

**WHOLESALE ELECTRICITY SPOT MARKET
RULES CHANGE COMMITTEE**

RESOLUTION NO. 2016-04

Proposed Amendments to the WESM Manual on Emergency Procedures

WHEREAS, on 21 July 2015, the Rules Change Committee (RCC) received the NGCP-System Operator's (NGCP-SO) Proposed Amendments to the WESM Manual on Emergency Procedures;

WHEREAS, said proposal sought to align the pertinent provisions of the WESM Manual on Emergency Procedures with the changes in practices in the power industry due to growing technical requirements and stricter implementation of applicable/amended rules of the Grid Code;

WHEREAS, the proposal was presented before the RCC during its 103rd and 104th RCC Meetings held on 05 August and 02 September 2015, respectively, and was thereafter approved for posting to solicit comments of participants and interested parties, subject to the proponent's re-submission of the proposal in proper format and based from the correct version of the WESM Manual on Emergency Procedures;

WHEREAS, the proposal was published on 28 October 2015 in the Market Information Website, with the corresponding notice to participants;

WHEREAS, the RCC deliberated on the proposal during its 109th Regular Meeting on 03 February 2016, taking into consideration the comments received from PEMC, the Technical Committee, MERALCO and North Luzon Renewables Corporation;

WHEREAS, the discussions centered on the revisions in the definition of relevant terminologies, addition of new terms, and the sequence of procedures either performed by the System Operator or coordinated by the same with concerned WESM Participants when the grid is in an Emergency State (i.e., during Overloading, Excess Generation, Undervoltage, Overvoltage and Manual Load Dropping);

WHEREAS, during its 111th Special Meeting on 03 March 2016, the RCC finalized the revisions to the various flowcharts on Emergency Procedures in accordance with the actual practices of the System Operator to address emergency events;

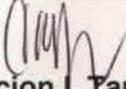
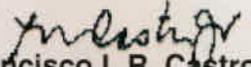
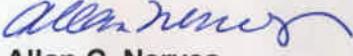
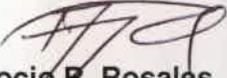
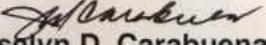
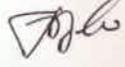
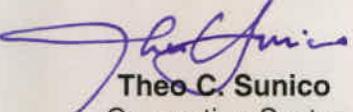
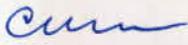
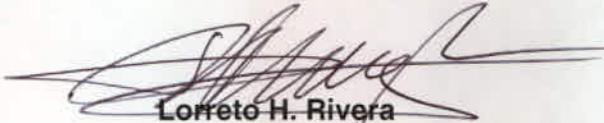
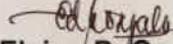
WHEREAS, the RCC, in the same meeting, subsequently approved the NGCP-SO's Proposed Amendments to the WESM Manual on Emergency Procedures, as discussed;

NOW THEREFORE, we, the undersigned and in behalf of the sector we represent, hereby resolve as follows:

RESOLVED, that the Proposed Amendments to the WESM Manual on Emergency Procedures, as revised, is hereby approved by the RCC;

RESOLVED FURTHER, that the attached Proposed Amendments to the WESM Manual on Emergency Procedures (Annex A) is hereby endorsed to the PEM Board for approval and endorsement to the DOE

Done this 03 March 2016, Pasig City.

| | |
|---|---|
| <p>Approved by: RULES CHANGE COMMITTEE</p>  <p>Maila Lourdes G. de Castro Chairperson Independent</p> | |
| <p>Members:</p> | |
|  <p>Concepcion I. Tanglao Independent</p> |  <p>Francisco L.R. Castro, Jr. Independent</p> |
|  <p>Allan C. Nerves Independent</p> |  <p>Isidro E. Cacho, Jr. Market Operator Philippine Electricity Market Corporation (PEMC)</p> |
|  <p>Ambrocio R. Rosales Transmission Sector National Grid Corporation of the Philippines (NGCP)</p> |  <p>Joselyn D. Carabuena Generation Sector Power Sector Assets and Liabilities Management Corporation (PSALM)</p> |
|  <p>Jose Ferlino P. Raymundo Generation Sector SMC Global</p> |  <p>Theo C. Sunico Generation Sector Vivant Corporation</p> |
|  <p>Ciprinilo C. Meneses Distribution Sector (PDU) Manila Electric Company (MERALCO)</p> |  <p>Jose P. Santos Distribution Sector (EC) Ilocos Norte Electric Cooperative, Inc. (INEC)</p> |
|  <p>Gilbert A. Pagobo Distribution Sector Mactan Electric Company (MECO)</p> |  <p>Ludovico D. Lim Distribution Sector Antique Electric Cooperative, Inc. (ANTECO)</p> |
|  <p>Lorreto H. Rivera Supply Sector TeaM (Philippines) Energy Corporation (TPEC)</p> | <p>Certified True and Correct:</p>  <p>Elaine D. Gonzales RCC Secretary PEMC</p> |

