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| C:\Users\tarykin\Desktop\LOGO-Full Wording-P301.jpg | **World Association of Nuclear Operators**  **Moscow Centre**  **WANO – MC**  25 Ferganskaya, Moscow, 109507, Russia  Phone. +7 495 376 15 87  Fax: +7 495 376 08 97  [info@wanomc.ru](mailto:info@wanomc.ru) |

**REQUEST**

**to provide technical and organizational information via WANO**

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| 1. **NPP/Organization:** Bushehr NPP IRAN (Request Number BNPP2022.Rq01.eng) |
| 1. **The topic of information request:** Requirements for existence of prohibition of connection of the backup input in the doubly-fed control circuits at the time of short circuit error |
| 1. **The goal of information request:** Gaining Experience and using information from other NPPs about requirements for existence of prohibition of connection of the backup input in the doubly-fed control circuits at the time of short circuit error. A) If the doubly-fed design would be used for the consumers of the control circuit, is the prohibition of connection of the backup input required or not? B) What is the criterion for selecting a design? |
| 1. **The describing of problem:**   In the Bushehr-1 Nuclear Power Plant, occurrence of short circuit during the repairs on the control circuit caused the disconnection of the main power supply input switch and due to lack of prohibition of connection of the backup switch, the backup switch was connected and the control circuit was activated under the short circuit. |
| 1. **Specific Questions:**   Occurrence of short circuit during the repairs on the control circuit (Voltage level=220v) caused the disconnection of the main power supply input switch and due to lack of prohibition of connection of the backup switch, the backup switch was connected and the control circuit was activated under the short circuit. Since the occurrence of such conditions is not unexpected, the following question would be brought up in regard to facing such design.  **1- What are the regulatory requirements for the doubly-fed circuits of the control circuits?**  **Paks NPP:** At Paks Nuclear Power Plant, the power switching operations on the equipment power supply are performed according to separate operational manuals. If maintenance or repair is in progress on any equipment (performed by a maintenance staff), the power supply to the equipment shall be in accordance with the conditions indicated in the work orders, for this piece of equipment no other action can be ordered. This is also applicable to equipment with double power supply. In other words, if the equipment switched-off condition is recorded in the work order as a condition for maintenance, no operation can be ordered on any of the power supplies. This is obviously a procedural limit; it will not physically prevent a faulty connection.  On the distributors there is also an on-the-spot warning and there is controlled documentation and diagrams located there for the double power supply. The operational staff is regularly trained to handle these issues.  There are no requirements prescribed for maintenance personnel for the troubleshooting. The free decision-making is necessary for test the circuits to find the fault. In case of new equipment, there is a detailed testing specification.    **2- Regardless of the type of consumers, is the “prohibition of connection of backup switch in case of occurrence of short circuit” is mandatory from the safety point of view?**  **Paks NPP:** It was not unambiguous in the question whether it relates to primary or to secondary circuit, so we will answer both:  • In case of 6 kV and 0.4 kV distributors there is a high short-circuit capacity. Therefore, proper automation has been developed on these to deal with the problem. In the event of a short circuit, the automations will not allow the backup to be activated. In the 0.4 kV distributors, the automation has an operational mode that protects the operators. When the disconnection function is switched on during operation on the distributor (Special Operating Mode Switch), the automation does not switch to standby-mode neither in the case of timed short-circuit fault (0sec).  • The switching automatic of the control circuits is not time limited for the case of short circuits. The automatic switching makes decision and will prioritize based on the available voltage. When a short circuit occurs on the control voltage backbone, the first priority overcurrent protection trips and then switches over and the second trips as well, etc. The control circuits are further divided by small circuit breakers. If a short circuit occurs in a branch, only this will trip, since the design is selective with by the fuse that feeds the spine. We have already experienced a short circuit in the branch, however not in the spine yet. Should it happen, the solenoid switches performing the switch-overs will probably need to be replaced.  **3- In case of impossibility of implementation of the design of prohibition of connection of backup switch in case of occurrence of short circuit, what is the alternative solution?**  **Paks:** The alternative could be to turn off the backup power supply. But it's not a practice at our plant.  We ask you to share any related information and experiences from your NPP . |
| 1. Proposed organizations for sending this request: ALL NPPs |
| 1. Department – request initiator: Electricity Management of BNPP |
| 1. Contact details of the requester: A. Alipour - Manager of Electricity |
| 1. Date of request: 02 Feb. 2022 |

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