

INPO

Institute of Nuclear Power Operations

INPO / WANO UPDATE: ***Collective Radiation Exposure and High Radiation Area Controls***

**ISOE ALARA Symposium
January 2014**

**Kevin Pushee
INPO Radiation Protection Manager**

INPO

Radiological Protection Department



VISION

Setting the global standard of excellence in radiological safety.

MISSION

To consistently promote the highest standards in radiological safety.

We identify gaps to excellence and provide assistance to foster continuous improvement.

INPO

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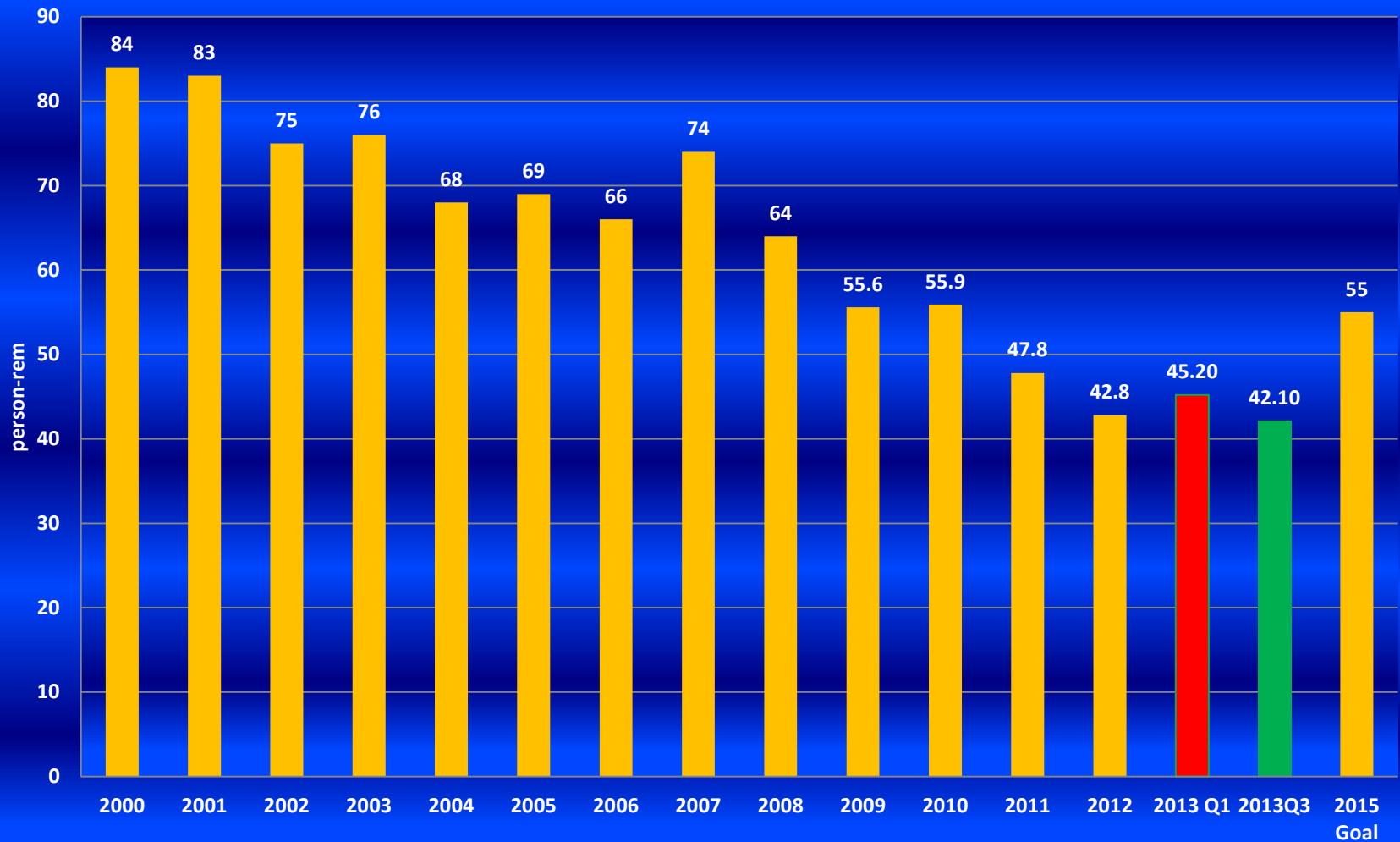
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Key Topics