Proposed Amendments to the WESM Manual on Emergency Procedures

| Title | Section | Original Provision | Proposed Amendment | Rationale |
|------------------------|---------|---|---|----------------------------------|
| 2. Definition of Terms | | | | |
| | | Automatic Load Dropping (ALD) is the process of automatically and deliberately removing pre-selected loads from a power system in response to an abnormal condition in order to maintain the integrity of the system. | Automatic Load Dropping (ALD). is the process of automatically and deliberately removing pre-selected Loads from a power system in response to an abnormal condition in order to maintain the integrity of the Power System . It can be classified as: 1) Under frequency Load Shedding (UFLS); and 2) Under-voltage Load Shedding (UVLS). | To align with the PGC definition |
| | | Contingency is the unexpected failure or outage of a system component, such as a generator, transmission line, power transformer, bus, circuit breaker, or other electrical element. A contingency may also include multiple components, which are related by situations leading to simultaneous component outages. | Contingency. The Outage of one Component of the Grid that cannot be predicted in advance but which excludes Scheduled Maintenance. is the unexpected failure or outage of a system component, such as a generator, transmission line, power transformer, bus, circuit breaker, or other electrical element. A contingency may also include multiple components, which are related by situations leading to simultaneous component outages. | To align with the PGC definition |
| | | Emergency State is the Grid operating condition when a Multiple Outage Contingency has occurred without resulting in Total System Blackout and any of the following conditions is present: (a) generation deficiency exists; (b) Grid transmission voltages are outside the limits of 0.90 and 1.10; or (c) the loading level of any transmission line | Emergency State is the Grid operating condition when a Multiple Outage Contingency has occurred without resulting in Total System Blackout and any of the following conditions is present: (a) generation deficiency exists; (b) Grid transmission voltages are outside the limits of 0.90 and 1.10; or (c) the loading level of any transmission line or substation Equipment is above 110 percent of its | To align with the PGC definition |

| Title | Section | Original Provision | Proposed Amendment | Rationale |
|-------|---------|--|--|---|
| | | <p>or substation Equipment is above 110 percent of its continuous rating.</p> | <p>continuous rating. <u>The grid shall be considered in the Emergency State when:</u></p> <ul style="list-style-type: none"> a. <u>Single Outage Contingency (N-1) Criterion is not met. Imminent threat in system security would exist should a credible n-1 contingency occur that would result in the cascading outages of lines and equipment if not corrected immediately.</u> b. <u>There is generation deficiency or Operating Margin is zero;</u> c. <u>Grid transmission voltage is outside the limits of -10% or+10% of the nominal value;</u> d. <u>The loading levels of all transmission lines and substation Equipment are beyond the threshold as set by the PGC.</u> e. <u>The Grid Frequency is beyond the limits of 59.4Hz and 60.6Hz</u> | |
| | | <p>Single outage (N-1) contingency is an event caused by the failure of one component of the grid including a generating unit, transmission line, or transformer.</p> | <p>Single Outage (N-1) Contingency (N-1) is <u>An e-Event caused by the failure of one eComponent of the gGrid including generating unit, transmission line, or transformer those enumerated under GO 6.2.1.1 of the PGC.</u></p> | <p>To align with the PGC definition</p> |

