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US NRC ALARA Findings and Observations

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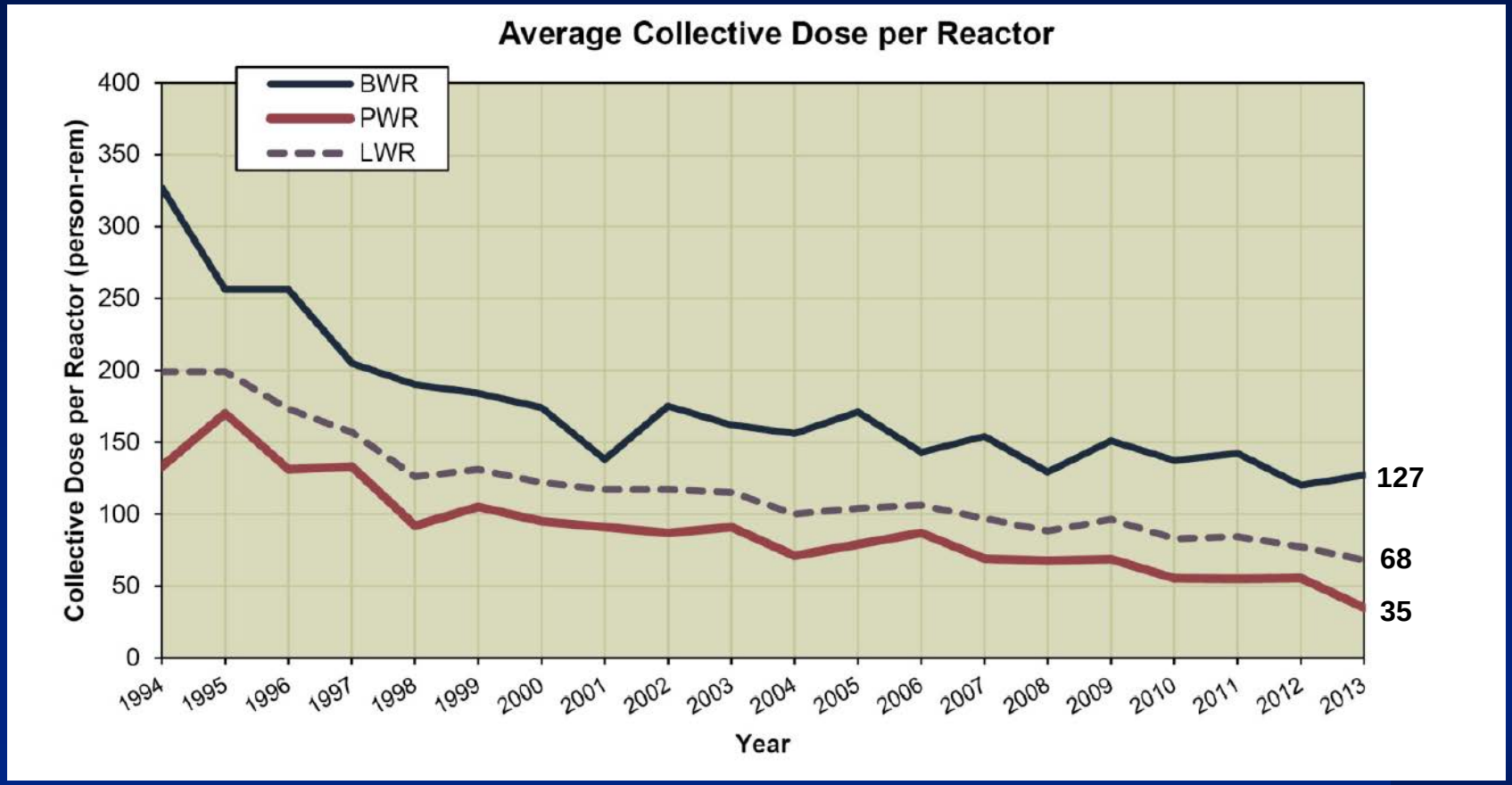
DRAFT

