



Continuously Improving Radiation Safety

Carl Moeller-RP Director PVGS

Palo Verde Generating Station



Palo Verde Generating Station

- *Three Combustion Engineered-System 80 Pressurize Water Reactors (7 Owners)*
 - *Unit 1 Operational License issued 06/1/1985*
 - *Unit 2 Operational License issued 4/24/1986*
 - *Unit 3 Operational License issued 11/25/1987*
- *Largest Single Generator in United States*
- *Cooling Water is reclaimed waste water from Phoenix metro area (Water Resource Facility)*
- *Zero Liquid Discharge*
- *18 months cycles, outages every April and October*
- *150 Plus Canisters on ISFSI*

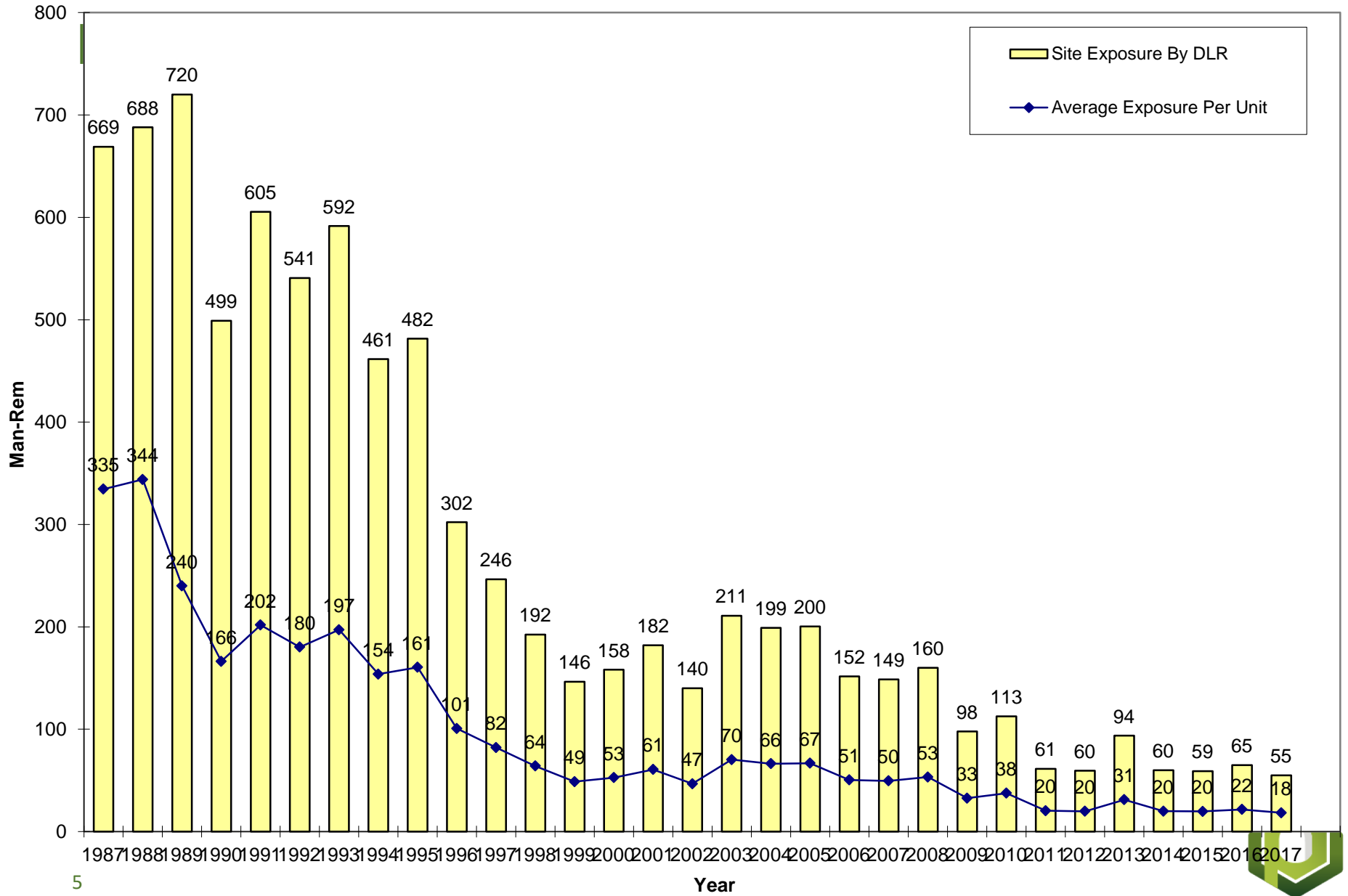


Radiation Protection Organization