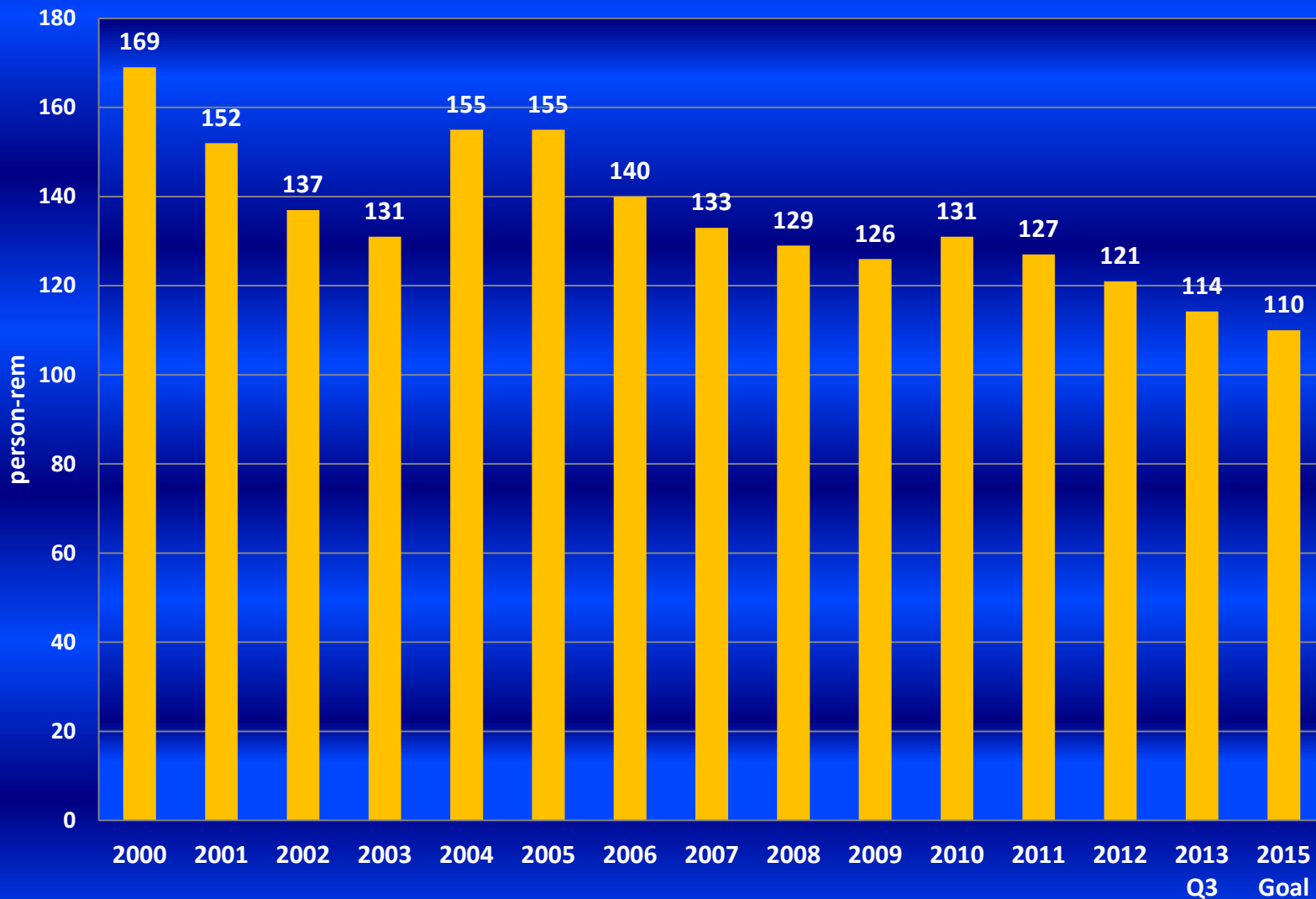
- 2014 Industry Focus Areas:
 - CRE Reduction
 - Dose Controls (HRA / LHRA Controls & Prevention of Unplanned Exposures)
 - RP Fundamentals
- Areas for Improvement and Principal Contributors to the Problems
- *What's Coming Your Way-*
INPO and “Big RP” Initiatives