Collective Dose 1994 – 2013

(Preliminary NUREG-0713)



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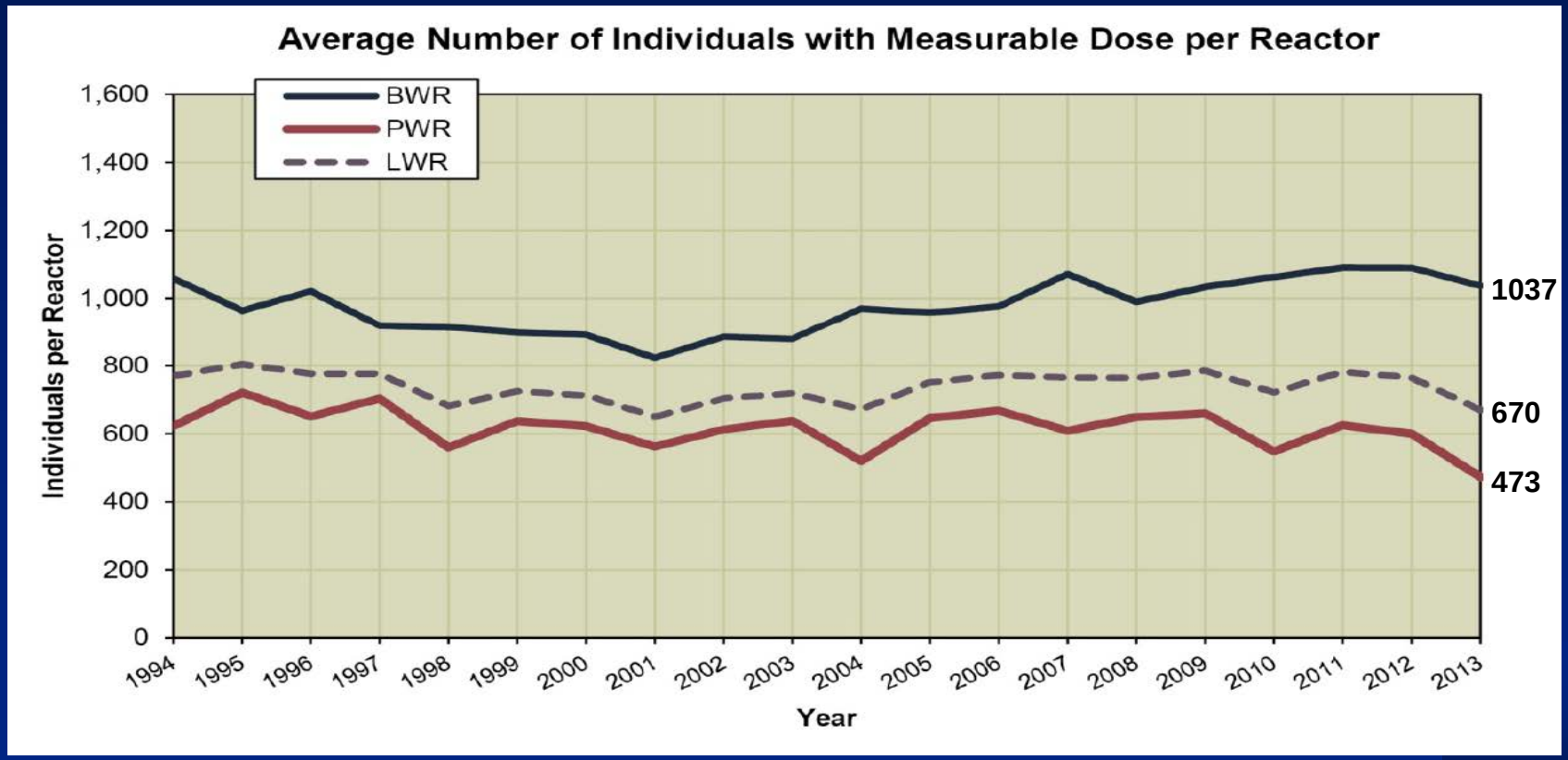
Average Number of Individuals with Measurable Dose per Reactor 1994 – 2013

