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September 15, 2014

NL-14-122

U.S. Nuclear Regulatory Commission
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SUBJECT: Proposed License Amendment Regarding An Exigent Change to Technical Specification 3.8.6 Station Battery Surveillance
Indian Point Unit Number 2
Docket No. 50-247
License No. DPR-26

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Entergy Nuclear Operations, Inc. (Entergy) hereby requests a License Amendment to Operating License DPR-26, Docket No. 50-247 for Indian Point Nuclear Generating Unit No. 2 (IP2). This exigent change is requested to revise the acceptance criteria for the Surveillance Requirement (SR) 3.8.6.6 for the 22 Battery. The 22 Battery met the SR 3.8.6.6 during its performance on March 7, 2014. However, questions were raised during a recent PI&R Sample Inspection about the continued operability of the Battery until the next surveillance test to be performed by March 7, 2015. If the 22 Battery no longer meets the SR 3.8.6.6, then SR 3.0.1 requires the battery to be declared inoperable even though it complies with applicable IEEE requirements until the next scheduled surveillance. The questions are based on a concern that the 22 Battery will degrade and no longer meet SR 3.8.6.6 before the next scheduled test and therefore must be demonstrated to meet the criteria to ensure strict TS compliance. The test cannot be done in Modes 1, 2, 3 or 4 and if the SR no longer meets SR 3.8.6.6, then SR 3.0.1 requires the battery to be declared inoperable. Foreseeing that compliance with the SR is in question and there would be a need to revise the surveillance acceptance criteria or shut down the plant prior to the next scheduled surveillance could not reasonably have been foreseen or anticipated.

An evaluation performed by Entergy has concluded that the SR will be met until September 25, 2014. Therefore, Entergy requests approval of the proposed amendment on an exigent basis by September 24, 2014 in order to resolve this issue. Entergy believes this request meets the criteria of 10 CFR 50.91(a)(6) where the proposed change involves no significant hazards considerations and that time does not permit the Commission to publish a Federal Register notice allowing 30 days for prior public comment.

Designated original
Douglas V. Pickett
9-16-2014
A001
NEP

Entergy has evaluated the proposed change in accordance with 10 CFR 50.91(a)(5) using the criteria of 10 CFR 50.92 (c) and has determined that this proposed change involves no significant hazards considerations. Attachment 1 includes this evaluation and describes the circumstances surrounding this request, including how this request satisfies the exigent change criteria, and that the situation could not have been avoided. The proposed Technical Specification and, for information, the planned Bases changes are provided in Attachments 2 and 3, respectively. A copy of this application and the associated attachments are being submitted to the designated New York State official in accordance with 10 CFR 50.91.

There are no new commitments being made in this submittal. If you have any questions or require additional information, please contact Mr. Robert Walpole, Manager, Regulatory Affairs at (914) 254-6710.

I declare under penalty of perjury that the foregoing is true and correct. Executed on September 9, 2014.

Sincerely,



JAV/sp

- Attachments:
1. Analysis of Proposed Exigent Technical Specification Change Regarding Change to Surveillance Requirement 3.8.6.6
 2. Markup of Technical Specification Change to Surveillance Requirement 3.8.6.6
 3. Markup of TS Bases 3.8.4 and 3.8.6 Changes Associated with Surveillance Requirement 3.8.6.6 Revision

Enclosure: Calculation IP-CALC-14-00028 -Station Battery 22 System Calculation – Analysis Variation with an Battery Aged to 80% Capacity

cc: Mr. Douglas Pickett, Senior Project Manager, NRC NRR DORL
Mr. William M. Dean, Regional Administrator, NRC Region 1
NRC Resident Inspectors Office
Mr. John B. Rhodes, President and CEO, NYSERDA
Ms. Bridget Frymire, New York State Dept. of Public Service

ATTACHMENT 1 TO NL-14-122

ANALYSIS OF PROPOSED EXEGENT TECHNICAL
SPECIFICATION CHANGE REGARDING CHANGE
TO THE SURVEILLANCE REQUIREMENT 3.8.6.6

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 2
DOCKET NO. 50-247

1.0 **DESCRIPTION**

This letter requests an amendment to Operating License DPR-26, Docket No. 50-247 for Indian Point Nuclear Generating Unit No. 2 (IP2). The proposed change is to revise Surveillance Requirement (SR) 3.8.6.6 of Technical Specification (TS) 3.8.6, "Battery Parameters" to allow a change to the acceptance criteria for the 22 Battery.

