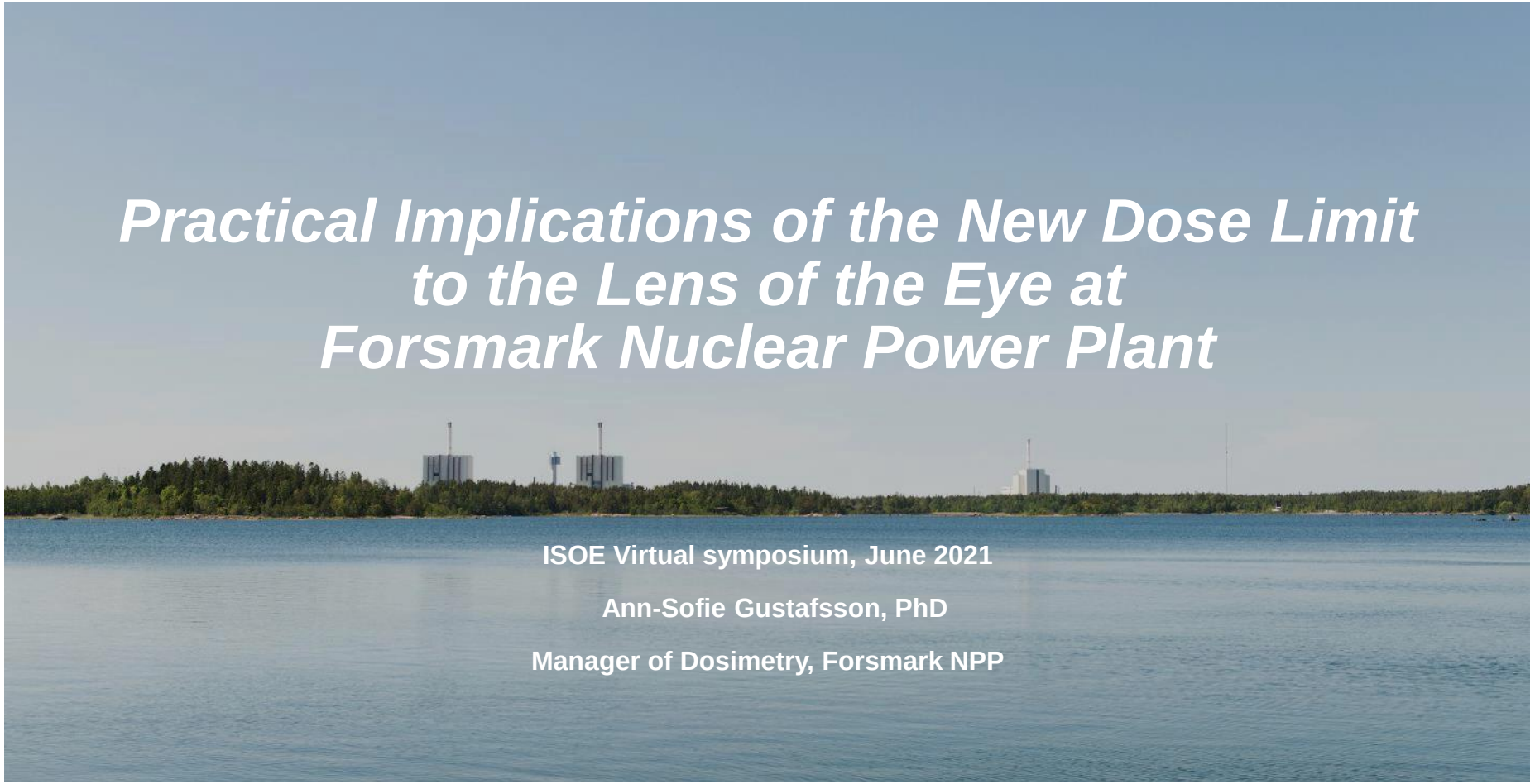