CRE Reduction

U.S. Collective Radiation Exposure (PWR)
Median Values Third Quarter 2013

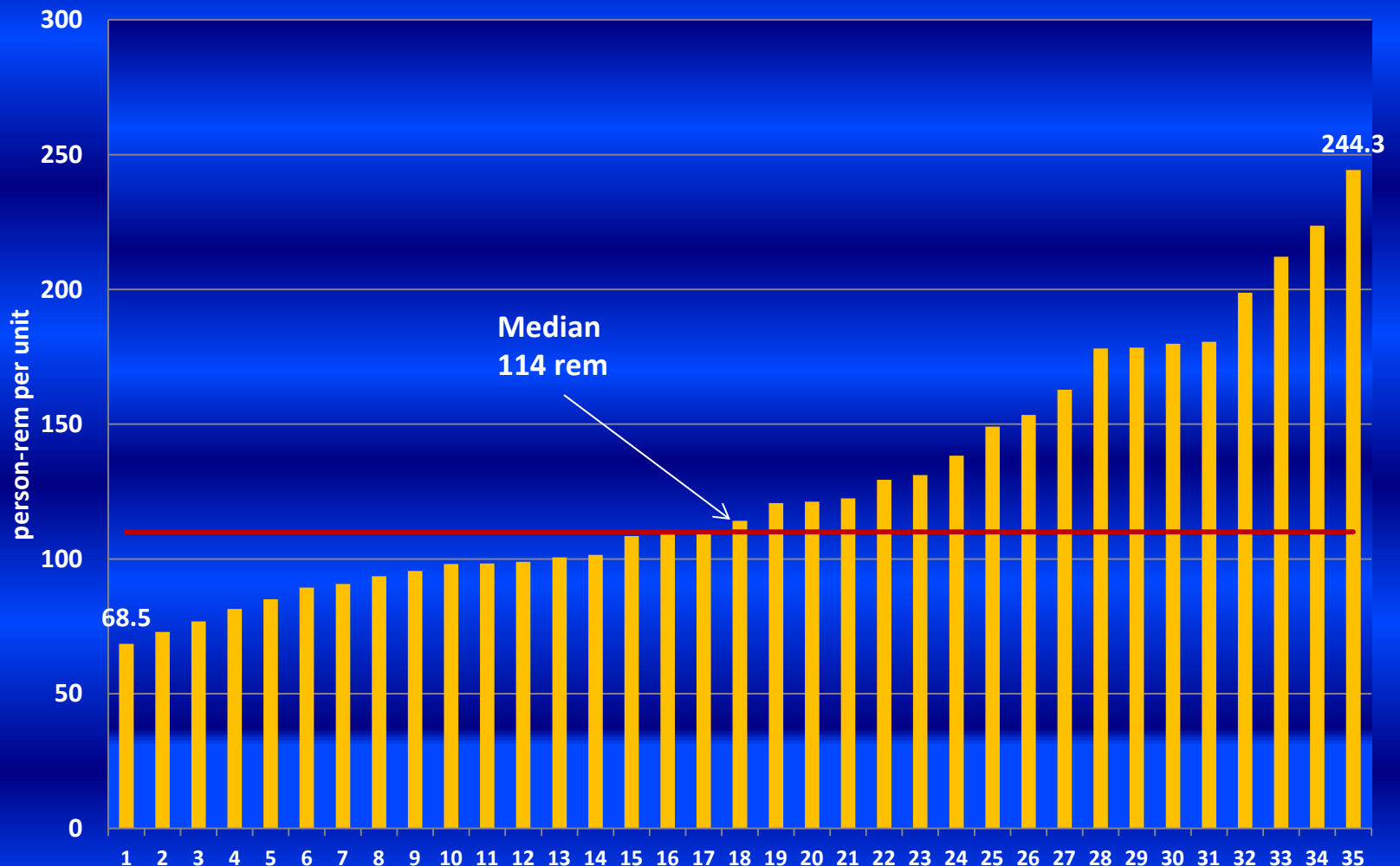


U.S. Collective Radiation Exposure (BWR) Median Values Third Quarter 2013

