



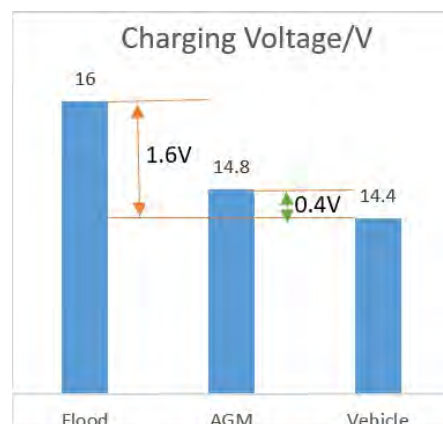
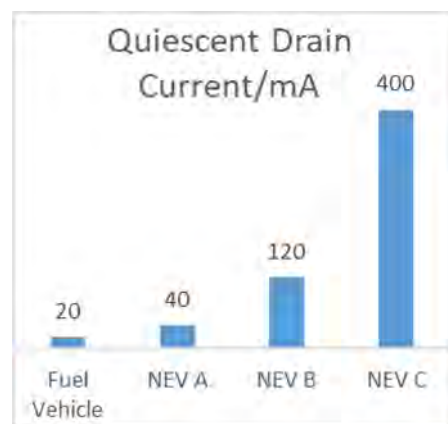
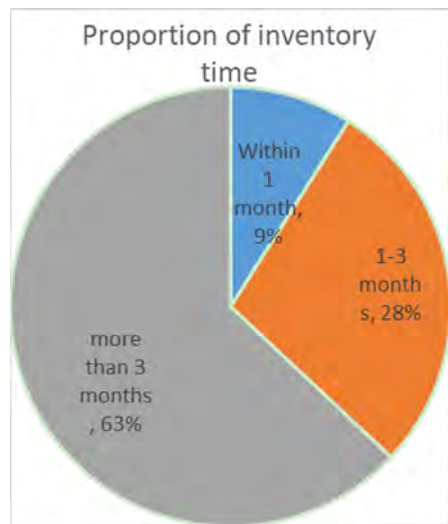
# Capacity recovery when charged at the vehicle voltage (14.4V) after overdischarging

Presentation Date: MAY 2026  
Camel Group Co. LTD.





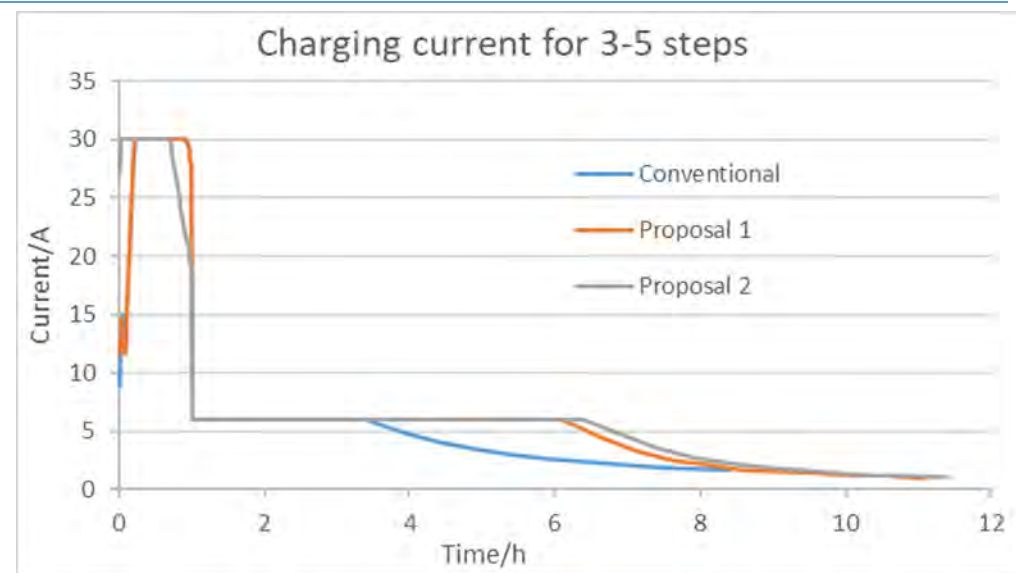
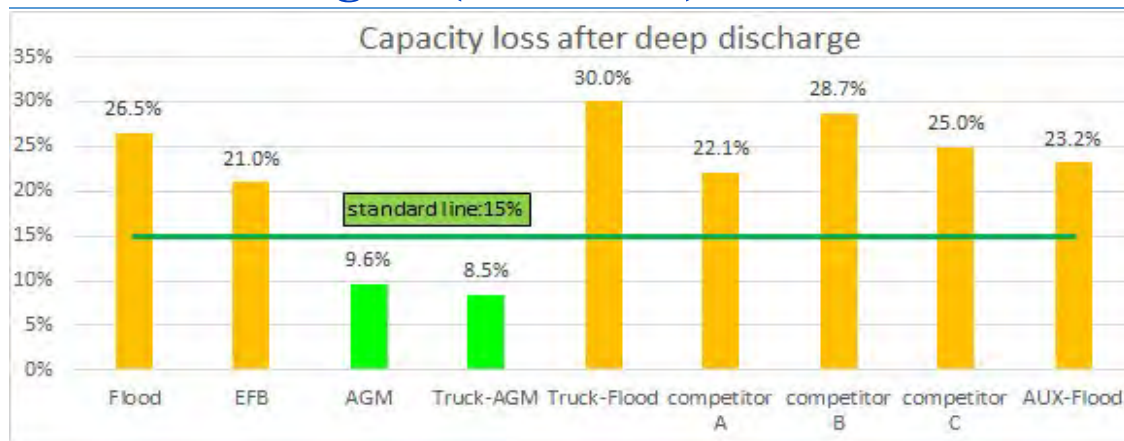
## Capacity recovery when charged at the vehicle voltage (14.4 V) after overdischarging