| Title | Section | Original Provision | Proposed Amendment | Rationale |
|-------|---------|---|---|----------------------------------|
| | | New definition: Single Outage Contingency (N-1) Criterion | <u>Single Outage Contingency (N-1) Criterion A system security criterion where the Grid, following a Credible N-1 Contingency (GO 6.2.1.1 of PGC), is required to be capable to operate within certain Minimum Performance (GO 6.2.1.2 of PGC) and tolerate the outage.</u> | |
| | | New definition: N-0 condition | <u>N-0 condition. Depicts a system in base case or in its normal steady-state operation, with all Components that are expected to be in service are in fact in service. For avoidance of doubt, resetting to new N-0 shall be applied after occurrence of a Long Lasting Contingency/Prolonged Outage.</u> | |
| | | New definition: N-1-1 condition | <u>N-1-1 condition. Depicts a Contingency where a sequence of events consisting of an initial Outage of a Component followed by a secondary loss.</u> | |
| | | New definition: N-k condition | <u>N-k Condition. Depicts a Contingency of multiple outages happening at the same time.</u> | |
| | | Voltage control is the control of transmission voltages through adjustments in generator | <u>Voltage Control. Any actions undertaken by the System Operator or User to maintain the voltage of the Grid within the limits prescribed by the</u> | To align with the PGC definition |

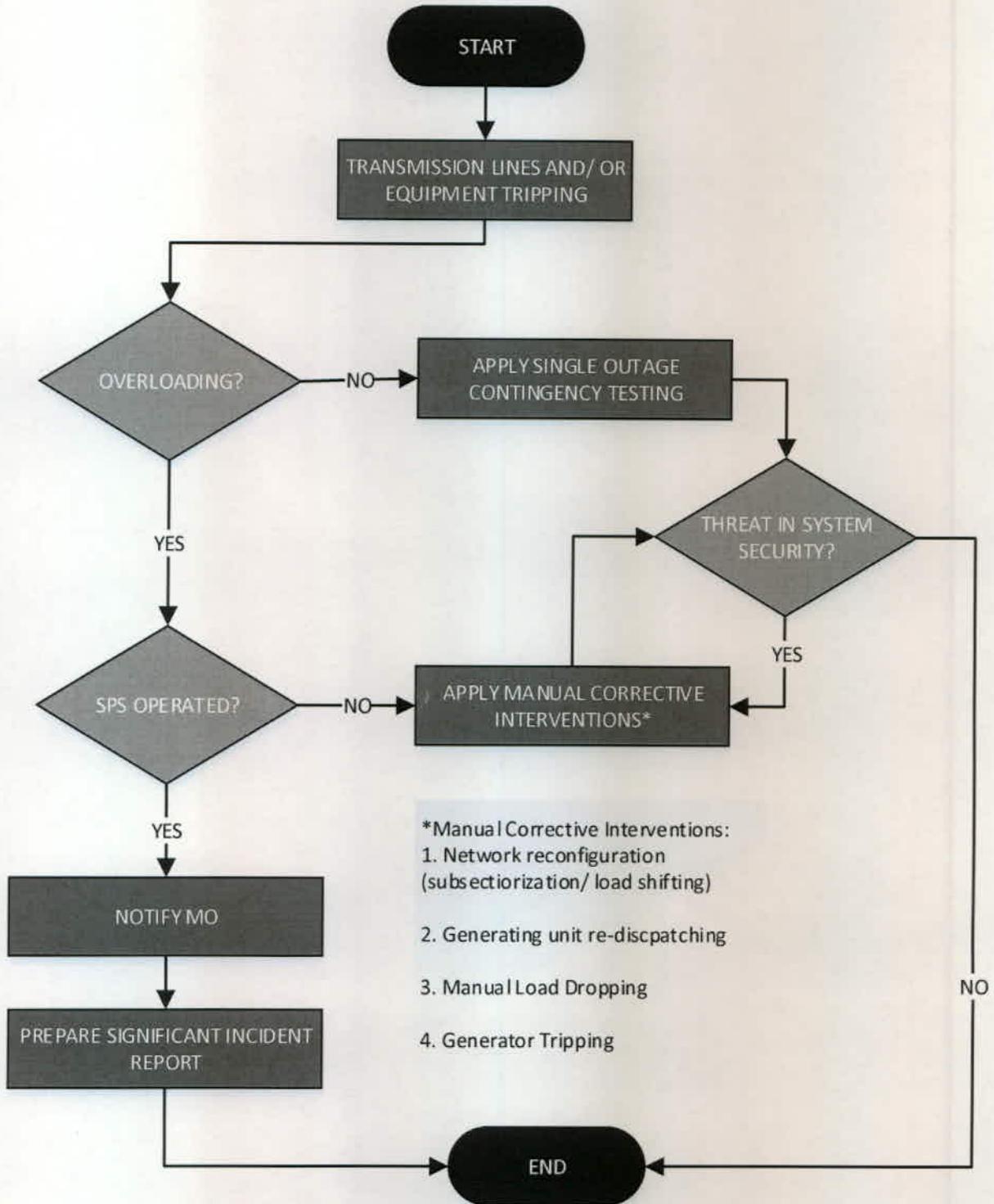
| Title | Section | Original Provision | Proposed Amendment | Rationale |
|-------|---------|---|---|--|
| | | reactive output and transformer taps and by switching capacitor and reactors on the transmission and distribution systems. | <u>Philippine Grid Code such as, but not limited to, adjustment of generator reactive output, adjustment in transformer taps or switching of capacitors or reactors.</u> is the control of transmission voltages through adjustments in generator reactive output and transformer taps and by switching capacitor and reactors on the transmission and distribution systems. | |
| | | Special Protection System (SPS) is an automatic protection scheme (requiring no operator intervention) installed on the grid that is generally applied to keep the power system intact in the event of an N-2 contingency. | <u>System Integrity Protection Scheme (SIPS). A protection system that is designed to detect abnormal or predetermined system conditions, and take automatic corrective actions.</u> Special Protection System (SPS) is an automatic protection scheme (requiring no operator intervention) installed on the grid that is generally applied to keep the power system intact in the event of an N-2 contingency. | To align with the PGC definition |
| | 5.1.1 | Declares an emergency when it determines the existence of a situation which has an adverse material effect on electricity supply or which poses as a significant threat to system security and make a report of the emergency to ERC. | <u>The System Operator shall give emergency instructions or directives</u> Declares an emergency when it determines the existence of a situation which has an adverse material effect on electricity supply or which poses as a significant threat to system security and make a report of the emergency to ERC <u>The System Operator shall prepare and submit a significant incident report to the ERC, PEM Board, DOE, GMC and the Market Operator.</u> | As corrected in clause 6.3.1.1 of the WESM Rules under Emergency and for Clarity |



