

Configuration Management in NRC's Reactor Inspection Program

Robert Patterson, Region II/DRS

Regulations

- 10 CFR 50, Appendix B, Criterion III, “Design Control”
 - States in part, that, “Measures shall be established to assure that applicable regulatory requirements...are correctly translated in to specifications, drawings, procedures and instructions.”
 - States in part, that, “Design changes, including field changes, shall be subject to design control measures commensurate with those applied to the original design...”
- 10 CFR 50.59, “Changes, Test, and Experiments”
 - (c)(1) A licensee may make changes in the facility as described in the FSAR, make changes in the procedures as described in the FSAR analysis report, and conduct tests or experiments not described in the FSAR without obtaining a license amendment only if: [See sections (c)(1)(i) and (c)(1)(ii)]

Leading up ...

- Safety System Functional Inspections and Safety System OM Inspections: Mid to late 80s, the NRC identified concerns that DB were not being maintained.
- NUMARC 90-12, “Design Basis Program Guidelines” to provide a standard framework for industry members to use in improving Design Bases (DB) information
 - NRC recommended making the DB reconstitution a formal initiative.
 - NUMARC responded this was not needed - most licensees were already conducting DB reconstitution.
- NUREG-1397, Feb 1991 – some results of NRC survey of 6 utilities include
 - DB docs should be a top-level and define the current plant configuration
 - Re-establishment of DB w/o reconstitution may not provide sufficient LOD for future modifications, plant operation, or event response
 - Minor changes should be tracked to ensure that changes in the aggregate do not affect validity of existing calcs and ability of a system to perform it’s design functions.

Leading up

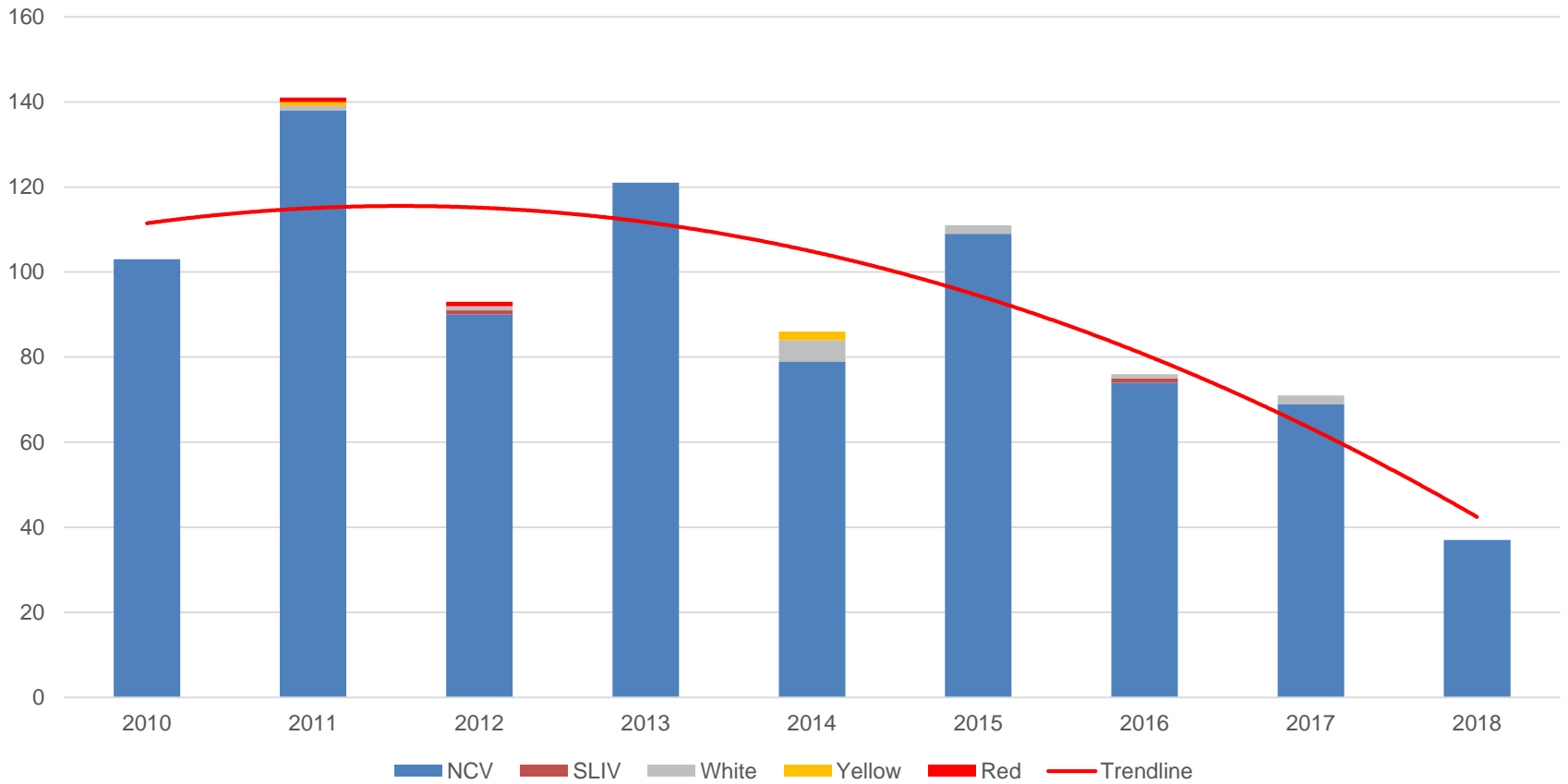
- Aug 1992 - NRC issued a Commission policy statement “Availability and Adequacy of Design Bases Information at Nuclear Power Plants”
 - DB docs should be sufficient to show the current plant configuration is consistent with the DB
 - DB should be understood and documented to support operability determinations and 50.59s
 - NRC will continue SSFI-like inspections
 - GL will be issued
- Mar 1993 – draft GL issued for comment
 - Requested licensees to describe their DB reconstitution efforts, and schedules,
 - Licensees not reconstituting their DB requested to provide rationale
 - Most commenters concluded that the GL was unnecessary.
 - NUMARC: this request would have a negative effect on ongoing efforts and undermine licensees’ abilities to manage these efforts.
- Oct 1993, in SECY 93-292, the NRC staff told the Commission that the policy statement and proposed GL conveyed the Commission’s concern and recommended the GL not be issued. The NRC would continue to perform design-related inspections.