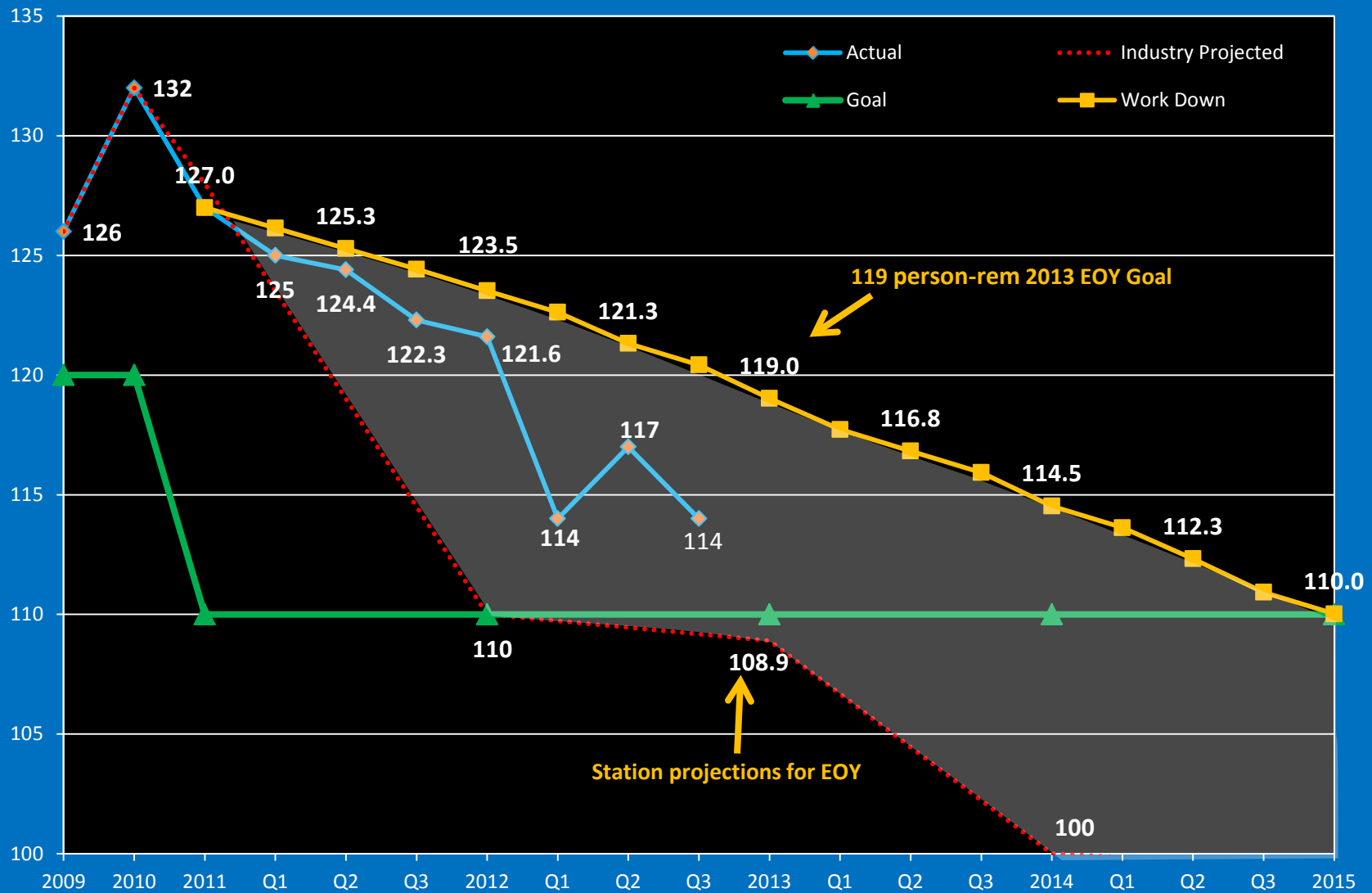


CRE Reduction

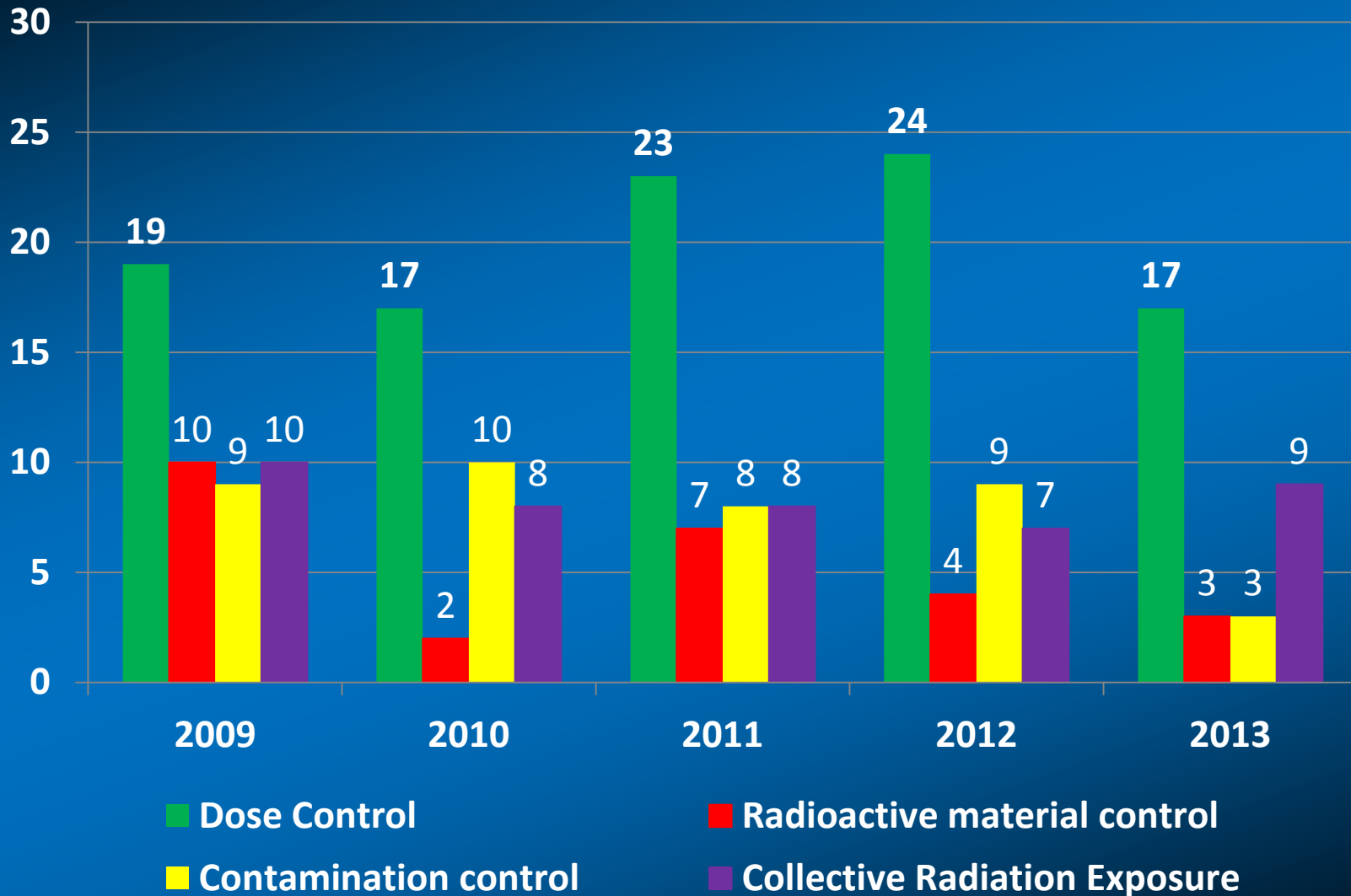
17/35 BWRs Meet the 2015 goal - need 18/35



BWR CRE Progress 3rd Quarter 2013



Radiation Protection Areas for Improvement



2013 CRE AFIs

The five-year ALARA plan is not maintained current. Initiatives to reduce CRE have not progressed, and it is unlikely that the 2015 industry dose goal for CRE will be achieved.