(Preliminary NUREG-0713)



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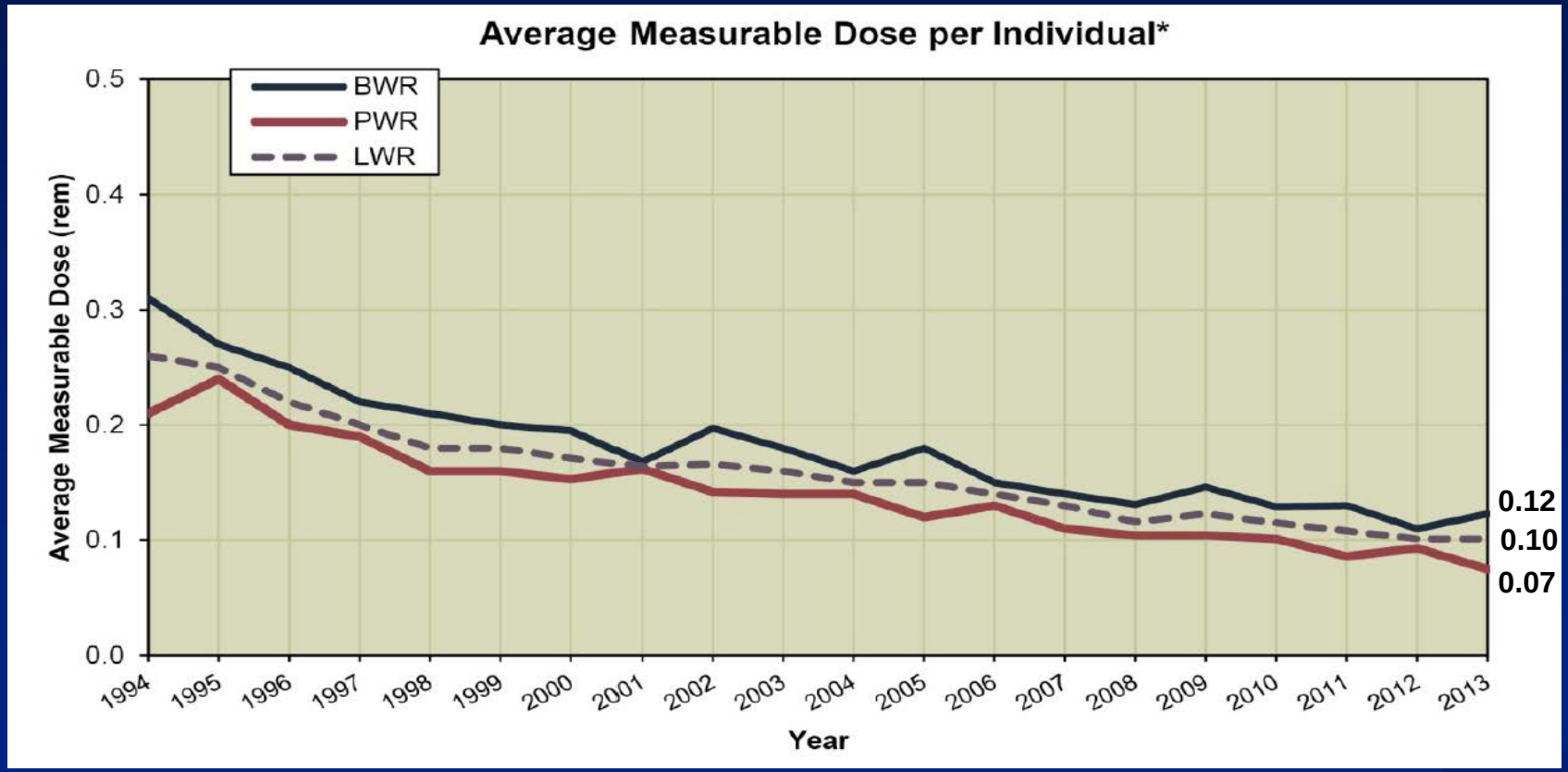
Average Measurable Dose per Individual 1994 – 2013 (Preliminary NUREG-0713)



