

PRIORITY Normal

DISPOSITION OF THE ORIGINAL DOCUMENT WILL BE TO THE TRANSMITTAL SIGNATURE UNLESS RECIPIENT IS OTHERWISE IDENTIFIED BELOW

- 1) 01749 L C GIBBY - MG01VP
- 2) 02049 NGO PRA MANAGER EC08I
- 3) 02388 DAVID DZIADOSZ LYNCHBG, VA
- 4) 02532 MCG NRC INSP MG-ADMIN MAIL RM
- 5) 02546 WC LIBRARY - MG01WC
- 6) 03044 MCG DOC CNTRL MISC MAN MG05DM
- 7) 03283 P R TUCKER MG01RP
- 8) 03614 MCG OPS PROCEDURE GP MG01OP
- 9) 03743 MCG QA TEC SUP MNT QC MG01MM
- 10) 03744 OPS TRNG MGR. MG03OT
- 11) 03759 U S NUC REG WASHINGTON, DC
- 12) 03796 SCIENTECH DUNEDIN, FL
- 13) 04698 D E BORTZ EC08G
- 14) 04809 MCG PLANT ENG. LIBR. MG05SE
- 15) 05162 MCG SHIFT WORK MGRS MG01OP

**Duke Energy
DOCUMENT TRANSMITTAL FORM**

REFERENCE

MCGUIRE NUCLEAR STATION
RECORD RETENTION # 005893

TECHNICAL SPECIFICATIONS (TS)
AND
TECHNICAL SPECIFICATIONS BASES (TSB)

Page 2 of 3

Date: 01/08/09

Document Transmittal #: DUK090080029

QA CONDITION Yes No

OTHER ACKNOWLEDGEMENT REQUIRED Yes

IF QA OR OTHER ACKNOWLEDGEMENT REQUIRED, PLEASE ACKNOWLEDGE RECEIPT BY RETURNING THIS FORM TO:

Duke Energy
McGuire
DCRM MGO2DM
13225 Hagers Ferry Road
Huntersville, N.C. 28078

Rec'd By _____

Date _____

DOCUMENT NO	QA COND	REV #/ DATE	DISTR CODE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL
TS & TSB MEMORANDUM (1 PAGE)	NA	--- 12/09/08	MADM-04B	V1	V1	V1	V1	V1	X	V1	V1	V1	V3	V8	V1	V1	V2	V1	47
TSB LIST OF EFFECTIVE SECTIONS (4 PAGES)	NA	093 12/09/08																	
TSB 3.8.4 (8 PAGES)	NA	094 12/08/08																	

REMARKS: PLEASE UPDATE ACCORDINGLY

RECIPIENT #00422 PREVIOUSLY COMPLETED

B H HAMILTON
VICE PRESIDENT
MCGUIRE NUCLEAR STATION

BY:
B C BEAVER MG01RC BCB/TLC

ACD
1/8/09

December 9, 2008

MEMORANDUM

To: All McGuire Nuclear Station Technical Specification, and Technical Specification Bases (TSB)
Manual Holders

Subject: McGuire Technical Specifications Bases

REMOVE

INSERT

TS Bases List of Effected Sections Rev 92

TS Bases List of Effected Sections Rev 93

Tech Spec Bases: 3.8.4 Rev 36 (Entire Bases)

Tech Spec Bases 3.8.4 Rev 94 (Entire Bases)

Revision numbers may skip numbers due to Regulatory Compliance Filing System.

Please call me if you have questions.

Bonnie Beaver

Bonnie Beaver
Regulatory Compliance
875-4180

McGuire Nuclear Station Technical Specification Bases LOES

TS Bases are revised by section

Page Number	Revision	Revision Date
BASES		
(Revised per section)		
i	Revision 63	4/4/05
ii	Revision 63	4/4/05
iii	Revision 63	5/25/05
B 2.1.1	Revision 51	1/14/04
B 2.1.2	Revision 0	9/30/98
B 3.0	Revision 81	3/29/07
B 3.1.1	Revision 73	3/6/06
B 3.1.2	Revision 10	9/22/00
B 3.1.3	Revision 10	9/22/00
B 3.1.4	Revision 0	9/30/98
B 3.1.5	Revision 19	1/10/02
B 3.1.6	Revision 0	9/30/98
B 3.1.7	Revision 58	06/23/04
B 3.1.8	Revision 0	9/30/98
B 3.2.1	Revision 74	5/3/06
B 3.2.2	Revision 10	9/22/00
B 3.2.3	Revision 34	10/1/02
B 3.2.4	Revision 10	9/22/00
B 3.3.1	Revision 95	10/17/08
B 3.3.2	Revision 62	1/27/05
B 3.3.3	Revision 71	10/12/05
B 3.3.4	Revision 57	4/29/04
B 3.3.5	Revision 11	9/18/00
B 3.3.6	Not Used - Revision 87	6/29/06
B 3.4.1	Revision 51	1/14/04
B 3.4.2	Revision 0	9/30/98
B 3.4.3	Revision 44	7/3/03
B 3.4.4	Revision 86	6/25/07
B 3.4.5	Revision 86	6/25/07