Causes:

- **Managers do not perform periodic reviews of the ALARA plan to ensure dose reduction initiatives are evaluated and managed.**
- **Senior managers are not prioritizing and implementing the recommendations from the source term and collective radiation exposure reduction plans.**

2013 CRE AFIs

The five-year ALARA plan is not maintained current....
Continued

Causes:

- Health physics did not perform industry benchmarking to identify dose reduction initiatives to incorporate into the long-range ALARA plan.
- Managers do not require dose reduction plan initiatives to be actionable and, in some cases, resources are not committed.
- RPMs not providing the strategic direction for reducing CRE.

2013 CRE AFIs

Long-term dose reduction initiatives and a few ALARA processes are not used effectively to lower CRE. This hampers the ability to meet the desired CRE performance goal, and is resulting in missed opportunities to reduce refueling outage dose.

Causes:

- **Managers have not implemented common industry industry-recognized dose reduction initiatives such as permanent shielding and scaffolding.**
- **The ALARA staff does not perform critical ALARA work-in-progress reviews resulting in missed opportunities to reduce outage dose.**

2013 CRE AFI's

Long-term dose reduction initiatives and a few ALARA processes... Continued

Causes:

- Insufficient plans to remove or reduce the sources of cobalt input to the reactor coolant system.
- Project managers not demonstrating strong dose reduction ownership for major projects.
- ALARA Committee not providing sufficient challenge to dose reduction initiatives.

2013 CRE AFIs

Several key actions to reduce or mitigate the consequences of elevated source term are not fully developed including actions to minimize crud deposition. This increases the potential for high collective dose during the refueling outage.

Causes:

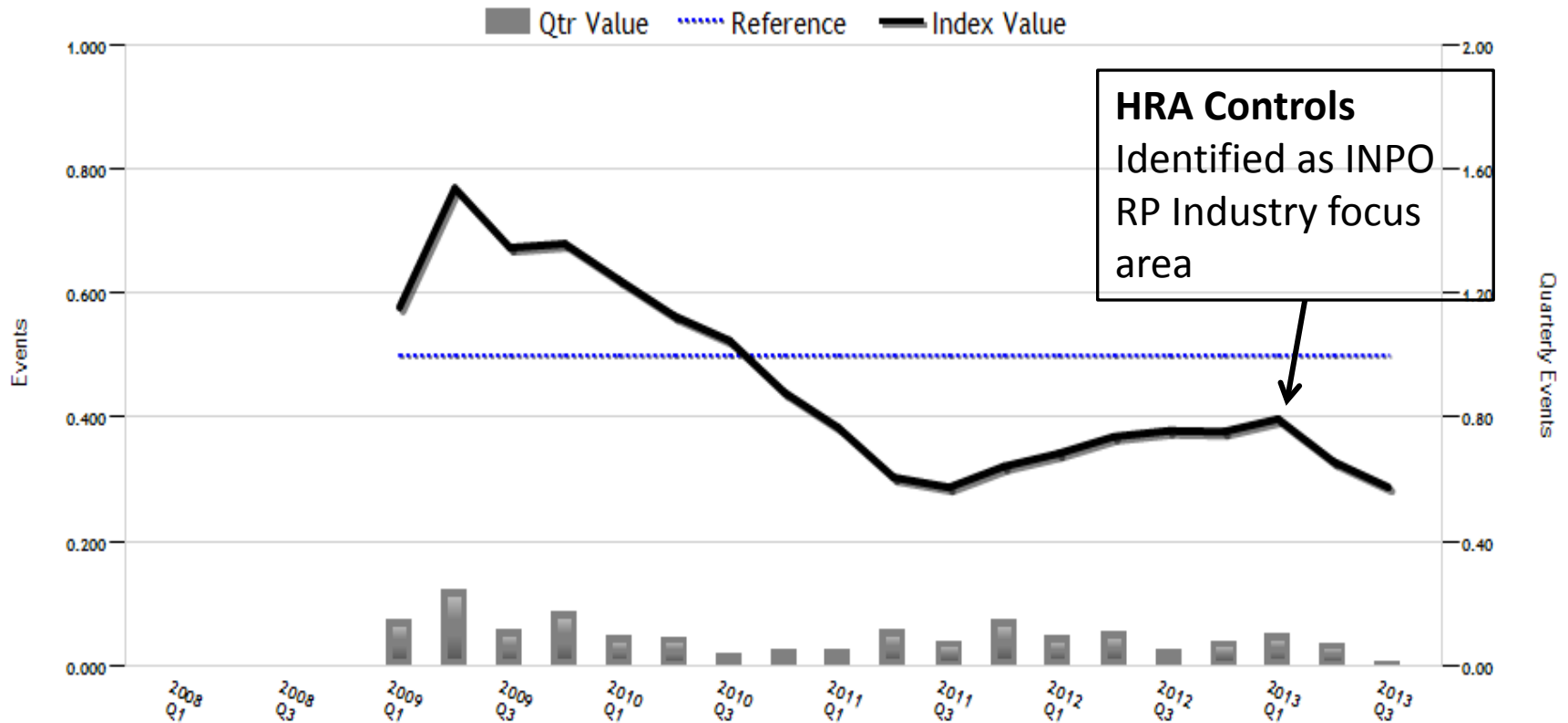
- **Managers have not aligned the organization to develop an integrated crud burst mitigation plan.**
- **Lack of pre-outage verification of reactor coolant filtration system operability.**