* Not adjusted for transient workers.

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Three-Year Dose Average 2011–2013

(Preliminary NUREG-0713)

- For BWRs
  - 1st Quartile: **57.725 - 85.497** person-rem
  - 2nd Quartile: **96.397 - 127.064** person-rem
  - 3rd Quartile: **130.650 - 158.144** person-rem
  - 4th Quartile: **158.250 - 241.675** person-rem
- For PWRs
  - 1st Quartile: **17.321 - 39.651** person-rem
  - 2nd Quartile: **39.663 - 45.306** person-rem
  - 3rd Quartile: **46.481 - 53.181** person-rem
  - 4th Quartile: **58.334 - 121.128** person-rem

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Inspection Procedure (IP): Radiation Safety – Public and Occupational

- IP 71124 (Eight Attachments)
- Attachment No. 71124.02, “Occupational ALARA Planning and Controls”
- Assess performance with respect to maintaining radiation exposures ALARA
  - Review ALARA work plans and verify dose estimates
  - Review performance of work activities (Actual vs Estimate)
  - Review radiation worker performance

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Attachment No. 71124.02

- Determine plant's quartile for three-year dose average
- Schedule inspection hours (biennial)
  - Top quartile – 44 inspection hours
  - Mid quartiles – 54 inspection hours
  - Lowest quartile – 64 inspection hours
- Adjust hours as appropriate based on the plant source term and overall ALARA effectiveness

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ALARA compliance with regulations

- ALARA "regulatory" compliance is based on whether licensees have adequate procedures to track and reduce collective dose
- Compliance is not based on whether individual doses are the absolute minimum, or use of all possible ALARA methods

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Program Assessment

- Effectiveness of ALARA assessed on a work activity-by-work activity basis
- Actual dose outcome of a work activity is compared to the planned, intended dose for that work activity
- Large Differences in Actual vs Estimate may be an indication of a potential weakness or failure

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Collective Dose Issue Screening

(IMC 0308 Appendix C)

- Minor Issues
  - The actual dose ≤ 50% above the planned, intended collective dose
  - The actual dose > 50% above the planned, intended collective dose and the actual dose < 5 person-rem
- More-than-Minor Issues
  - The actual dose ≥ 5 person-rem and the actual dose > 50% above the planned, intended collective dose
    - Failure to establish, maintain or implement procedures or engineering controls