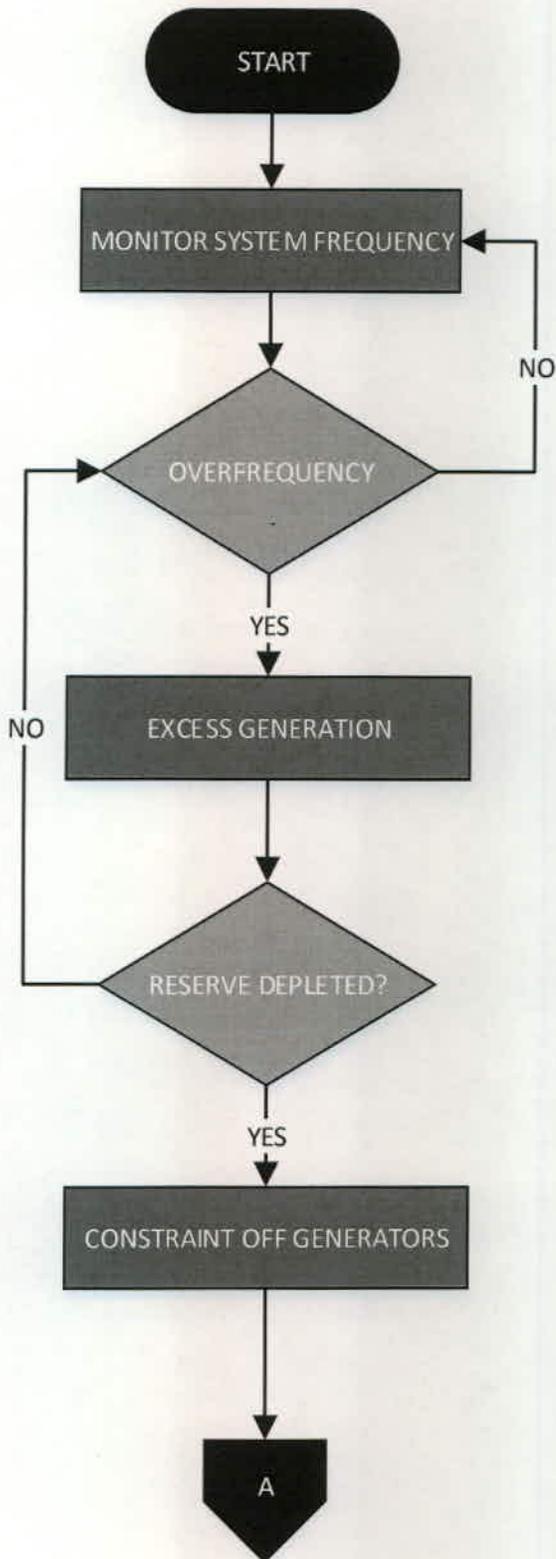
| Title | Section | Original Provision | Proposed Amendment | Rationale |
|-------|---------|---|---|---|
| | 5.1.3 | Review the emergency procedures from time to time in consultation with the Market Operator. | Review and update the emergency procedures from time to time in consultation with the Market Operator as the need arises. | Included the word update |
| | 5.1.4 | Make available a copy of the approved emergency procedures to all WESM Participants within seven (7) days after each occasion on which the emergency procedures have been updated. | Make available a copy of the approved emergency procedures to all WESM Participants within seven (7) days after each occasion on which the emergency procedures have been updated. | For deletion |
| | | <p>6. Emergency Procedures</p> <p>6.1 Emergency Procedure During Overload (Due to Line and/or Equipment tripping)</p> <p>6.2 Emergency Dispatch Procedure During System Over-Frequency (Due to Loss of Load)</p> <p>6.3 Emergency Procedure During Undervoltage Condition</p> | <p>6. Emergency Procedures</p> <p>6.1 Emergency Procedure During Overload (Due to Line and/or Equipment tripping) (see attachment: Revised Flowchart Annex A-1)</p> <p>6.2 Emergency Dispatch Procedure During Excess Generation System Over-Frequency (Due to Loss of Load) (see attachment: Revised Flowchart- Annex A-2)</p> <p>6.3 Emergency Procedure During Undervoltage Condition (see attachment: Revised Flowchart Annex A-3)</p> <p>NEW:</p> | For updating to reflect necessary changes to the various emergency procedures |