Page Number	Amendment	Revision Date
B 3.4.6	Revision 86	6/25/07
B 3.4.7	Revision 86	6/25/07
B 3.4.8	Revision 41	7/29/03
B 3.4.9	Revision 0	9/30/98
B 3.4.10	Revision 0	9/30/98
B 3.4.11	Revision 57	4/29/04
B 3.4.12	Revision 57	4/29/04
B 3.4.13	Revision 86	6/25/07
B 3.4.14	Revision 0	9/30/98
B 3.4.14-2	Revision 5	8/3/99
B 3.4.14-6	Revision 5	8/3/99
B 3.4.15	Revision 82	9/30/06
B 3.4.16	Revision 57	4/29/04
B 3.4.17	Revision 0	9/30/98
B 3.4.18	Revision 86	6/25/07
B 3.5.1	Revision 70	10/5/05
B 3.5.2	Revision 89	9/10/07
B 3.5.3	Revision 57	4/29/04
B 3.5.4	Revision 70	10/5/04
B 3.5.5	Revision 0	9/30/98
B 3.6.1	Revision 53	2/17/04
B 3.6.2	Revision 32	10/4/02
B 3.6.3	Revision 87	6/29/06
B 3.6.4	Revision 0	9/30/98
B 3.6.5	Revision 0	9/30/98
B 3.6.5-2	Revision 6	10/6/99
B 3.6.6	Revision 93	04/30/07
B 3.6.7	Not Used - Revision 63	4/4/05
B 3.6.8	Revision 63	4/4/05
B 3.6.9	Revision 63	4/4/05
B 3.6.10	Revision 43	5/28/03
B 3.6.11	Revision 78	9/25/06
B 3.6.12	Revision 53	2/17/04
B 3.6.13	Revision 96	9/26/08
B 3.6.14	Revision 64	4/23/05

Page Number	Amendment	Revision Date
B 3.6.15	Revision 0	9/30/98
B 3.6.16	Revision 40	5/8/03
B 3.7.1	Revision 0	9/30/98
B 3.7.2	Revision 79	10/17/06
B 3.7.3	Revision 0	9/30/98
B 3.7.4	Revision 57	4/29/04
B 3.7.5	Revision 60	10/12/04
B 3.7.6	Revision 0	9/30/98
B 3.7.7	Revision 0	9/30/98
B 3.7.8	Revision 0	9/30/98
B 3.7.9	Revision 43	5/28/03
B 3.7.10	Revision 75	6/12/06
B 3.7.11	Revision 65	6/2/05
B 3.7.12	Revision 28	5/17/02
B 3.7.13	Revision 85	2/26/07
B 3.7.14	Revision 66	6/30/05
B 3.7.15	Revision 66	6/30/05
B 3.7.16	Revision 0	9/30/98
B 3.8.1	Revision 92	1/28/08
B 3.8.2	Revision 92	1/28/08
B 3.8.3	Revision 53	2/17/04
B 3.8.4	Revision 94	12/08/08
B 3.8.5	Revision 41	7/29/03
B 3.8.6	Revision 0	9/30/98
B 3.8.7	Revision 20	1/10/02
B 3.8.8	Revision 41	7/29/03
B 3.8.9	Revision 24	2/4/02
B 3.8.10	Revision 41	7/29/03
B 3.9.1	Revision 68	9/1/05
B 3.9.2	Revision 41	7/29/03
B 3.9.3	Revision 91	11/7/07
B 3.9.4	Revision 84	2/20/07
B 3.9.5	Revision 59	7/29/04
B 3.9.6	Revision 41	7/29/03

Page Number

Amendment

Revision Date

B 3.9.7

Revision 88

9/5/07

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources—Operating

BASES

BACKGROUND

The station DC electrical power system provides the AC emergency power system with control power. It also provides both motive and control power to selected safety related equipment and preferred AC vital bus power (via inverters). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the DC electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure. The DC electrical power system also conforms to the recommendations of Regulatory Guide 1.6 (Ref. 2) and IEEE-308 (Ref. 3).