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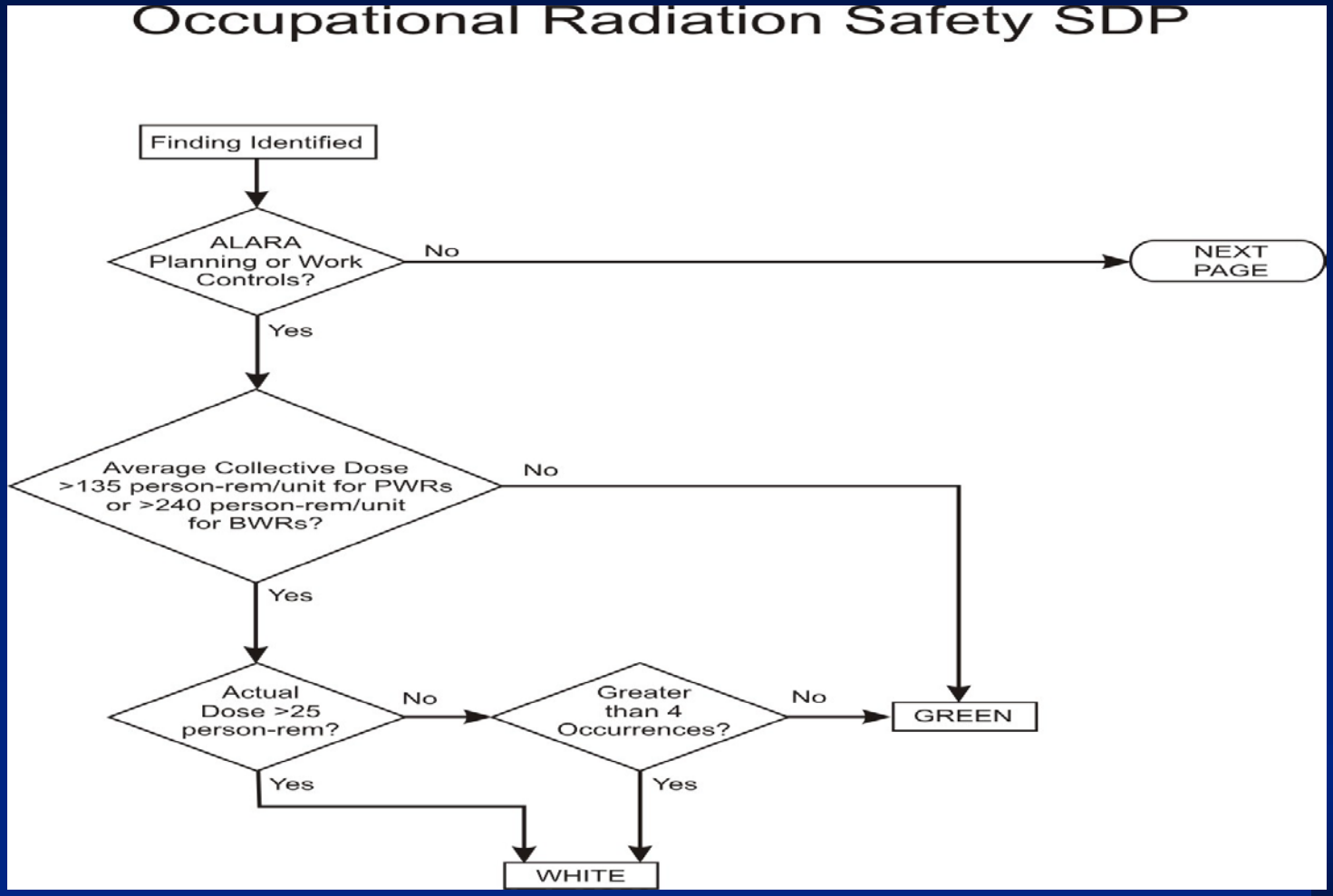
Significance Determination Process
(IMC 0609 Appendix C)



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Last 24 Months ALARA Findings

1. Reactor Coolant Pump (RCP) Activities ML14314A052
2. Control Rod Drive Mechanism (CRDM) Repairs ML14127A543
3. (Two Jobs) In-Service Inspections (ISI) Examinations and Snubber Inspections ML14041A007
4. ISI Examinations ML14045A089
5. Reactor Re-Assembly and Cavity Decon ML13310A647
6. Chemical Volume Control System (CVCS) Piping Modification ML13221A584
7. Spent Fuel Pool (SPF) Cooling Heat Exchanger Replacement ML13042A373

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Causes

- Job Planning
  - Inadequate work scope
  - Inadequate walkdowns
  - Underestimation of time to perform job
- Job Execution
  - Rework
  - Poor coordination of shielding installation
  - Lack of coordination of support groups

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Questions and Discussion