So, we have this testing method:

1. At 25°C. The fully charged battery shall be discharged with an  $I_o=10\%C_e$  to a voltage of 3 V.
  2. The battery shall then be short-circuited with a cable between the terminals for 168 hours (7 days).
  3. The battery shall then be charged with a constant voltage of 14.4 V and a current limit at 50% $C_n$  for 60 minutes.
  4. The battery shall then be charged with a current equal to 10% $C_n$  until the battery voltage reaches 14.4 V.
  5. The battery shall then be charged for 5 hours with voltage limit at 14.4 V and a current limit at 10% $C_n$ .
  6. The charged battery will then be tested for a  $C_n$  capacity.
- Requirement: Capacity loss  $\leq 15\% C_e$ .

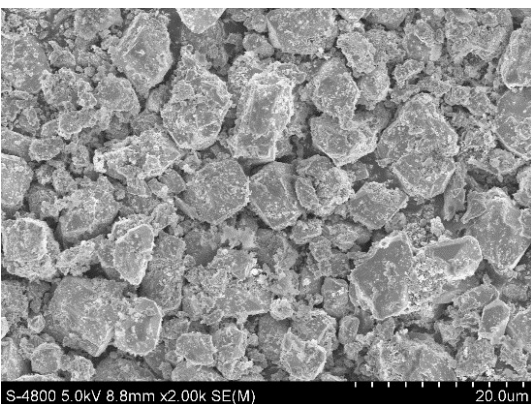
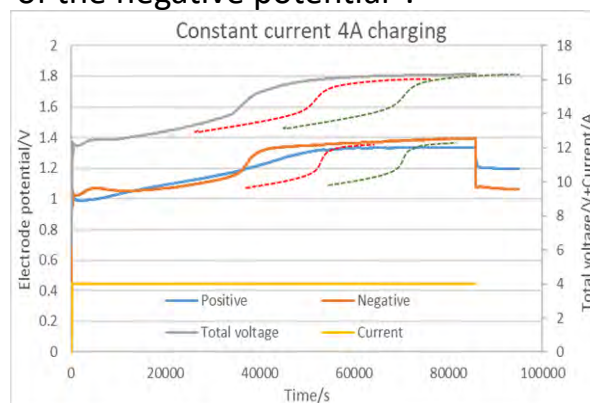
# Capacity recovery when charged at the vehicle voltage (14.4V) after overdischarging