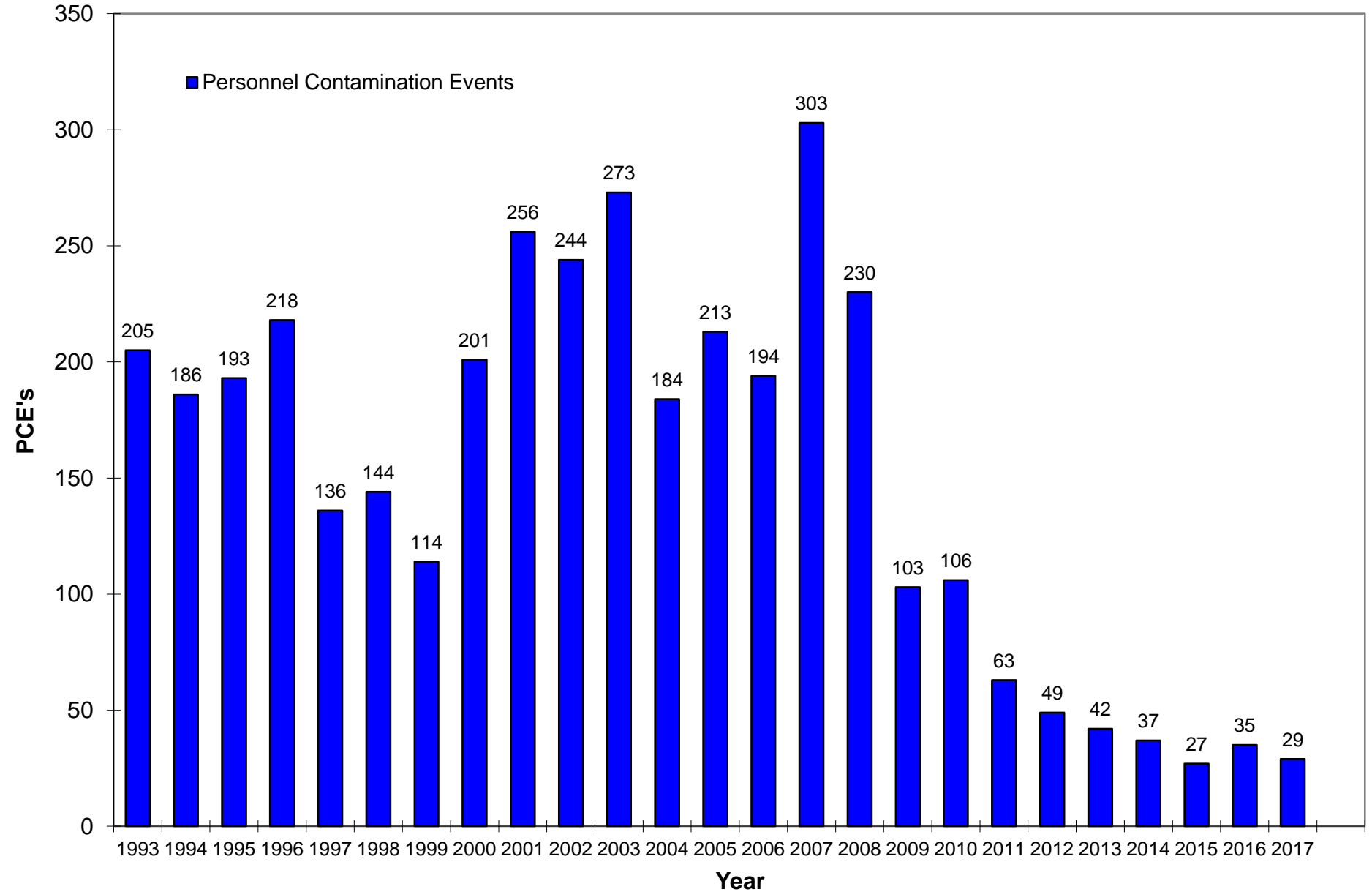
- ***RP Director/RPM (90)***
- ***Superintendent-RP Operations (58)***
 - *4 Unit Supervisors and 5 Crew Supervisors (Ops Rotating Shifts)*
 - *49 Radiation Protection Technicians (including effluent monitoring)*
- ***Superintendent-RP Technical (15)***
 - *1 Supervisor for HP Group, 1 Supervisor over Dosimetry/Instruments*
 - *1 CHP, 4 Sr HPs, 2 HPS, 2 Instrument Techs and 3 Dosimetry Techs*
- ***Superintendent-RP Ops Support (16)***
 - *1 Supervisor over ALARA, 1 Supervisor over Radwaste*
 - *ALARA has 2 Sr HPs and 6 Radiation Protection Technicians*
 - *Radwaste has 5 Radiation Protection Technicians*
- ***20-30 Full time contractors (Capital project, decon, DCS)***