The 125 VDC electrical power system consists of two independent and redundant safety related Class 1E DC electrical power subsystems (Train A and Train B). Each subsystem consists of two channels of 125 VDC batteries (each battery 100% capacity), the associated battery charger(s) for each battery, and all the associated control equipment and interconnecting cabling.

Additionally there is one spare battery charger, which provides backup service in the event that the preferred battery charger is out of service. If the spare battery charger is substituted for one of the preferred battery chargers, then the requirements of independence and redundancy between subsystems are maintained.

During normal operation, the 125 VDC load is powered from the battery chargers with the batteries floating on the system. In case of loss of normal power to the battery charger, the DC load is automatically powered from the station batteries.

The Train A and Train B DC electrical power subsystems provide the control power for its associated Class 1E AC power load group, 4.16 kV switchgear, and 600 V load centers. The DC electrical power subsystems also provide DC electrical power to the inverters, which in turn power the AC vital buses.

The DC power distribution system is described in more detail in Bases for LCO 3.8.9, "Distribution System—Operating," and LCO 3.8.10, "Distribution Systems—Shutdown."

BASES

BACKGROUND (continued)

Each battery (EVCA, EVCB, EVCC, EVCD) has adequate storage capacity to carry the required duty cycle for one hour after the loss of the battery charger output. In addition, the battery is capable of supplying power for the operation of anticipated momentary loads during the one hour period.

Each 125 VDC battery is separately housed in a ventilated room apart from its charger and distribution centers. Each channel is located in an area separated physically and electrically from the other channel to ensure that a single failure in one subsystem does not cause a failure in a redundant subsystem. There is no sharing between redundant Class 1E subsystems, such as batteries, battery chargers, or distribution panels.

The batteries for the channels of DC are sized to produce required capacity at 80% of nameplate rating, corresponding to warranted capacity at end of life cycles and the 100% design demand. Battery size is based on 125% of required capacity and, after selection of an available commercial battery, results in a battery capacity in excess of 150% of required capacity. The individual cell voltage limit is 2.13 V per cell. The minimum battery terminal voltage limit is greater than or equal to 125 V while on float charge as discussed in the UFSAR, Chapter 8 (Ref. 4). The criteria for sizing large lead storage batteries are defined in IEEE-485 (Ref. 5).

Each channel of DC 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 capacity to restore the battery from the design minimum charge to its fully charged state within 8 hours while supplying normal steady state loads discussed in the UFSAR, Chapter 8 (Ref. 4).

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 6), and in the UFSAR, Chapter 15 (Ref. 7), assume that Engineered Safety Feature (ESF) systems are OPERABLE.

The OPERABILITY of the DC sources is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining the DC sources OPERABLE during accident conditions in the event of:

BASES

APPLICABLE SAFETY ANALYSES (continued)

- a. An assumed loss of all offsite AC power or all onsite AC power; and
- b. A worst case single failure.

The DC sources satisfy Criterion 3 of 10 CFR 50.36 (Ref. 8).

LCO

Each DC channel consisting of one battery, battery charger for each battery and the corresponding control equipment and interconnecting cabling supplying power to the associated bus within the train is required to be OPERABLE to ensure the availability of the required power to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence (AOO) or a postulated DBA. Loss of any channel of DC does not prevent the minimum safety function from being performed (Ref. 4).

An OPERABLE channel of DC requires the battery and respective charger to be operating and connected to the associated DC bus.

APPLICABILITY

The DC electrical power sources are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure safe unit operation and to ensure that:

- a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients; and
- b. Adequate core cooling is provided, and containment integrity and other vital functions are maintained in the event of a postulated DBA.

The DC electrical power requirements for MODES 5 and 6 are addressed in the Bases for LCO 3.8.5, "DC Sources— Shutdown."

ACTIONS

A.1 and A.2

Condition A represents one channel of DC with a loss of ability to fully respond to a DBA with the worst case single failure. Two hours is provided to restore the channel of DC to OPERABLE status and is consistent with the allowed time for an inoperable channel of DC distribution system requirement.

BASES

ACTIONS (continued)

If one of the required channels of DC is inoperable (e.g., inoperable battery, inoperable battery charger(s), or inoperable battery charger and associated inoperable battery), the remaining DC channels have the capacity to support a safe shutdown and to mitigate an accident condition. If the channel of DC cannot be restored to OPERABLE status, Action A.2 must be entered and the DC channel must be energized from an OPERABLE channel, from the same train, within 2 hours. The capacity of the redundant channel is sufficient to supply its normally supplied channel and cross tied channel for the required time, in case of a DBA event. The inoperable channel of DC must be returned to OPERABLE status within 72 hours and the cross ties to the other channel open. The 72 hour Completion Time reflects a reasonable time to assess unit status as a function of the inoperable channel of DC and, if the DC channel is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown.