| Title | Section | Original Provision | Proposed Amendment | Rationale |
|-------|---------|--------------------|---|-----------|
| | | | <p><u>6.4 Emergency Procedure During Overvoltage</u> (see attachment: Flowchart Annex A-4)</p> <p><u>6.5 Emergency Procedure During Manual Load Dropping</u> (see attachment: Flowchart Annex A-5.)</p> | |

**Annex A-1
Emergency Procedure During Overloading (Due to Line and/or Equipment tripping)**



**Annex A-2
Emergency Procedure During Excess Generation**

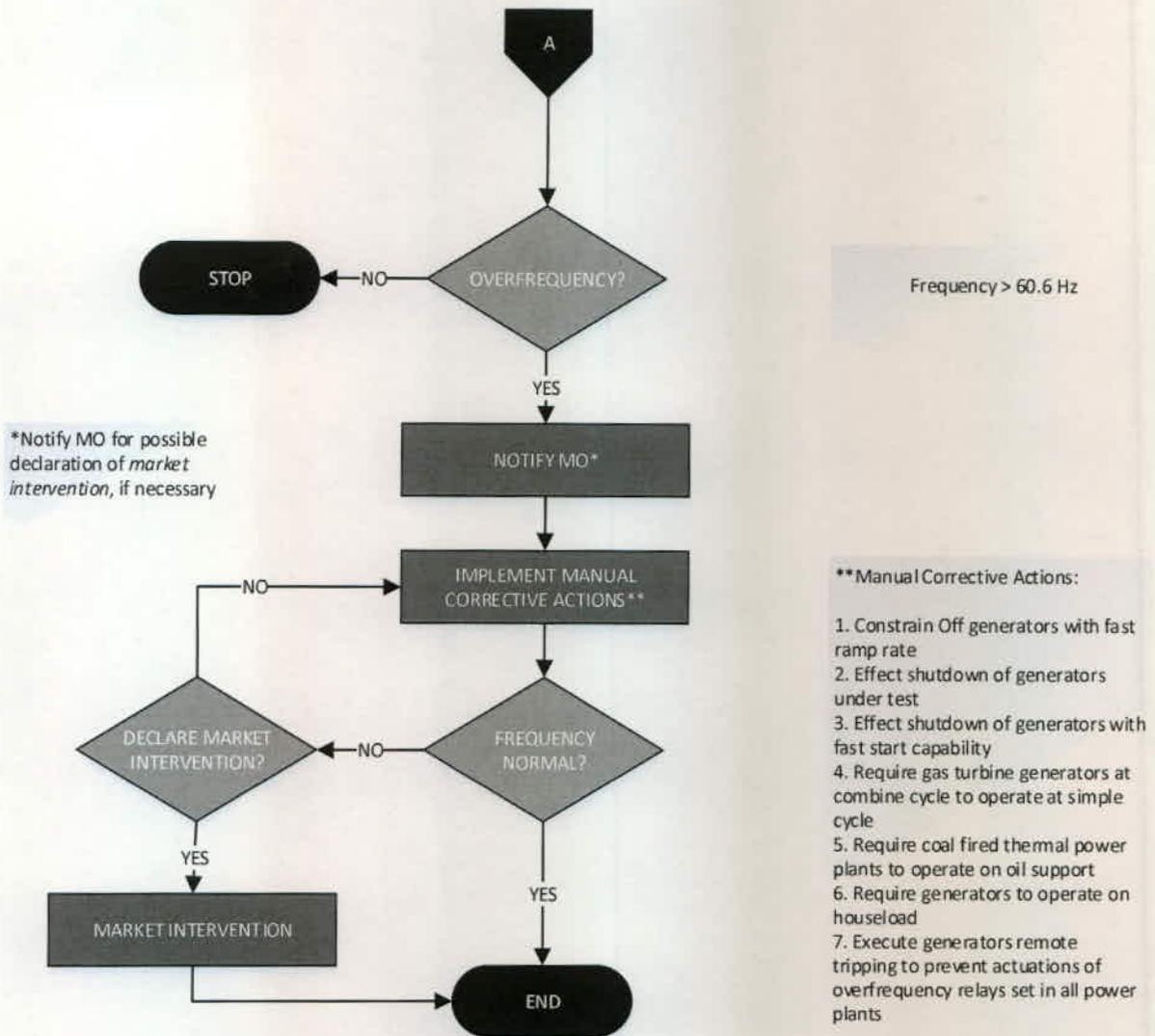


Frequency > 60.3 Hz

"Constraint Off" generators ranked in the highest order of priority (from offers dispatched) of the Merit Order Table (MOT)

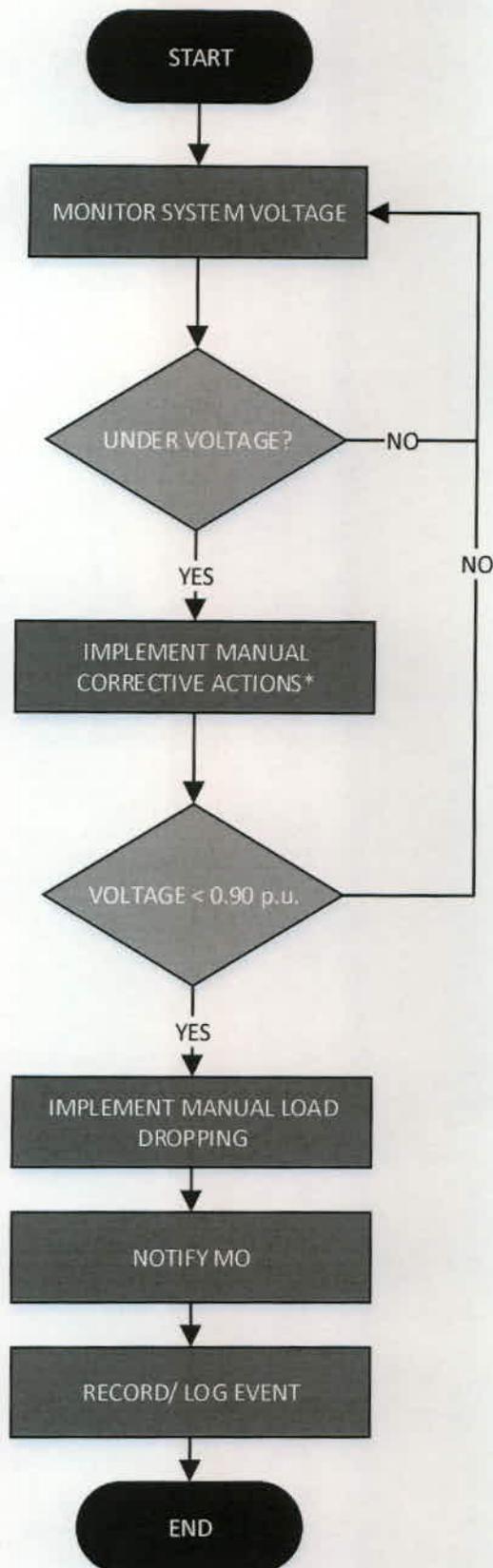
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**Annex A-2
Emergency Procedure During Excess Generation**