PVGS Annual Collective Radiation Exposure



PVGS Annual Personnel Contamination Events



Developing a Radiation Safety focused Culture

- OUR three aspirations at PVGS to lead the industry.
 - Safety (Nuclear, Industrial, Radiation and Safety Culture)
 - Knowledge and Training
 - Employee Engagement



Aspiration to lead in Safety

- Nuclear safety-significant improvement over last several years resulting in well mitigated risk on-line and during refueling outages
- Industrial Safety-10 OSHA Recordable injuries in 2017 (5 at Water Resource Facility)
- Safety Culture-Continues to improve (NRC, ECP, Survey Results)



RADIOLOGICAL SAFETY

- Leveraging Employee Engagement & Knowledge and Training aspirations to drive ownership and continuous improvement:
- “How good could we be”? “What do we need to do”?
 - See it, Own it, Solve it and do it!
 - Ownership, Innovation and Pride
 - Craftsmanship, Engaged Thinking Operators, Engineering Excellence, ALARA Advocate Committees



Frontline Innovation

- Auxiliary Operator designed and developed quick disconnect hose fittings saving dose and eliminating contamination events during system draining and venting.
- Maintenance craftsman designed lifting hoist for safe and efficient removal of Shutdown Cooling Heat Exchanger end bell.
- Steam Generator engineers partnered with vendor to improve ECT inspection and develop tooling for remote S/G nozzle dam/FME cover installation and removal
- Engineers designed HEPA ventilation for S/G Inspections



Frontline Ownership

- ALARA Advocates—Typical to see 20-25 individuals meeting and collaborating on improving performance.
- Carpenters and Insulators have dedicated “ALARA Planners” who provide cross discipline training to weld and valve shops (Present at EPRI Workshops)
- Welders and Valve craftsman developed and provide Just in time training to Radiation Protection Technicians
- Refueling and Outage Maintenance Craftsman developed new tooling, including mock-ups for Just in Time training for ICI Cut-Up, CEA Cut-up and CRDM Replacement



RP Leads The Way

- Outage Control Center—Next to Shift Outage Director
- Established Critical Parameter Monitoring shift activity sheets to identify and detect potential trends
- Actively Participate in High Impact Teams, Establish outage shielding teams, provide oversight for Mode 4 Clean Up Teams
- Actively support 15-20 tours inside containment each outage.
- Coordinate and enhance audio/video/remote coverage capabilities
- Collaborate and RECOGNIZE peer performance



Questions?