B.1 and B.2

If the inoperable channel of DC cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems. The Completion Time to bring the unit to MODE 5 is consistent with the time required in Regulatory Guide 1.93 (Ref. 9).

**SURVEILLANCE
REQUIREMENTS****SR 3.8.4.1**

Verifying battery terminal voltage while on float charge for the batteries helps to ensure the effectiveness of the charging system and the ability of the batteries to perform their intended function. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery (or battery cell) and maintain the battery (or a battery cell) in a fully charged state. The voltage requirements are based on the nominal design voltage of the battery and are consistent with the initial voltages assumed in the battery sizing calculations. The 7 day Frequency is consistent with manufacturer recommendations and IEEE-450 (Ref. 10).

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.2

Visual inspection to detect corrosion of the battery cells and connections, or measurement of the resistance of each intercell, interrack, intertier, and terminal connection, provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance.

The Surveillance Frequency for these inspections, which can detect conditions that can cause power losses due to resistance heating, is 92 days. This Frequency is considered acceptable based on operating experience related to detecting corrosion trends.

SR 3.8.4.3

Visual inspection of the battery cells, cell plates, and battery racks provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance. The presence of physical damage or deterioration does not necessarily represent a failure of this SR, provided an evaluation determines that the physical damage or deterioration does not affect the OPERABILITY of the battery (its ability to perform its design function). Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.8.4.4 and SR 3.8.4.5

Visual inspection and resistance measurements of intercell, interrack, intertier, and terminal connections provide an indication of physical damage or abnormal deterioration that could indicate degraded battery condition. The anticorrosion material is used to help ensure good electrical connections and to reduce terminal deterioration. The visual inspection for corrosion is not intended to require removal of and inspection under each terminal connection. The removal of visible corrosion is a preventive maintenance SR. The presence of visible corrosion does not necessarily represent a failure of this SR provided visible corrosion is removed during performance of SR 3.8.4.4. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.4.6

This SR requires that each battery charger be capable of supplying 400 amps and 125 V for ≥ 1 hour. These requirements are based on the design requirements of the chargers (Ref. 4). According to Regulatory Guide 1.32 (Ref. 11), the battery charger supply is required to be based on the largest combined demands of the various steady state loads and the charging capacity to restore the battery from the design minimum charge state to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and duration ensures that these requirements can be satisfied.

The Surveillance Frequency is acceptable, given the unit conditions required to perform the test and the other administrative controls existing to ensure adequate charger performance during these 18 month intervals. In addition, this Frequency is intended to be consistent with expected fuel cycle lengths.

SR 3.8.4.7

A battery service test is a special test of battery capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length of 1 hour should correspond to the design duty cycle requirements as specified in Reference 4.

The Surveillance Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 11) with the exception that it is allowable to perform the battery service test with a unit in any Mode.

This SR is modified by a Note. The Note allows the performance of a modified performance discharge test in lieu of a service test.

The modified performance discharge test, as defined by IEEE-450 (Ref. 12) is a simulated duty cycle consisting of just two rates; the one minute rate published 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 rated 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

BASES

SURVEILLANCE REQUIREMENTS (continued)

discharge test. The battery terminal voltage for the modified performance discharge test should 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.

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.

SR 3.8.4.8

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.

A battery modified performance discharge test is described in the Bases for SR 3.8.4.7 and in IEEE-450 (Ref. 12). Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.4.8; however, only the modified performance discharge test may be used to satisfy SR 3.8.4.8 while satisfying the requirements of SR 3.8.4.7 at the same time.

The acceptance criteria for this Surveillance are consistent with IEEE-450 (Ref. 12). 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 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 rating. Degradation is indicated, according to IEEE-450 (Ref. 10), 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. 10).

BASES

- REFERENCES
1. 10 CFR 50, Appendix A, GDC 17.
 2. Regulatory Guide 1.6, March 10, 1971.
 3. IEEE-308-1971.
 4. UFSAR, Chapter 8.
 5. IEEE-485-1983, June 1983.
 6. UFSAR, Chapter 6.
 7. UFSAR, Chapter 15.
 8. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).
 9. Regulatory Guide 1.93, December 1974.
 10. IEEE-450-1995.
 11. Regulatory Guide 1.32, February 1977.
 12. IEEE-450-1980.