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**Annex A-3
Emergency Procedure During Under Voltage**

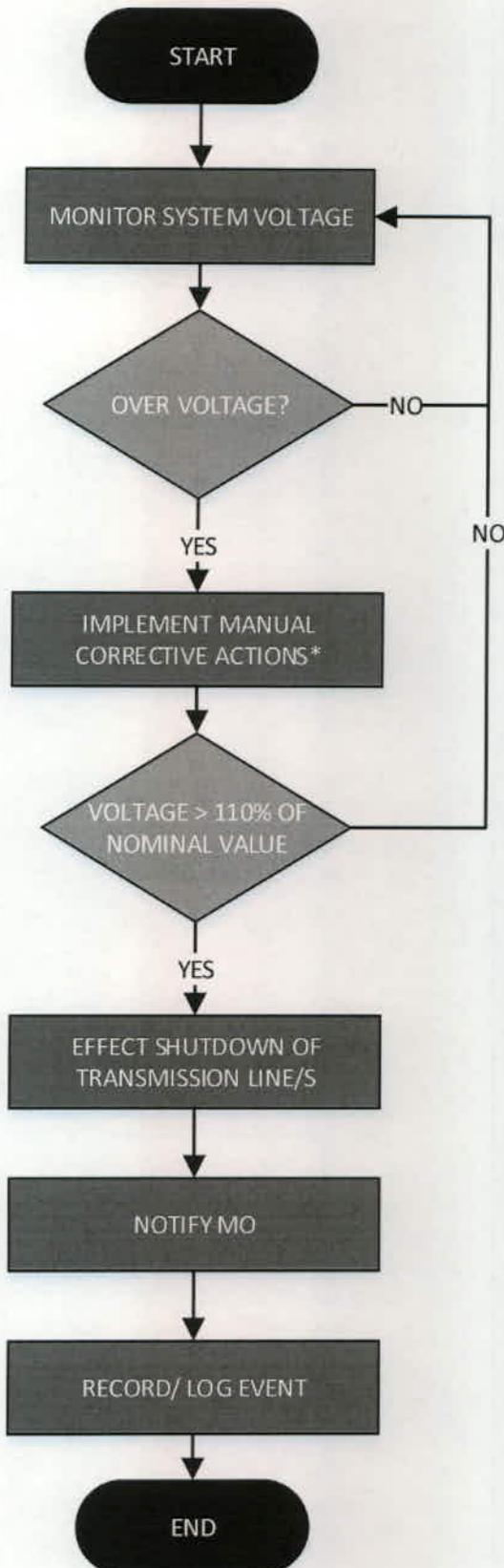


***Manual Corrective Actions:**

1. Instruct the plant operator/s to provide the required MVAR adjustment on their generating units to correct the system voltage based on the declared generator capability curve (within 0.85 lagging power factor as specified in the PGC.)
2. Switch on capacitor banks if offline and switch off shunt reactors if online.
3. Instruct plant operator/s of a generator with certified reactive ancillary providers with approved nomination to provide per the Ancillary Service Contract (below 0.85 lagging power factor)

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**Annex A-4
Emergency Procedure During Over Voltage**