HRA / LHRA Controls & Prevention of Unplanned Exposures

Data Analysis in 2012 Revealed an Industry Adverse Trend:

- Actual and precursor events increased from 3rd Qtr 2011 through 4th Qtr 2012, *but some decline in 2013.*
- Number of AFIs concerning in Dose Control also increased from 2010 through 2012
- Although there have been a recent improvement in number of HRA control incidents, performance gaps in RP Fundamentals remains a principal contributor to the issue.

HRA / LHRA Controls & Prevention of Unplanned Exposures



Industry Total High Radiation Control Events

2013 Dose Control AFIs

Radiation protection personnel did not appropriately control a few activities with elevated radiological risk. This resulted in unexpected LHRA dose rate conditions on the refuel floor, a radiography boundary violation, and an uncontrolled locked HRA.

Causes:

- RP supervision did not provide proper oversight for several high-risk radiological activities.
- RP supervisor did not ensure that remote telemetry was in place to identify the RWP stop work dose rate criteria.
- RP supervisor overseeing radiography did not brief a new boundary guard on their responsibilities.

2013 Dose Control AFIs

HP technicians do not apply RP fundamentals or use self and peer-checking when conducting regularly performed tasks. This resulted in unposted high radiation areas, worker entries into areas with unknown airborne conditions, and unsecured LHRAs.

Causes:

- **HP management is not adequately reinforcing expectations for use of radiation protection fundamentals.**
- **HP Technicians do not consistently request peer checks when down posting HRAs and verifying LHRA gates are secured.**
- **Some HP technicians have resisted implementation of procedure based peer checks because it was perceived that it would slow down work.**

2013 Dose Control AFIs

Radiation workers qualified in RP coverage activities are not consistently performing fundamental RP practices properly. This has resulted in unplanned dose, personnel contaminations, and the spread of contamination to clean areas of the plant.

Causes:

- First-line managers do not enforce and correct behaviors associated with radiological performance.
- FLM did not stop the job when the work crew encountered difficulty in transferring a high dose rate filter into a shield.
- RP personnel not taking a proactive approach to provide good radiological direction and oversight of some higher risk work activities (*overreliance on qualified self-monitor workers*).

2013 Dose Control AFIs

Radiation workers qualified in RP coverage activities are not consistently applying RP fundamentals properly....

Continued

Causes:

- **Workers are making decisions based upon their own assessment of risk instead of following requirements.**

2013 Dose Control AFIs

RP personnel do not consistently monitor and control work in high radiation areas. This resulted in unplanned dose alarms and in radiation work permit limits being exceeded.

