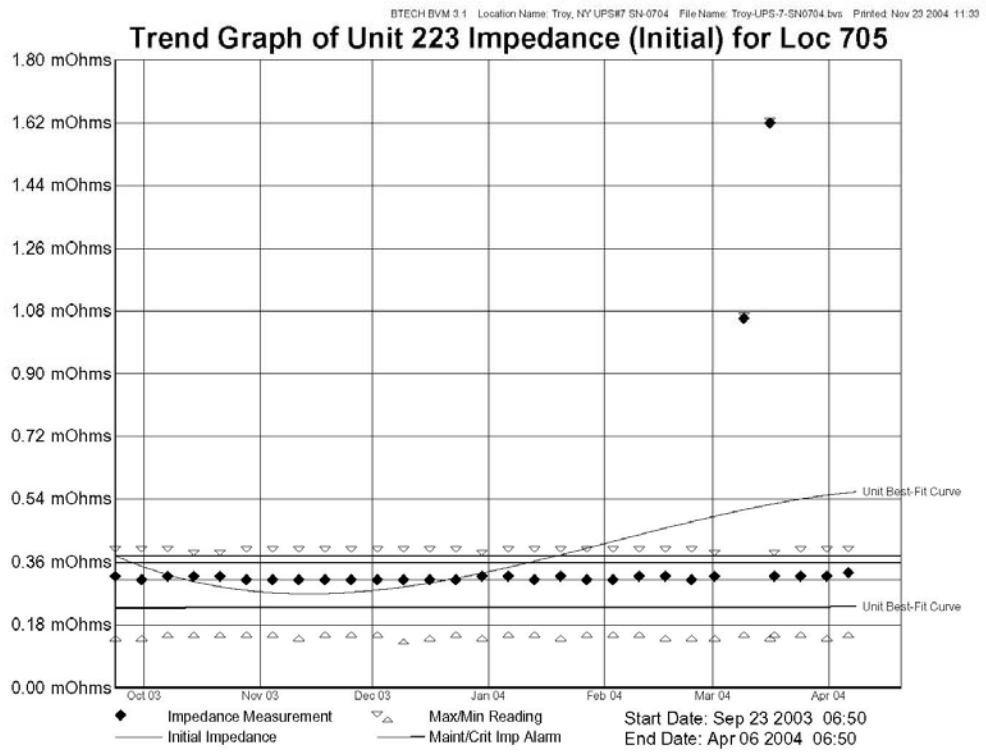

Figure 2 – A Flooded (Wet) Cell Impedance Interconnection Failure

3. Detecting battery failures with a sudden voltage drop

Flooded batteries can also show their failure mode with a voltage drop, with the change of one unit actually occurred before impedance. Voltages declined 10% quickly over a two-week period, as shown in Figure 3, below. From the graph, we were able to deduce that this battery had a small electrical (dendritic) short between the battery plates, causing the voltage change. This customer needed to replace the unit immediately. This problem would have gone unnoticed for many weeks until the next quarterly service was performed.

An important point here is that any system monitoring at the cell pair or 4-cell jar level would not be able to detect this small voltage change, as it would be masked in the other data.

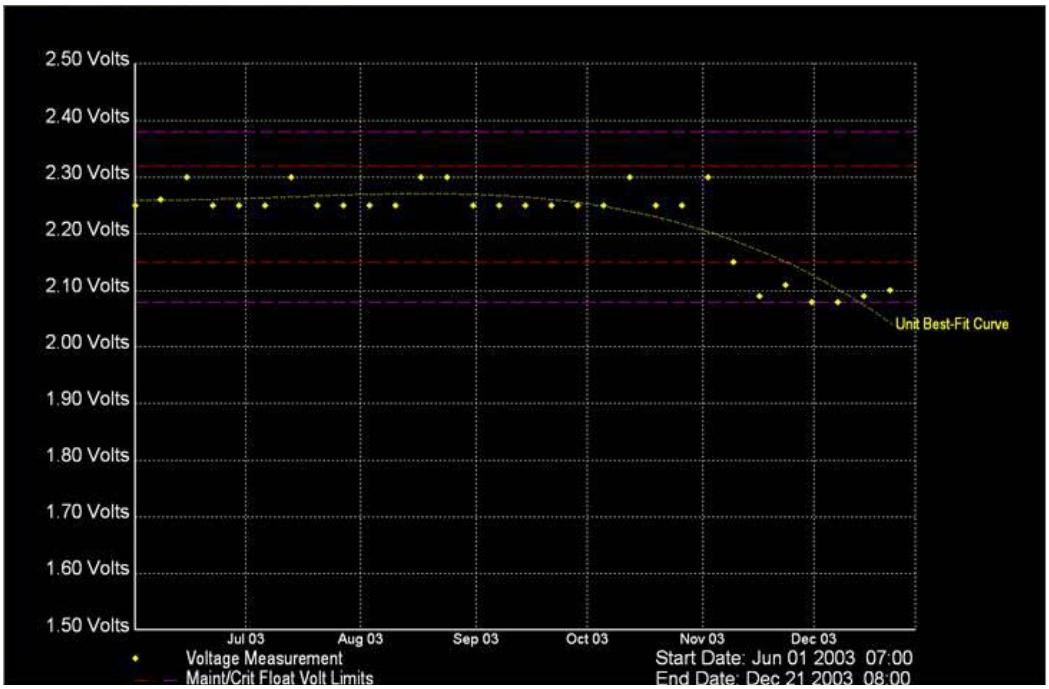

Figure 3 – A Flooded (Wet) Cell Dendritic Short

4. Many Other Common Problems Detected

BTECH has found many other problems on wet cell battery systems well before service providers were on the scene. Here are some on them:

a) Incorrect float voltage settings
b) Temperature problems – the S5 system includes one temperature monitoring point for every 6 cells, giving the user many pilot cell monitoring points.
c) Discharge alarms

5) Lowering Costs with BTECH Battery Monitoring Systems

With a system monitoring the voltages and impedances of flooded cell systems, it is possible to lower operating and maintenance costs:

a) Reduction of load test frequency from yearly to once every 4 or 5 years. Each

discharge test for a 240 cell battery system is upwards of $6k per test.
b) The S5 system functions as a full real-time discharge data logger, so money can be saved even when discharge tests are performed, because no discharge data logger needs to be rented and connected to each battery.
c) Quarterly maintenance can be reduced to semi-annual as long as the jar fluid levels are within specification (a visual check by maintenance personnel is all that is required to confirm this.

Conclusion

BTECH feels it is prudent and cost-effective to install battery monitoring systems on flooded (wet) cell battery systems. With a long history of satisfied customers, we are certain you will find our monitoring systems helpful and cost-effective in improving system reliability and increasing battery life.

Respectfully submitted:

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