Based on the above analysis, we have made improvements, the flood battery can meet the requirements of this testing method.

| Cell/2V                    | Conventional | Proposal 1 | Proposal 2 |
|----------------------------|--------------|------------|------------|
| Weight/kg                  | 3.201        | 3.196      | 3.210      |
| Ri/mΩ                      | 1.07         | 1.09       | 1.08       |
| C20/Ah                     | 67.778       | 61.986     | 61.79      |
| Step 4 charged capacity/Ah | 20.449       | 36.591     | 38.391     |
| Capacity loss              | 25.68%       | 13.70%     | 14.17%     |

2. The capacity loss after charging (compared to fully charged) - mainly due to the positive electrode, not fully charged - we need to consider delaying the timing of the "rapid rise of the negative potential".



1. Deep discharge time -- affects the negative, irreversible sulfation -- we need to suppress negative sulfation;

Kunping Yu, Camel Group, MAY 2026

# THANK YOU



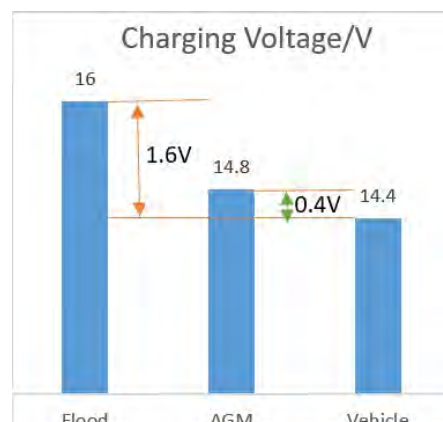
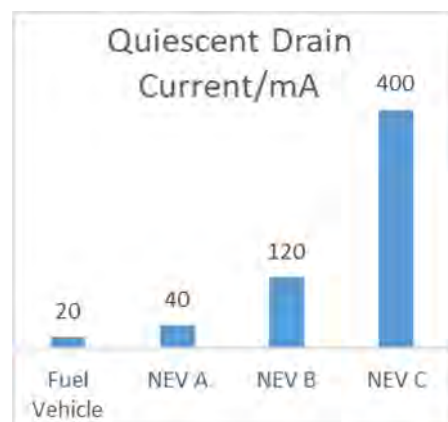
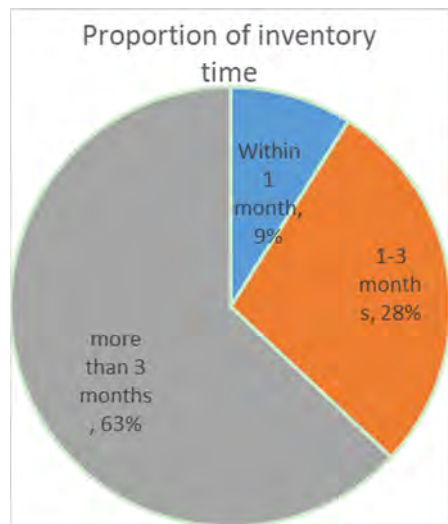
## VALUES