After ...

- May 1996 - NRC IG investigations found fault with the NRC for failing to recognize the problems at Millstone and impose Corrective Actions much earlier
- Oct 1996 - NRC issued 50.54(f) letters to all licensees requiring information that ensures plants are operated and maintained in accordance with their Design Bases.
- 1999 - NRC issued a revised 10 CFR 50.59 which clarified the conditions to allow licensees to make changes without prior NRC approval.
- Baseline design basis inspections were implemented
 - SSFI, revised in 1996 – included engineering design, configuration control, and 50.59/mods
 - SSD&PC team inspections– safety system design and performance capability
 - CDBIs
 - Mods/50.59 inspections

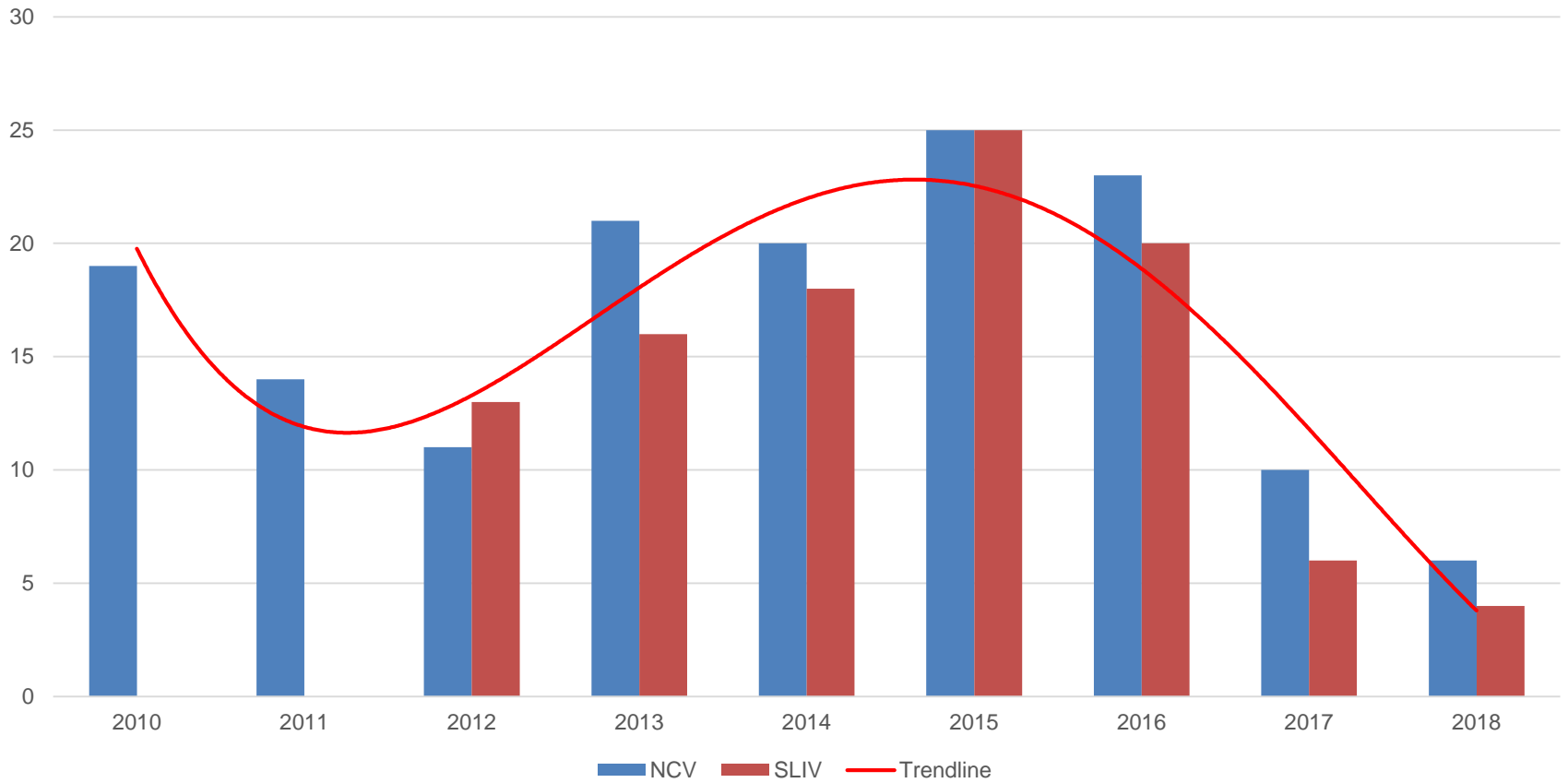
Trends

Criterion III Findings



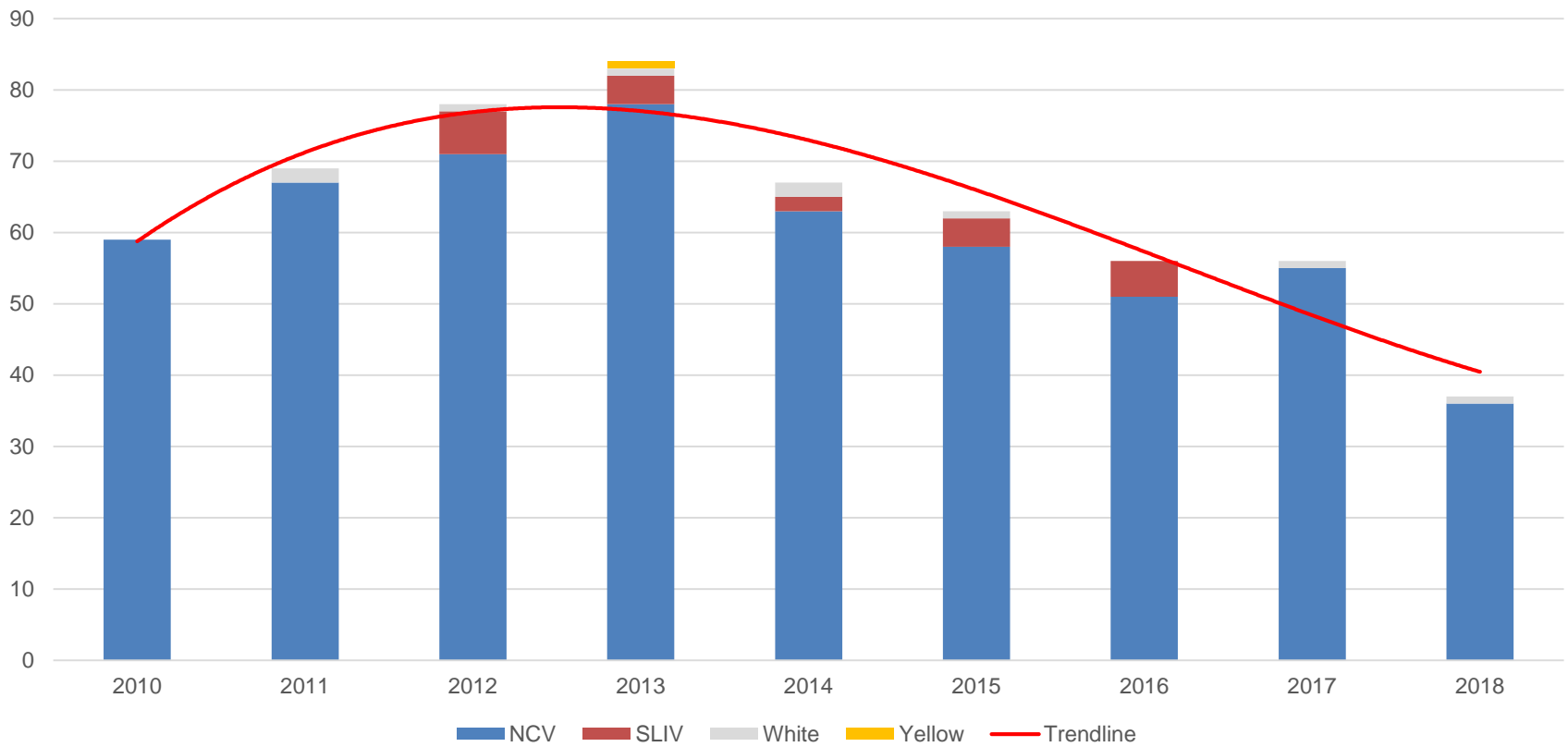
Trends

50.59 Findings



Trends

Configuration control related
(includes operations, maintenance, and some Criterion III)



Configuration Control Findings

Modification Errors

- Inadequate Temporary Configuration Change
 - A temporary pump and hose was installed in order to drain the spent fuel pool transfer canal. The pump and hose was configured to pump water from the transfer canal into the spent fuel pool. While pumping, a condition developed that siphoned water from the spent fuel pool back into the canal, resulting in a low level alarm and requiring operator action.