Causes:

- The HRA access control procedure does not state that continuous RP technician engagement is required when workers cannot self-monitor - *such as when dosimeters are required to be worn under protective clothing.*
- Entries into steam affected areas (BWR) are inappropriately characterized as low-risk. This is increasing the potential for gaps in applying appropriate controls to prevent unplanned exposures.

2013 Dose Control AFIs

RP technicians do not follow standards for HRA access controls. This has resulted in workers entering areas with unknown radiological conditions and deviations from industry guidance for controlling LHRA, creating vulnerabilities to unplanned dose events.

Causes:

- **Technicians do not consistently recognize the risk when deviating from HRA control requirements because previous deviations have not resulted in consequential events.**
- **In some cases where HRA standards are unclear, technicians stated they make up their own standards.**

2013 Dose Control AFIs

RP personnel do not effectively monitor and control radiological work or establish and implement radiological stop work criteria.

Causes:

- Technicians often do not apply proper fundamental controls because they believe they are unnecessary and the risk is low.
- Supervisors unintentionally condone the behavior by not correcting technicians behaviors.
- Providing coverage for some higher risk activities has desensitized RP personnel when covering lower risk work.

2013 Dose Control AFIs

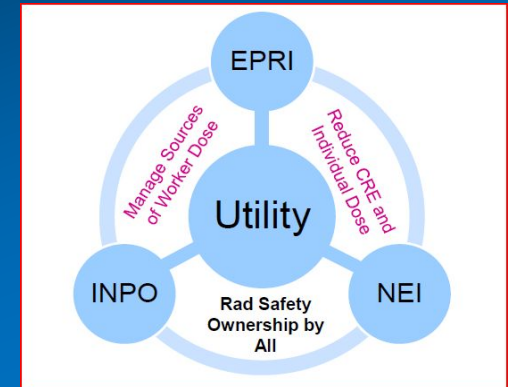
Dose consequences are not sufficiently considered in outage plans or activities that affect plant area dose rates.

Causes:

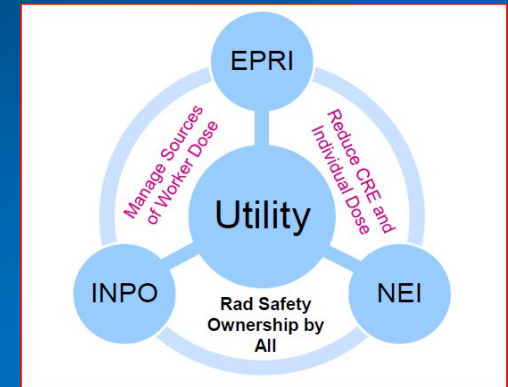
- **Communication between RP and other groups is ineffective.**
- **Workers moved or altered shielding without an assessment and approval of ALARA personnel because of a lack of oversight and enforcement of expected standards.**

What's Coming Your Way - “The Big RP” and INPO Initiatives

- **Develop / Distribute Plant Managers' PWR Source Term Reduction Guide**
(EPRI / INPO – Complete December 2013)
- **Develop / Distribute PWR Dose Reduction Checklist to Support Industry Development of Long-Range ALARA Plans**
(Industry / INPO –February 2014)
- **Revise and Distribute INPO Alpha Monitoring and Control How-To**
(INPO – January 2014)



What's Coming Your Way - "The Big RP" and INPO Initiatives



- **Issue Level 4 IER: “Improper Setting of Electronic Dosimeter Alarm Setpoints”**
(INPO-January 2014)
- **Commence Piloting New 2020 INPO RP Index**
 - CRE (~5 pts)
 - Dose Control (~ 3 pts)
 - RAM (~ 2 pts)(INPO - June 2014)

INPO 2014 Meeting Schedule

Date	Event
04/08/2013 - 04/10/2014	Radiological Protection Managers Meeting
11/04/2013 - 11/06/2014	Radiological Protection Managers Meeting
11/18/2013 - 11/20/2014	Industrial Safety Working Meeting
12/02/2013 - 12/04/2014	New Radiological Protection Managers Meeting

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Questions & Comments