**Integrity Diligence Thinking Innovation**

## VISION

**Build a century-old enterprise, be a globally  
leading energy service provider**

## Proposal of the method

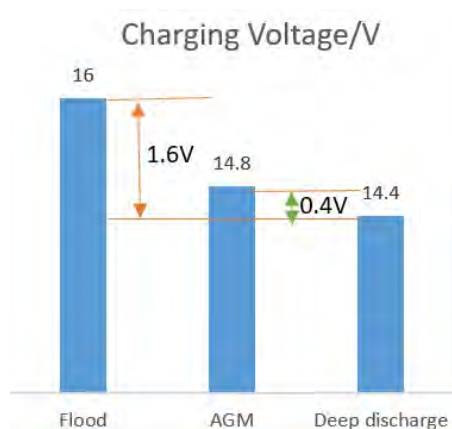
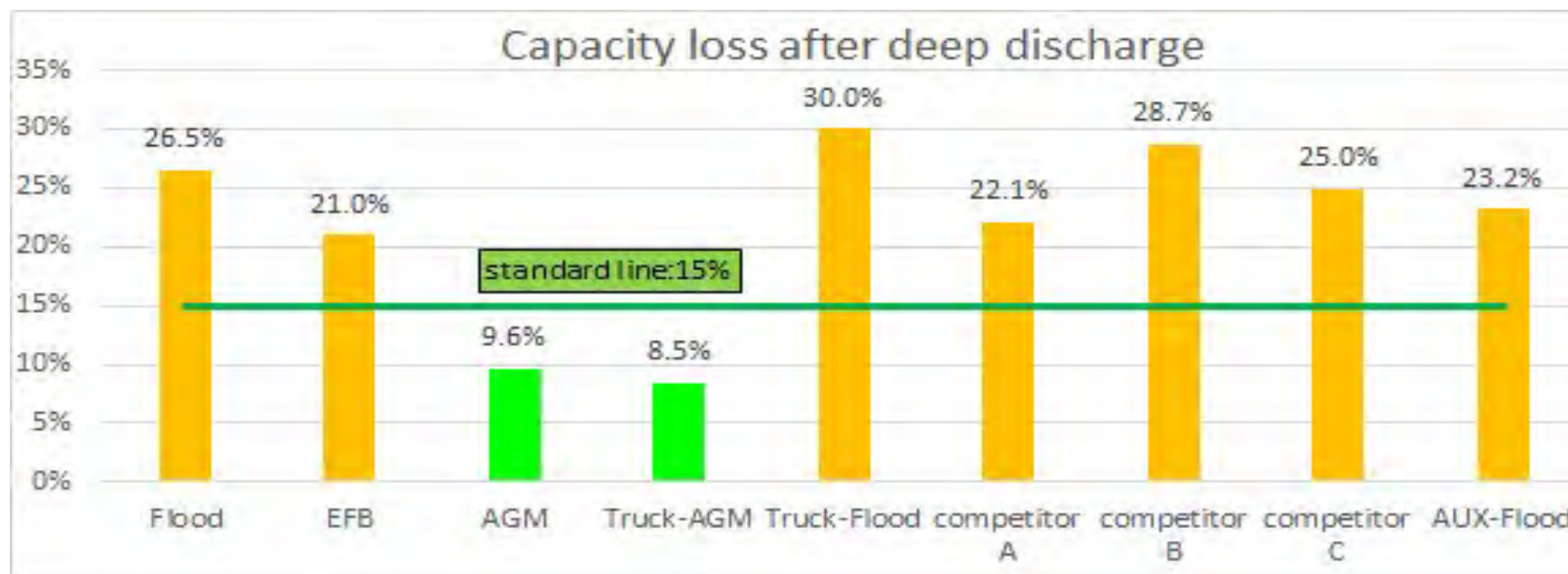


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## Current Situation



For this testing method, we conducted a current status evaluation on a large number of batteries:

The test results show that AGM battery can meet this requirement, but Flood battery (including SLI, EFB, and AUX) cannot meet it, and their capacity loss is generally over 20%.

After preliminary analysis, we believe that this is due to the different voltages required for charging different types of batteries: under this charging condition, a charging voltage of 14.4V can fully charge (or approach full charge) AGM batteries, but cannot fully charge Flood batteries.