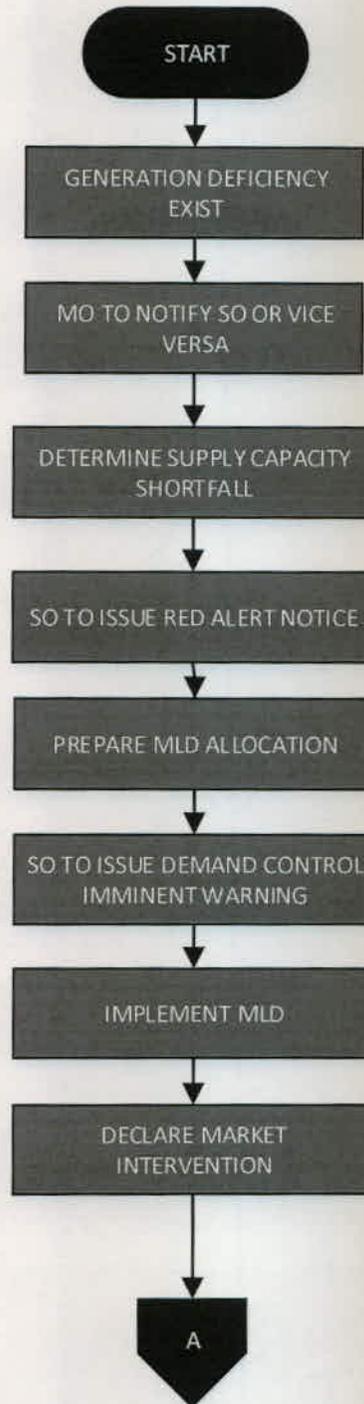


***Manual Corrective Actions:**

1. Instruct the plant operator/s to provide the required MVAR adjustment on their generating units to correct the system voltage based on the declared generator capability curve (within 0.85 lagging power factor and 0.90 leading power factor as specified in the PGC).
2. Switch off capacitor banks if online and switch on shunt reactors if off line.
3. Instruct plant operator/s of a generator with certified reactive ancillary providers with approved nomination to provide reactive support as per Ancillary Service Contract (above 0.90 leading power factor).
4. Shutdown transmission line/s for extreme cases of high voltage condition. Voltage is a above 1.10 p.u.

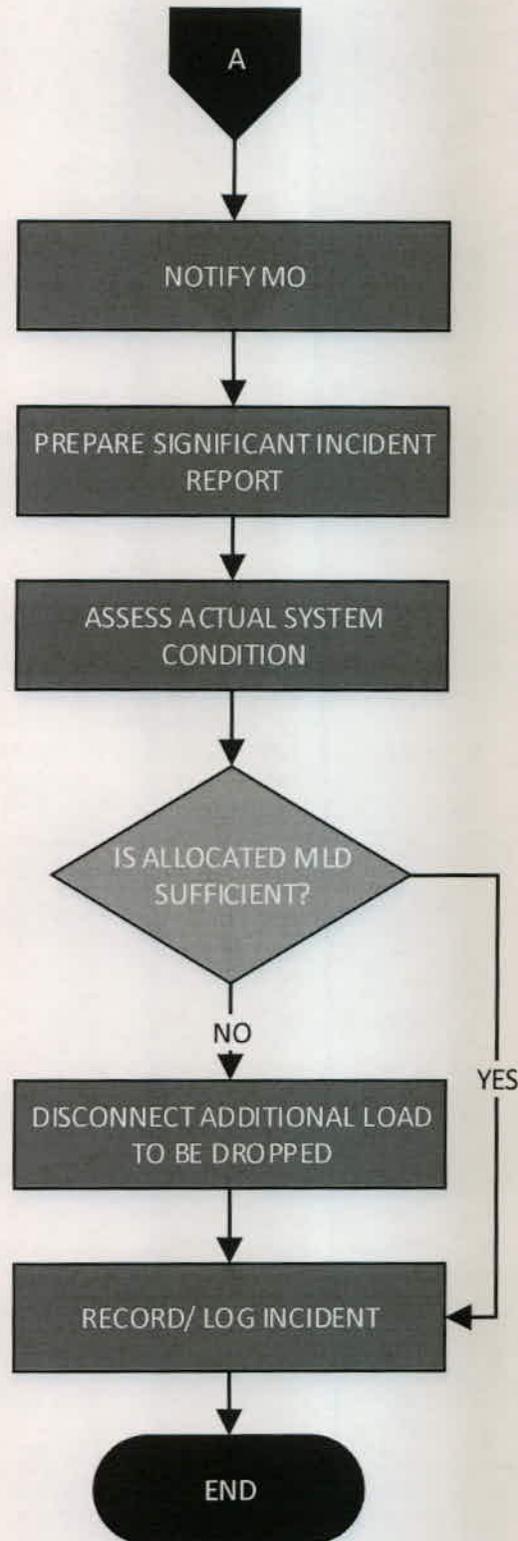
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**Annex A-5
Emergency Dispatch Procedure During Manual Load Dropping**



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**Annex A-5
Emergency Dispatch Procedure During Manual Load Dropping**



John