Entergy has requested that this proposed change be processed as an exigent change per 10CFR50.91(a)(6), since insufficient time exists to provide a normal public comment period prior to issuance of the amendment to resolve the concerns with the 22 Battery. As demonstrated below, there is no unreviewed safety question. The change is needed because of concerns that the 22 Battery will degrade and no longer meet SR 3.8.6.6 before the next scheduled test. The station must be able to demonstrate the ability to meet the criteria in SR 3.8.6.6 to ensure strict TS compliance. If the SR no longer meets SR 3.8.6.6 then SR 3.0.1 requires the 22 Battery to be declared inoperable. Foreseeing the question regarding compliance with the SR would be raised and there would be a need to revise the surveillance acceptance criteria or shut down the plant could not reasonably have been foreseen or anticipated. TS SRs are designed to maintain components operable under TS until the next scheduled surveillance unless there is objective evidence to the contrary.

2.0 **PROPOSED CHANGES**

Revise the SR 3.8.6.6 acceptance criteria for a performance discharge test or modified performance discharge test to allow 22 Battery to use 80% rather than 85% battery capacity and revise the TS Bases 3.8.4 and 3.8.6 to reflect the change. The TS proposed change is:

From

"Verify battery capacity is $\geq 85\%$ of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test."

To

"Verify battery capacity is $\geq 85\%$ ($\geq 80\%$ for Battery 22) of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test."

The associated Bases changes to TS 3.8.4 and 3.8.6 are in Attachment 3 for information.

3.0 **BACKGROUND**

IP2 has four separate safety-related 125 volt (V) direct current (DC) systems that serve various DC loads throughout the station. Each system consists of one battery, one battery charger, one main power panel, and one or more DC distribution panels (sub panels). Each of the four batteries is composed of 58 lead-calcium storage cells connected to provide a nominal terminal voltage of 125 V DC.

Each battery charger is supplied from a different 480 V alternating current (AC) switchgear bus. Under normal conditions, the battery charger supplies the DC loads and float charges the battery. The IP2 Updated Final Safety Analysis Report (UFSAR) states that the battery provides power to the DC loads under the following conditions:

- (a) When the load exceeds the capacity of the battery charger, such as during DC motor starting or simultaneous breaker operation.
- (b) When the battery charger is not available, such as a battery charger failure or loss of input voltage.

Each battery has been sized to carry its expected shutdown loads for a period of at least 2 hours following a plant trip and a loss of all AC power. All equipment supplied by the batteries is maintained operable with minimum expected voltages at the battery terminals during the 2 hours. Each of the four battery chargers has been sized to recharge its own discharged battery within 15 hours while simultaneously carrying its normal load.

Each battery is maintained under continuous charge by its associated self-regulating battery charger so that the batteries will always be at full charge in anticipation of a loss of AC power incident. This ensures that adequate DC power will be available for starting and loading the emergency diesel generators and for other emergency uses.

TS SR 3.8.6.6 currently requires the verification that battery capacity is $\geq 85\%$ of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test. The current acceptance criteria of $\geq 85\%$ represents a change from the original criteria of $\geq 80\%$ made in Amendment 264 (the 80% criteria is the criteria currently in the Standard Technical Specification (STS) in brackets indicating it is the expected criteria but plant specific values should be used). The Entergy amendment corrected a non-conservative TS that was determined to exist during an engineering review. This change was not required for the 22 Battery but was made for consistency.

As part of Amendment 264, it was noted that the battery sizing for IP2 was performed using Institute of Electrical and Electronics Engineers (IEEE) Standard 485-1997 "IEEE Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications." The NRC staff reviewed the general battery loading assumptions of calculation FEX-00062-01 (Minimum Operating Electrolyte Temperature for 125 V DC Batteries 21, 22, 23 and 24), used to determine the 85% battery capacity, and calculation FEX-00204-01 (Station Battery 22 System Calculation). The NRC staff reviewed specific areas of the calculations to verify that the assumptions were consistent with IEEE 485-1997, endorsed by Regulatory Guide 1.212.

4.0 TECHNICAL ANALYSIS

The station battery load/discharge test is intended to show compliance with Tech Spec SR 3.8.4.3, and SR 3.8.6.6. Indian Point Unit 2 is committed to following the battery monitoring and maintenance program of IEEE Standard 450-1995 as stated in Tech Spec 5.5.15, and the wording in SR 3.8.6.6 follows the IEEE Standard.