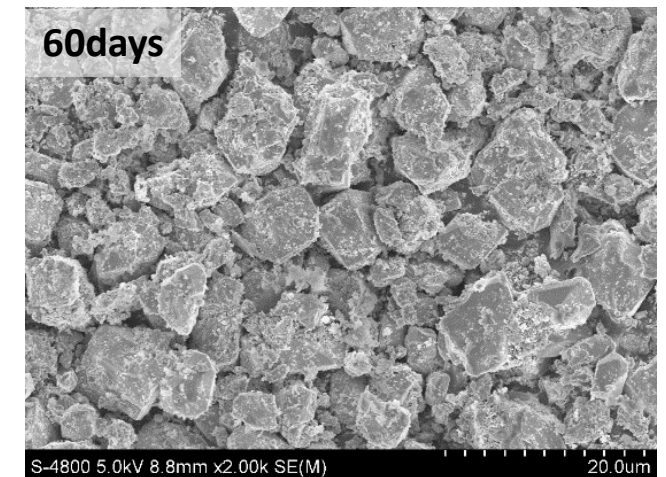
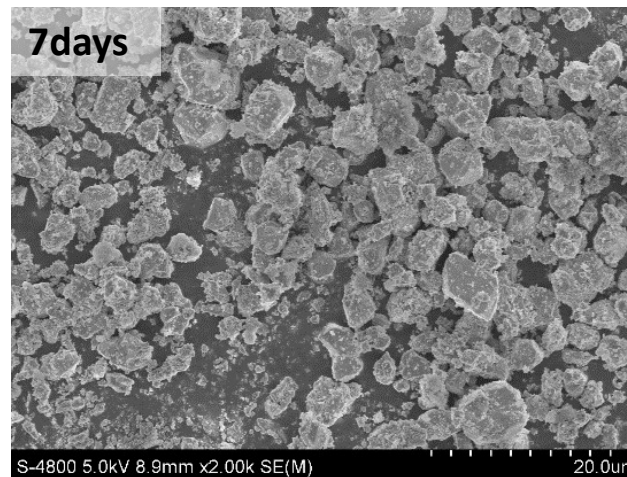
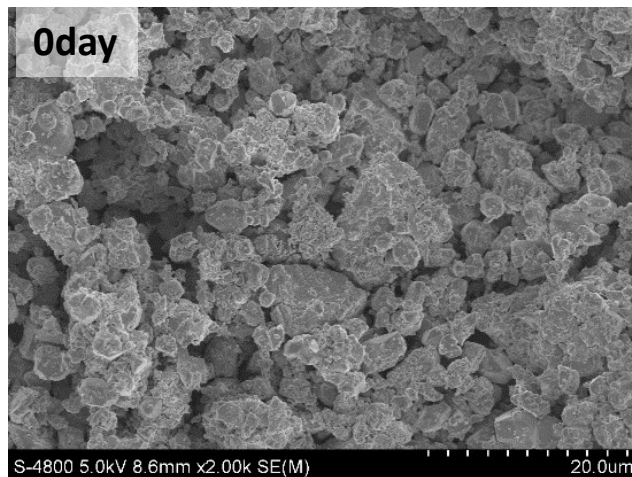
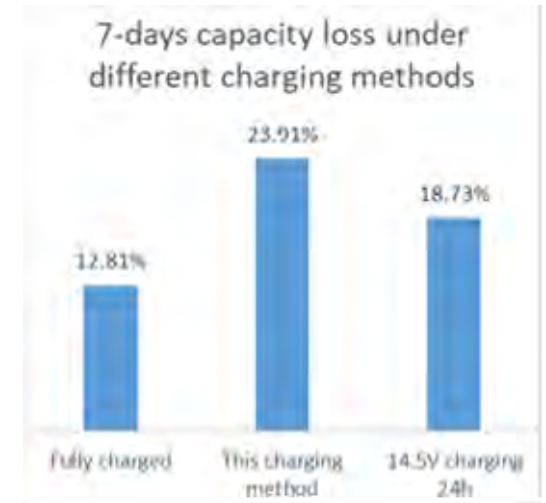