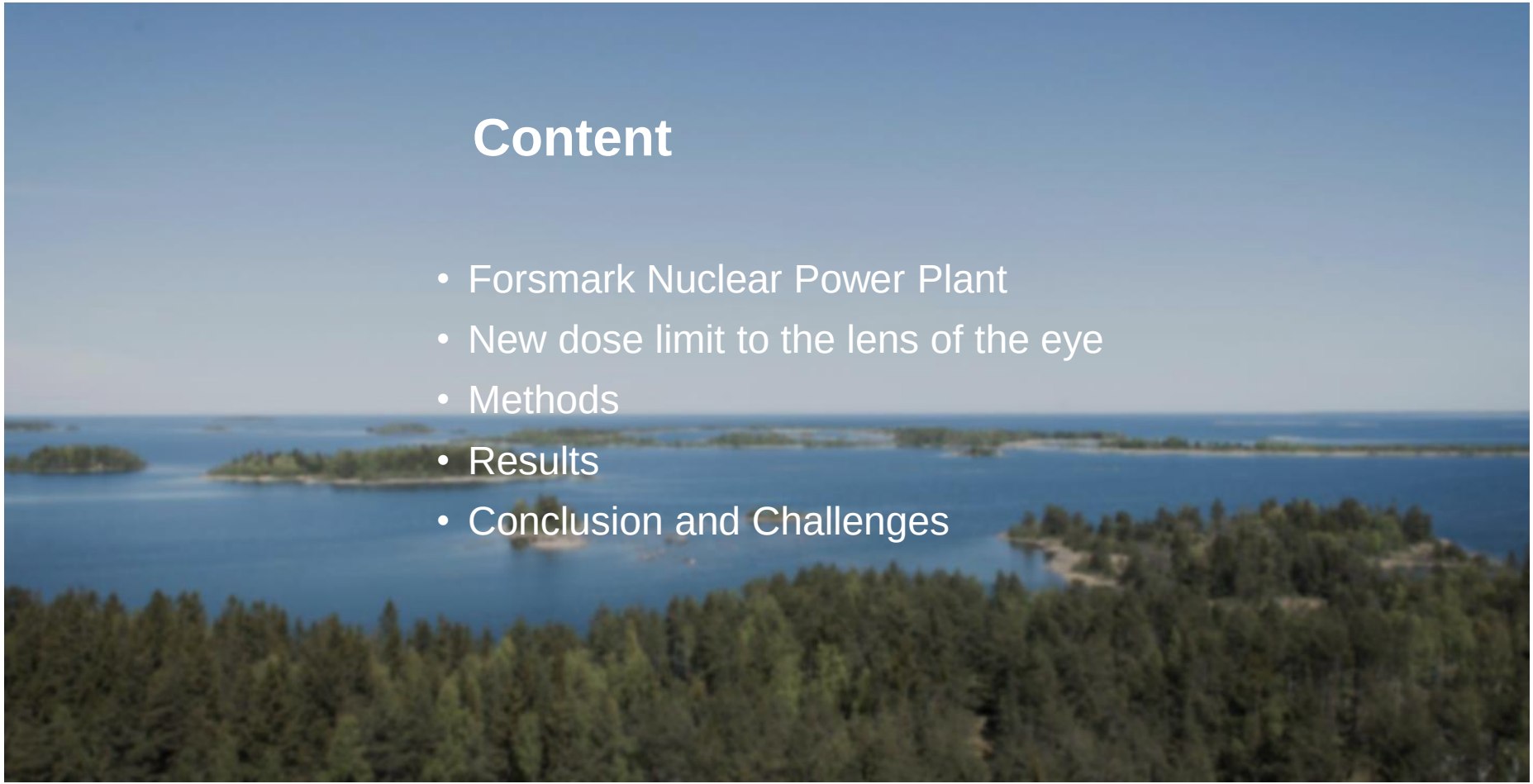


