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C-A OPERATIONS PROCEDURES MANUAL

15.3.6.1 Booster/AGS Ring Power Systems Group Nitrogen and Transformer Yard Inspection Procedure

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Attachments

Hand Processed Changes

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Approved: _____ *Signature on File* _____
 Collider-Accelerator Department Chairman Date

M. Bannon

15.3.6.1 Booster/AGS Ring Power Systems Group Nitrogen and Transformer Yard Inspection Procedure

1. Procedure

1.1 This procedure provides instructions to Booster/AGS Ring Power Systems Group personnel who perform nitrogen and transformer yard inspections. Specifically it describes the general process to perform the inspection, how to record the inspection results and who to inform if an unexpected condition or unexpected parameter exists. Specifically the inspection includes the transformer yards at Buildings 930A, 929, 1000P and 1006 (STAR) and checks for any signs of oil leakage, possible oil over-temperature problems and for the proper nitrogen pressure at the top of the oil in transformers to prevent moisture from entering the tank.

2. Responsibility

2.1 Staff performing these inspections shall be knowledgeable with the requirements of this procedure, the proper use of any required PPE and understand the details of the inspection process for each transformer yard.

2.2 If an unexpected condition or parameter is found at a transformer yard, the assigned inspector shall immediately inform the Siemens Operations Supervisor or designee.

2.3 The Siemens Operations Supervisor or designee shall be responsible to maintain this procedure and current with each transformer yard “as-built” conditions.

3. Prerequisites

3.1 Booster/AGS Ring Power Systems Group staff assigned to perform transformer yard inspections shall be knowledgeable with this procedure, electrical safe working practices and the proper use of PPE.

4. Precautions

4.1 Substations are normally energized while inspections are performed. Adhere to all postings and wear proper PPE while performing inspections.

4.1.1 Inspections of transformer yards with exposed live parts shall not be performed within the fenced areas when it is raining.

4.2 The inspector is responsible to ensure that the substation gates are fully locked at the completion of the inspection and the substation key is controlled.

5. Procedure

5.1 Obtain transformer yard key.

- 5.2 Read all postings at substation and comply with them.
- 5.3 In general, maintaining the maximum distances when inside the transformer yard fenced area will ensure safety from electrical or arc flash hazards.

NOTE:

No PPE is required to perform the transformer yard inspections and nitrogen cylinder change outs specified in this procedure.

DANGER:

Entrance into the transformer yard is strictly for inspection of the transformer as covered in this procedure. Under no circumstances shall you approach any covered cables, exposed bus or go anywhere close to the tops of the transformers while they are energized.

A TRANSFORMER THAT IS NOT LOCKED OUT/TAGGED OUT SHALL BE CONSIDERED ENERGIZED

DANGER:

Injury or death may result if you are not aware that the following substations have exposed equipment.

Substations 1000P2, 1000P3:

CAUTION

Exposed live parts on top of transformers located over 8'-0" above grade.

Prohibited Approach Boundary (PAB) is 0'-7".

Restricted Approach Boundary (RAB) is 2'-2" (includes 1'-0" for inadvertent movement)

To cross the RAB, Class 2 voltage rated PPE required.

Conductive materials that might inadvertently make contact with live parts, for example, conduit or pipes, shall not be brought into yard.

In general, no work is to be accomplished and no PPE is required.

Booster Substation Transformers & STAR 1, 2, 3, & 4:

DANGER

Exposed live parts on top of transformers located approximately 6'-0" above grade.

Prohibited Approach Boundary (PAB) is 0'-7".

Restricted Approach Boundary (RAB) is 2'-2" (includes 1'-0" for inadvertent movement)

The temperature gauges are less than 2'-2" from live parts but greater than 1'-2" from live parts.

RAB will be established at 1'-2". Note: inadvertent movement would be down and away from live part.

Conductive materials that might inadvertently make contact with live parts, for example, conduit or pipes, shall not be brought into yard.

In general, no work is to be accomplished and no PPE is required.

- 5.4 Once a shift the transformer yards at the Booster Building 930A , RF Yard at Building 929, RHIC X-Y Arc at Building 1000P and STAR Power Supply at Building 1006 is checked as follows:
- 5.4.1 Check for any oil leaks on concrete slabs or gravel surrounding the transformers at each transformer yard, and all plumbing joints, couplings and valves.
 - 5.4.2 Record any indication of oil leakage in the Siemens Watch Logbook and immediately inform the Siemens Operator Supervisor of the leak to allow corrective actions.
 - 5.4.3 If the leak is significant, or if any evidence of oil on soil, call BNL Fire/Rescue at x2222 or x911 for immediate response, and notify the C-AD ECR, C-AD Environmental Coordinator, or the C-AD Power Distribution Group Leader, and the Siemens Operator Supervisor.
 - 5.4.4 Check the oil levels and temperatures of each transformer and compare them to each other. If any one either has a lower oil level or the temperature seems to be running hotter than the rest, notify the Siemens Operator Supervisor for further investigations.
 - 5.4.5 Check the nitrogen pressure remaining in each nitrogen cylinder and record the amount on the Transfer Yard nitrogen bottle pressure readings.
 - 5.4.5.1 If nitrogen cylinder pressure is low, replace with a full cylinder. The old cylinder shall be brought outside the cage area and stored in the empty cylinder rack ready to be swapped when there are enough cylinders ready to be called in for an exchange.

Note 1:

The nitrogen cylinder regulator control is too coarse to use for regulating the desired 2-4 psig pressure maintained on the transformers. Therefore, after the cylinder regulator there is a fine regulator set to control nitrogen pressure between 2-4 psig regardless of the input pressure. Thus the coarse regulator on the cylinder is set for approximately 10 psig which is then regulated down to 2-4 psig by the fine regulator.

Note 2:

On very hot days during summer running, when the sun is beating down on the top of a transformer for hours, it is possible for the nitrogen pressure to rise in the transformer tanks. There is a pressure relief valve that will bleed slow rises in transformer pressure. You may pull the head of the pressure relief valves located on the cross fitting of the stainless steel nitrogen gas plumbing located on the side of the transformer if you determine that the gas pressure is close to 5 psig to bleed the pressure back down to the desired range of 2-4psig.

- 5.5 Immediately inform Siemens Operations Supervisor of any unexpected conditions or parameters.

6. Documentation

6.1 Siemens Watch Logs.

7. References

7.1 NFPA 70B, Recommended Practice for Electrical Equipment Maintenance.

8. Attachments

None