## Cause Analysis



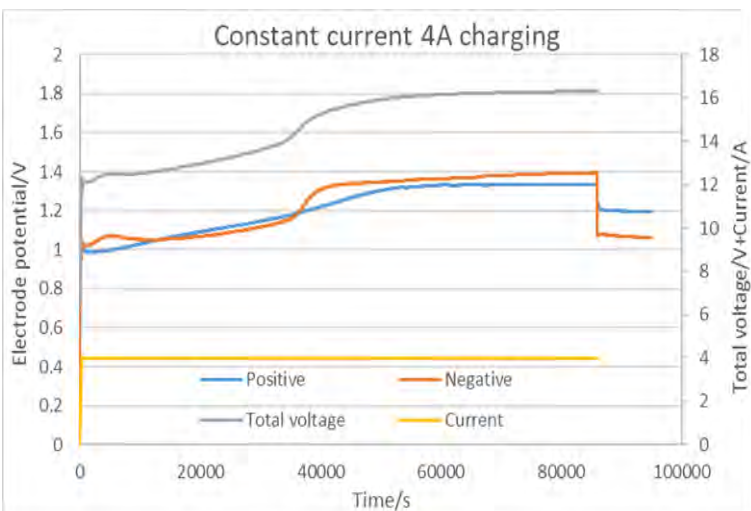
1. The longer the short circuit time, the greater the capacity loss. Based on the SEM image, as the short-circuit time increases, the  $\text{PbSO}_4$  crystal particles in the negative become larger.

2. When charging at 16V or charging for 24 hours, the capacity loss is less than that of the charging method in the deep discharge standard, indicating that the charging method in this standard cannot fully charge the Flood battery.

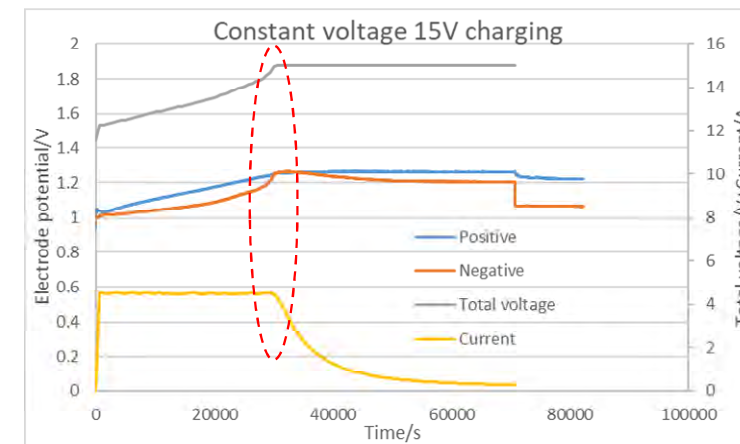
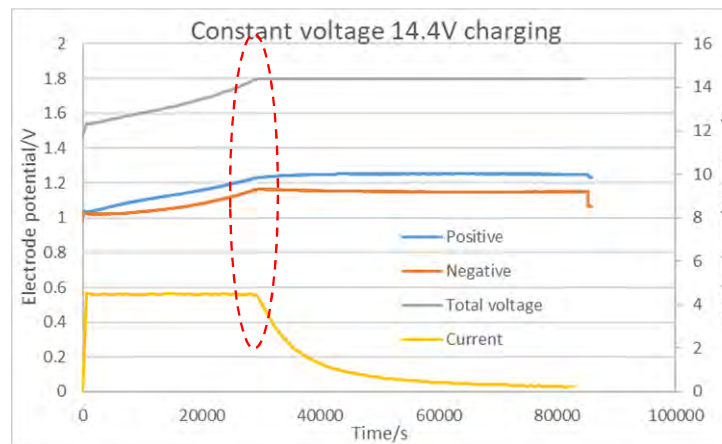
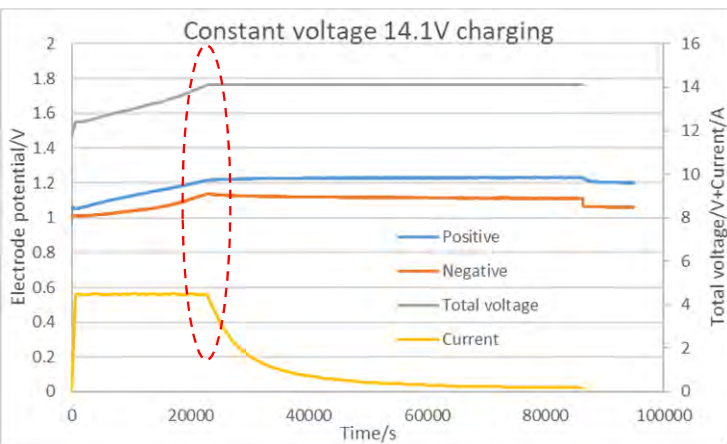
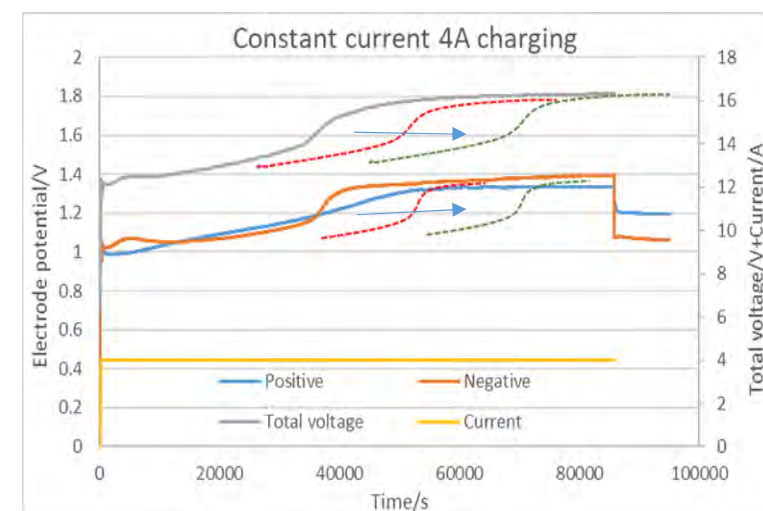