The Basis for SR 3.8.6.6 indicates that the "acceptance criteria for this Surveillance are consistent with IEEE-450 (Ref. 3) and IEEE-485 (Ref. 4). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of

80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements. The acceptance criteria for this surveillance is battery replacement if capacity is below 85% of the manufacturer's rating, with the difference due to plant loading requirements, temperature limitations and the expected battery end-of-life conditions. Furthermore, the battery is sized to meet the assumed duty cycle loads when the battery design capacity reaches this 85% limit. The Surveillance Frequency for this test is normally 60 months. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is < 100% of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that retain capacity \geq 100% of the manufacturer's ratings. Degradation is indicated, according to IEEE-450 (Ref. 3), when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is \geq 10% below the manufacturer's rating. These Frequencies are consistent with the recommendations in IEEE-450 (Ref.3)."

The 22 battery discharge test was performed during 2R21 and the test data evaluated on March 7, 2014. The result of the test was an 85.2% battery capacity with the temperature correction factor. Previous battery testing was done in a manner that does not allow direct trending of the SR 3.8.6.6 test results:

1. The original profile was based on the as-received capacity of 317 Amperes which represented 90% of manufacturer's rated capacity with the expectation that the capacity would grow to 100% within a few cycles. This as-received manufacturer's rating of 317A was reclassified as the 100% of manufacturer's rated capacity and used thereafter as the benchmark for determining Battery 22's capacity. Recently, this test profile was changed to reflect the manufacturer's published rated capacity of 360 Amperes and when Battery 22 was tested to this profile during the 2014 Outage (2R21). As a result of this change in methodology, Battery 22 showed a significant drop in capacity.
2. There were several changes in the battery testing methodology at IP2. Previous battery testing procedures at IP2 directed the performer to terminate the battery discharge tests when capacities of 100% were reached. While this fulfilled the intent of the surveillance it created an information gap in which there is no test data to show how much the battery was actually above 100% capacity. This growth above 100% is expected as new batteries are charged and discharged in the beginning of their service life. Revisions to the discharge tests have extended the test time from 3 hours to 4 hours, to ensure that capacities greater than 100% were captured for trending purposes.
3. The surveillance tests were also revised to incorporate battery discharge rates which were higher than those previously used based on the identification of non-conservative testing criteria in previous revisions.

Based on these changes, there is limited available historical data to directly compare capacity drop over time while referencing the battery discharge rate. Entergy has assessed the changes between the 2012 discharge test and the 2014 test and concluded that with test changes made for the 2014 test the 2012 test result would have been 85.9% of battery capacity.

The Technical Specification as currently written, are subject to a presumption that the battery is known to degrade and therefore there is no assurance that SR 3.8.6.6, which requires 85% of the manufacturers rating, continues to be met. Consequently, the application of SR 3.0.1 would require the plant to declare Battery 22 inoperable when the 85% of manufacturers rating is no longer met or to shutdown and demonstrate it is met through testing. The enclosed calculation IP-CALC-14-00028, Revision 0 provides the basis for a revised acceptance criteria of 80% of the manufacturers rating. Some of the more important points are

1. The analysis for Battery 22 has always shown that it was capable of supplying its design basis loading at 80% rated capacity. The original revision of calculation FEX-000204-01 Revision 0 showed that Battery 22 had adequate spare capacity (12.7%) while supplying its design loading at 85% of its rated capacity. Conservative loading was identified and removed from FEX-000204-01 Revision 0. This work was incorporated in FEX-000204-01 Revision 1; its results show that spare capacity increased to 36.14%. Calculation FEX-000204-01 Revision 1 is included in Enclosure 1 as supporting documentation.
2. The enclosed calculation, IP-CALC-14-00028 Revision 0, was issued, based wholly on FEX-00204-01 Revision 1, to demonstrate the spare capacity at an aging factor of 1.25 (80% of its rated capacity). The result was a spare capacity of 28.06%. Therefore, if Battery 22 is allowed to operate down to 80% of its rated capacity (1.25 aging factor), as supported by IEEE 450-1995 para. 7. IP-CALC-14-00028 Revision 0 demonstrates that it is more than capable of performing its safety function. In fact, Battery 22 contains such a large amount of spare capacity that a smaller battery cell size (a GN-21 type) can be used in the replacement battery.