Practical Implications of the New Dose Limit to the Lens of the Eye at Forsmark Nuclear Power Plant

ISOE Virtual symposium, June 2021

Ann-Sofie Gustafsson, PhD

Manager of Dosimetry, Forsmark NPP



Content

- Forsmark Nuclear Power Plant
- New dose limit to the lens of the eye
- Methods
- Results
- Conclusion and Challenges

Forsmark NPP Sweden

VATTENFALL

Update of dose limit to lens of the eye

Occupational Dose Limits According to Radiation Protection Ordinance SFS 2018:506

Occupation	Period of time Quantity	Highest dose allowed Equivalent dose [mSv]
Worker	Year	
	Effective Dose	20
	Equivalent, lens of the eye	20
	Equivalent, skin	500
	Equivalent, extremities	500
Students and Apprentices 16-18 years of age	Year	
	Effective Dose	6
	Equivalent, lens of the eye	15
	Equivalent, skin	150
	Equivalent, extremities	150

ISO 15382:2015 recommends that monitoring should be undertaken if there is reasonable probability to receive a dose of 15 mSv in a single year, Or if there is reasonable probability to receive a dose of 6 mSv in consecutive Years.

Method of monitoring

Dosimeter:

- Public Health England Personal Dosimetry Service (PHE PDS)
- The headband dosimeter measures Hp(3)
- Period of measuring time is one month or during specific work tasks

Method of usage

- Situations where the eye is more exposed than the rest of the body due to shielding
- Situations where the eye is closer to the source of radiation than the rest of the body

Method of usage

Other specific work task were the individual dose is estimated to exceed 1 mSv

- Service of Control Rod Drive Mechanisms (CRDM)
- Specific decontamination work
- Reactor main circulation system
- Work on the reactor vessel head

Results

- measurements from 2019-2020

Results

2019

- **Total 259** measurements of equivalent dose to the lens of the eye
- **158** measurements ≥ **0.5** mSv
- **128** measurements, Hp(3) > Hp(10)

2020

- **Total 396** measurements of equivalent dose to the lens of the eye
- **251** measurements ≥ **0.5** mSv
- **193** measurements, Hp(3) > Hp(10)

Decontamination Station and

Worker	Result (mSv)	
	$H_p(3)$	TLD
A	9,1	9,2
B	10	10
C	9,2	9,1
D	8,8	8,8

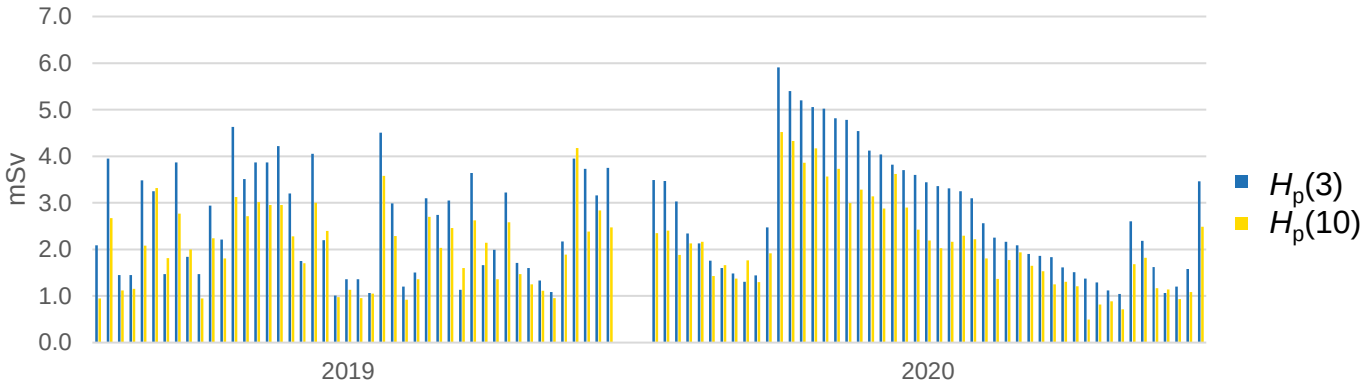
Active waste Station 2020

- Results of yearly dose, by monthly evaluation

Worker	Result (mSv)	
	$H_p(3)$	TLD
E	6,5	7,6
F	1,9	0,9
G	3,6	2,3
H	4,3	4,3
I	2,1	2
J	1,2	1,5

