Allen Bradley 700-RTC Relay Part 21 Issues

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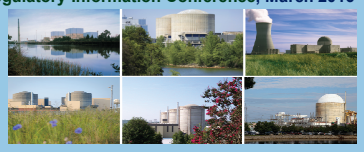
NRC Regulatory Information Conference, March 2016



Bhavesh Patel – Duke Energy
Director, Fleet Procurement Engineering

Licensee Event Report 1-2015-002, Brunswick Unit 1

- Emergency diesel generators (EDGs) 3 and 4 determined to have been unable to tie to their respective emergency busses for 12 minutes on March 21, 2015.
  - Allen Bradley (AB) 700RTC Relays in breaker control logic were susceptible to electrical noise from nearby relays
- This is considered a loss of safety function since 3 of the 4 EDGs are required to mitigate an accident on one unit.
- Root cause: Procedural inadequacy in the commercial grade dedication (CGD) process that allowed an unauthorized component modification to go unrecognized.
- Affected circuits in all 4 EDGs have been modified and the CGD procedure has been revised.

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Digital Device Found on Commercially Dedicated Relays

Part 21s Generated by NLI, Duke Energy, Qualtech, NTS, UCI (May - July, 2015)

- Allen Bradley (AB) had made an internal design change to the 700-RTC relay reportedly in the late 2008 time period. This change involved changing the relay's internal circuitry to add a CPLD (Complex Programmable Logic Device) chip.
  - Thus, the relay went from being an analog device to digital device. Upon incorporation of the design change, Allen Bradley made no part number change to the relay, did not issue any product update/technical service bulletin noting the change and did not update or indicate in the 700-RTC relay technical literature that a CPLD (digital) device had been incorporated into the design of the product.
  - Due to the unawareness of the internal design change, Duke Energy Progress continued to dedicate the AB 700-RTC relay after the digital chip was incorporated within the relay's circuitry and did not address or evaluate the design change as required by procedure.

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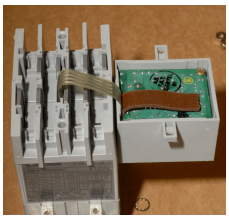
Relay Pictures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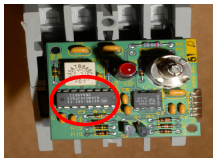
Old Versus New Boards



Original

Replacement

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Duke Energy CGD Actions – Completed and Planned

- Placed existing Allen Bradley (AB) 700-RTC Relay inventory on hold
- Deactivated AB 700-RTC Relay CGD Package and will change Procurement Method to App. B purchase
- Set up protocol to perform sample inspection of incoming electrical CGD candidates for potential unauthorized digital device – applies to components likely to contain a digital device such as transmitters, relays, timers, transducers, indicators and similar products with more complex circuitry – Procedure Revision Request (PRR) generated to update PE procedure
- Identified existing inventory of other AB/Rockwell dedicated items to validate absence of unauthorized digital device
- Identified existing inventory of other dedicated electrical items (and those with "Solid State Device" in description), to validate absence of unauthorized digital device (Trust but Verify)
- Trained PE and CGD specialists to perform additional inspections of electrical items to help identify potential unauthorized digital devices, and apply these lessons learned to other applicable CGD items for Fleet PE
- Updated PE database to capture results of these inspections for repository of info and ease of retrievability (to aid in future inspections for comparisons, data and part pictures)
- Contacted AB/Rockwell to initiate protocol to perform V&V of programming of digital device in partnership with AZZ/NLI – completed 12/2015

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AZZ | NLI CGD Actions – Completed & Planned

- Two non-disclosure agreements (NDAs) have been executed between AZZ, Duke Energy and Rockwell Automation for access to the software and other pertinent design information.
- NLI will perform the full sequence of EMI/RFI testing per EPRI TR-102323 on the relay. This report is due out in 2016 from NLI.
- Between the V&V and EMI/RFI testing, we plan to show there is no impact to the function of the relay with the addition of the CPLD chip.
  - This V&V audit will provide AZZ with the software/firmware version information history from 2008 to present.
  - It will also enable us to perform software checks per our normal V&V follow-up procedure to address any future changes (revisions) to the software/firmware made by Rockwell.

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Opportunities and Challenges

- Opportunities
  - Trusted past experience with vendor about change notifications with P/N changes, but didn't verify
  - Contacted AB/Rockwell in March 2015 for existence of chip, but initial response was there were no changes and no CPLD (terminology)
  - Previous industry OE not distributed so unaware a utility had identified the CPLD in late 2013
  - Risk for potential of digital items with newer/lesser known used vendors recognized, but not applied to vendors with established history – understand risk and mitigate by validation
- Challenges
  - May 2015 request for detailed information on CPLD from AB/Rockwell deemed proprietary
  - Management intervention initiated dialogue with appropriate AB/Rockwell personnel
  - Legal involved on both sides due to proprietary information and the need for NDAs
  - AB/Rockwell and Duke Energy/NLI aligned on path forward

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