# Cause Analysis



1. The positive electrode potential undergoes a slow rise process
2. The negative electrode potential undergoes a rapid rise process.
3. When charging at a limit voltage of 14.4V, the total voltage often reaches the limit voltage when the negative electrode potential starts to rise rapidly. At this point, the charging current begins to rapidly decrease.





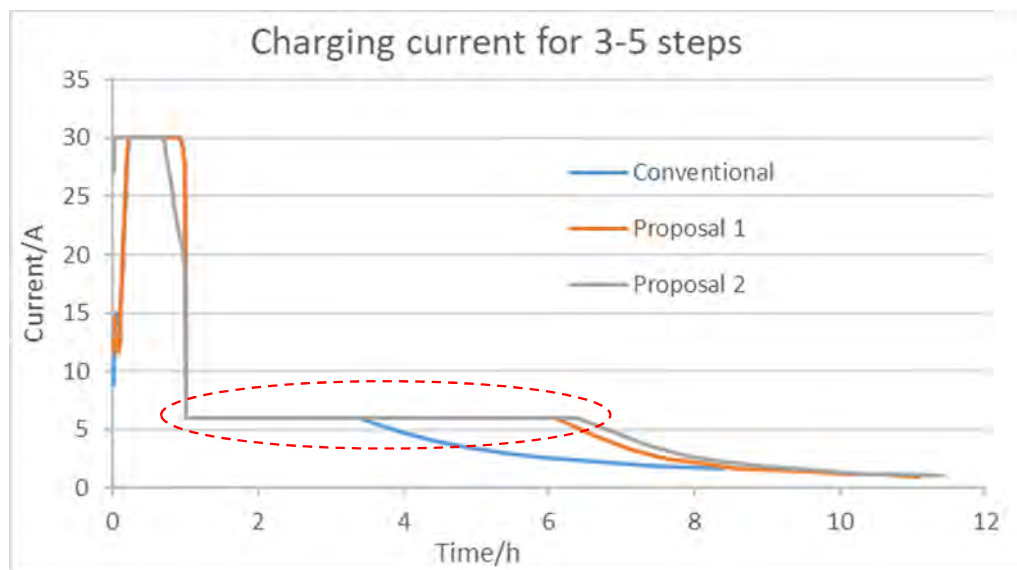
## Results Presentation



Therefore, we have come to the conclusion that:

1. Deep discharge time -- affects the negative , irreversible sulfation -- we need to suppress negative sulfation;
2. The capacity loss after charging (compared to fully charged) - mainly due to the positive electrode, not fully charged - we need to consider delaying the timing of the "rapid rise of the negative potential".

Based on the above analysis, we have made improvements, the flood battery can meet the requirements of this testing method.



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