Result of Service of Control Rod Drive Mechanisms (CRDM) 2019-2020

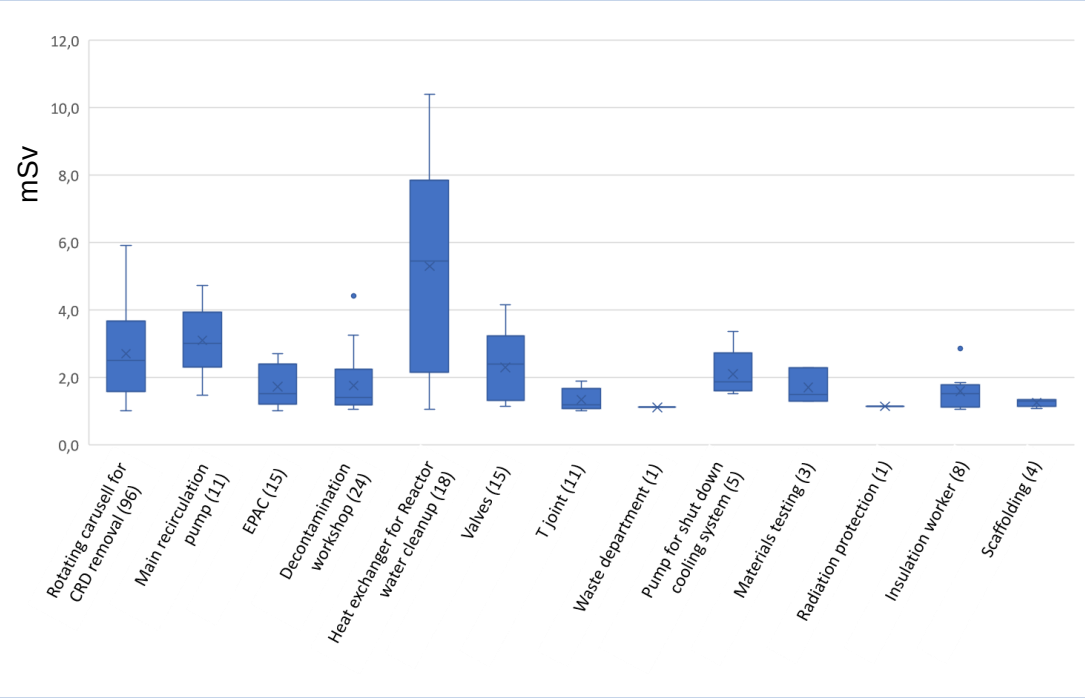
- Dosimeter pairs ($H_p(3)$ and $H_p(10)$) for personnel working on the rotating carusell for CRD removal



- Extremely individual
- Importance of rotation amongst workforce and work task

VATTENFALL

Outage work 2019-2020

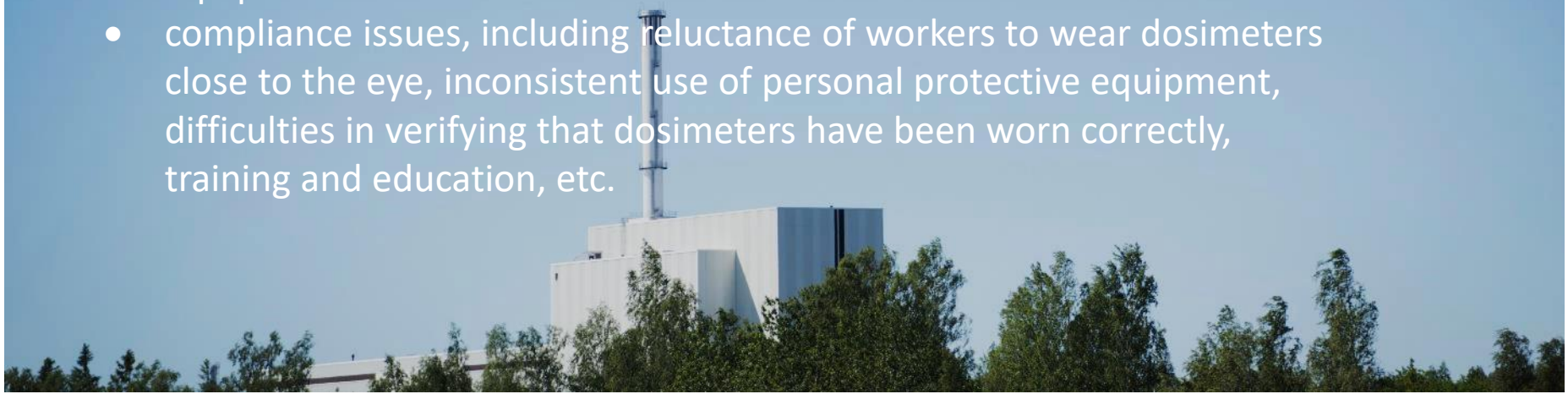


- Large dose heterogeneity
  - the spread can be large within the same work task
- Difficult to make dose calculations
  - difficult to plan workforce

Conclusion and Challenges

Conclusion and Challenges

- difficulties and concerns over accurate measurement
- ergonomic issues and concerns, leading to reluctance of personnel to wear eye lens dosimeters or protective glasses
- issues with dosimeter placement and use of personal protective equipment
- compliance issues, including reluctance of workers to wear dosimeters close to the eye, inconsistent use of personal protective equipment, difficulties in verifying that dosimeters have been worn correctly, training and education, etc.



Conclusion and Challenges

- large dose heterogeneity
  - the spread can be large within the same work task
- difficult to make dose calculations
  - difficult to plan workforce

Thank you for listening

Questions?

Email:
Ann-Sofie.Gustafsson@vattenfall.com