- Failure to consider Valve Stability during Modification to Pressurizer Safety Valves
 - A change was made to the settings of pressurizer safety valves even though industry testing identified that the valves would be unstable at the new settings. Plans had to be initiated to return the valves back to the qualified testing settings.
- Failure to conduct 50.59 screenings for scaffolding erected for greater than 90 days

Configuration Control Findings

Oversight/Maintenance Errors

- Failure to Ensure Containment Equipment Hatch was Properly Closed during Fuel Movements
 - Refueling operations procedures required the containment hatch be closed during the movement. It was identified that the hatch was left partially open due to improperly tightened bolts.
- Failure to maintain configuration control of the plant during operations
 - Multiple examples of improperly stored equipment and inadequate control of scaffolding
- Failure to maintain configuration control which led to internal flooding event
 - A fill valve was inadvertently left open which resulting in the primary water storage tank overflowing and spilling into the auxiliary building.

Configuration Control Findings

Resource/Human Performance Errors

- Failure to follow work instructions or operating procedures
 - Failure to address thermal dynamic impacts during repair of condensate tube leak resulted in water hammer in feedwater system.
 - Missing wire during installation of a digital upgrade to the main generator synchronization circuit resulted in a reactor trip.
 - Failure to verify a circuit breaker was closed resulted in the inability of a residual heat removal system suction valve to function.
 - Failure to detect a disconnected lead led to the failure of a service water pump to shed from an emergency bus during performance of maintenance.
- Inadequate work instructions or operating procedures
 - Inadequate information to maintain plant status control resulted in several valves being mispositioned.

Closing Remarks

- Configuration control issues continue to challenge the industry
- The majority of configuration control issues are caused during maintenance or operations activities
 - Failure to follow procedures/work instructions
 - Inadequate procedures/work instructions
- Modifications to the plant also contribute to configuration control issues
 - Plant modifications will grow more challenging as the industry moves forward with replacing aging equipment
 - Planned reductions in modifications as part of delivering the nuclear promise
- Agency is adapting and revising oversight efforts commensurate to the significance of issues identified.