Entergy is currently planning to test or replace the 22 Battery and this will be complete by the date for the next surveillance due date on March 7, 2015. The replacement battery will be like in kind so that the capacity factor of 80% will be appropriate.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

Entergy has evaluated the proposed Technical Specification change using the criteria of 10CFR50.92 and found that no significant hazards consideration exist for the following reasons:

- 1) Does the proposed License amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The proposed change revises the acceptance criterion applied to an existing surveillance test for the Indian Point 2 station battery 22 discharge test. Performing a technical specification surveillance test is not an accident initiator and does not increase the probability of an accident occurring. The proposed revision to the test acceptance criterion is based on the design calculation for battery performance and an assessment of the

acceptability of the lower acceptance criterion for the discharge test. The proposed new value for the test acceptance criteria is less limiting than the existing value but meets operability criterion. Establishing a test acceptance criterion that meets plant criterion validates the equipment performance assumptions used in the accident mitigation safety analyses. Therefore the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

- 2) Does the proposed License amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

The proposed change revises the test acceptance criterion for an existing technical specification surveillance test conducted on the 22 station battery. The proposed change does not involve installation of new equipment or modification of existing equipment, so that no new equipment failure modes are introduced. Also, the proposed change in test acceptance criterion does not result in a change to the way that the equipment or facility is operated so that no new accident initiators are created. Therefore the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

- 3) Does the proposed License amendment involve a significant reduction in a margin of safety?

Response: No.

No. The conduct of performance tests on safety-related plant equipment is a means of assuring that the equipment is capable of performing its intended safety function and therefore maintaining the margin of safety established in the safety analysis for the facility. The proposed change in the acceptance criterion for the 22 battery capacity surveillance test is less conservative and less restrictive than the overly conservative value currently in the technical specification. The proposed change is based on the applicable design calculation for these components and meets IEEE criteria,.

Based on the above, Entergy concludes that the proposed amendment to the Indian Point 2 Technical Specifications presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of 'no significant hazards consideration' is justified

5.2 Applicable Regulatory Requirements / Criteria

IP2 was designed to the proposed Atomic Industrial Forum versions of the criteria issued for comment by the AEC on July 11, 1967. The applicable criteria are General Design Criteria (GDC) 24 and 39 which specify that an emergency power source shall be provided and designed with adequate independency, redundancy, capacity, and testability to permit the functioning of the engineered safety features and protection systems required to avoid undue risk to the health and safety of the public. This power source shall provide this capacity assuming a failure of a single component. These criteria, found in Section 8.1 of the UFSAR, continue to be met with this proposed change because the 22 battery remains functional and therefore the design remains compliant.

Although not licensed to the GDC, IP2 was evaluated against them in response to the February 11, 1980 confirmatory order. Compliance with these specific criteria is maintained because the 22 battery remains functional and therefore the design remains compliant

GDC 17; "Electrical Power Systems", requires that onsite electrical power systems have sufficient independence, capacity, capability, redundancy and testability to ensure the (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences, and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents, assuming a single failure.

GDC 18; "Inspection and Testing of Electrical Power Systems", requires that electrical power systems important to safety be designed to permit appropriate periodic inspection and testing to assess the continuity of systems and the conditions of their components. During the TS change these criterion continue to be met.

IP2 UFSAR section 8.1 describes how the requirements of GDC 17 and 18 are met at IP2, including for the safety-related 125 VDC electrical power subsystem, which consists of four separate trains of batteries, battery chargers, and associated power distribution panels. Under normal conditions, each battery charger supplies its DC loads, while maintaining its associated battery at full charge. Each battery provides power to its DC loads when its associated battery charger is not available. Each battery has been sized to carry its expected shutdown loads for a period of 2 hours following a plant trip and a loss of all AC power. All equipment supplied by the batteries is maintained operable with minimum expected voltages at the battery terminals during the 2 hours.

5.3 Environmental Considerations

The proposed changes to the IP2 Technical Specifications do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 REFERENCES

1. NRC Letter to Entergy regarding TS Amendment 264, dated February 24, 2010.

ATTACHMENT 2 TO NL-14-122

MARKUP OF TECHNICAL SPECIFICATION FOR
CHANGE TO SURVEILLANCE REQUIREMENT 3.8.6.6

Changes indicated by lineout for deletion and Bold/Italics for additions

Unit 2 Affected Pages:

TS 3.8.6 - 4

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.6.5 Verify each battery connected cell voltage is ≥ 2.07 V.	92 days
<p>SR 3.8.6.6 -----</p> <p style="text-align: center;">- NOTE -</p> <p>This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</p> <p>-----</p> <p>Verify battery capacity is $\geq 85\%$ ($\geq 80\%$ for Battery 22) of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.</p>	<p>60 months</p> <p><u>AND</u></p> <p>12 months when battery shows degradation, or has reached 85% of the expected life with capacity < 100% of manufacturer's rating</p> <p><u>AND</u></p> <p>24 months when battery has reached 85% of the expected life with capacity $\geq 100\%$ of manufacturer's rating</p>

ATTACHMENT 3 TO NL-14-122

MARKUP OF TS BASES 3.8.4 AND 3.8.6 CHANGES ASSOCIATED
WITH SURVEILLANCE REQUIREMENT 3.8.6.6 REVISION

Changes indicated by lineout for deletion and Bold/Italics for additions

Unit 2 Affected Bases Pages:

B 3.8.4 - 3

B 3.8.6 - 7

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BASES

BACKGROUND (continued)

The batteries are sized to produce required capacity at 85% (**80% for Battery 22**) of nameplate rating, corresponding to expected capacity at end of life cycles and the 100% design demand. The minimum design voltage limit is 105 V.

The battery cells are lead calcium construction with a nominal specific gravity of 1.215. This specific gravity corresponds to an open circuit battery voltage of approximately 120 V for a 58 cell battery (i.e., cell voltage of 2.06 volts per cell (Vpc)). The open circuit voltage is the voltage maintained when there is no charging or discharging. Optimal long term performance however, is obtained by maintaining a float voltage of approximately 2.20 to 2.25 Vpc. The nominal float voltage of 2.20 to 2.25 Vpc corresponds to a total float voltage output of approximately 130 V for a 58 cell battery.

Each of the four DC electrical power subsystem battery chargers has ample power output capacity for the steady state operation of connected loads required during normal operation, while at the same time maintaining its battery bank fully charged. Each battery charger also has sufficient excess capacity to restore the battery from the design minimum charge to its fully charged state within 15 hours while supplying normal steady state loads discussed in the UFSAR, Chapter 8 (Ref. 4).

The battery charger is normally in the float-charge mode. Float-charge is the condition in which the charger is supplying the connected loads and the battery cells are receiving adequate current to optimally charge the battery. This assures the internal losses of a battery are overcome and the battery is maintained in a fully charged state.

When desired, the charger can be placed in the equalize mode. The equalize mode is at a higher voltage than the float mode and charging current is correspondingly higher. The battery charger is operated in the equalize mode after a battery discharge or for routine maintenance. Following a battery discharge, the battery recharge characteristic accepts current at the current limit of the battery charger (if the discharge was significant, e.g., following a battery service test) until the battery terminal voltage approaches the charger voltage setpoint. Charging current then reduces exponentially during the remainder of the recharge cycle. Lead-calcium batteries have recharge efficiencies of greater than 95%, so once at least 105% of the ampere-hours discharged have been returned, the battery capacity would be restored to the same condition as it was prior to the discharge. This can be monitored by direct observation of the exponentially decaying charging current or by evaluating the amp-hours discharged from the battery and amp-hours returned to the battery.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.6.6

A battery performance discharge test is a test of constant current capacity of a battery, normally done in the as found condition, after having been in service, to detect any change in the capacity determined by the acceptance test. The test is intended to determine overall battery degradation due to age and usage.

Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.6.5; however, only the modified performance discharge test may be used to satisfy the battery service test requirements of SR 3.8.4.3.

A modified discharge test is a test of the battery capacity and its ability to provide a high rate, short duration load (usually the highest rate of the duty cycle). This will often confirm the battery's ability to meet the critical period of the load duty cycle, in addition to determining its percentage of rated capacity. Initial conditions for the modified performance discharge test should be identical to those specified for a service test.

It may consist of just two rates; for instance the one minute rate for the battery or the largest current load of the duty cycle, followed by the test rate employed for the performance test, both of which envelope the duty cycle of the service test. Since the ampere-hours removed by a one minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the performance test without compromising the results of the performance discharge test. The battery terminal voltage for the modified performance discharge test must remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.

The acceptance criteria for this Surveillance are consistent with the methodology of IEEE-450 (Ref. 3) and IEEE-485 (Ref. 4). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements. The acceptance criteria for this surveillance is battery replacement if capacity is below 85% (**80% for Battery 22**) of the manufacturer's rating, with the difference due to plant loading requirements, temperature limitations and the expected battery end-of-life conditions. Furthermore, the battery is sized to meet the assumed duty cycle loads when the battery design capacity reaches this 85% (**80% for Battery 22**) limit.