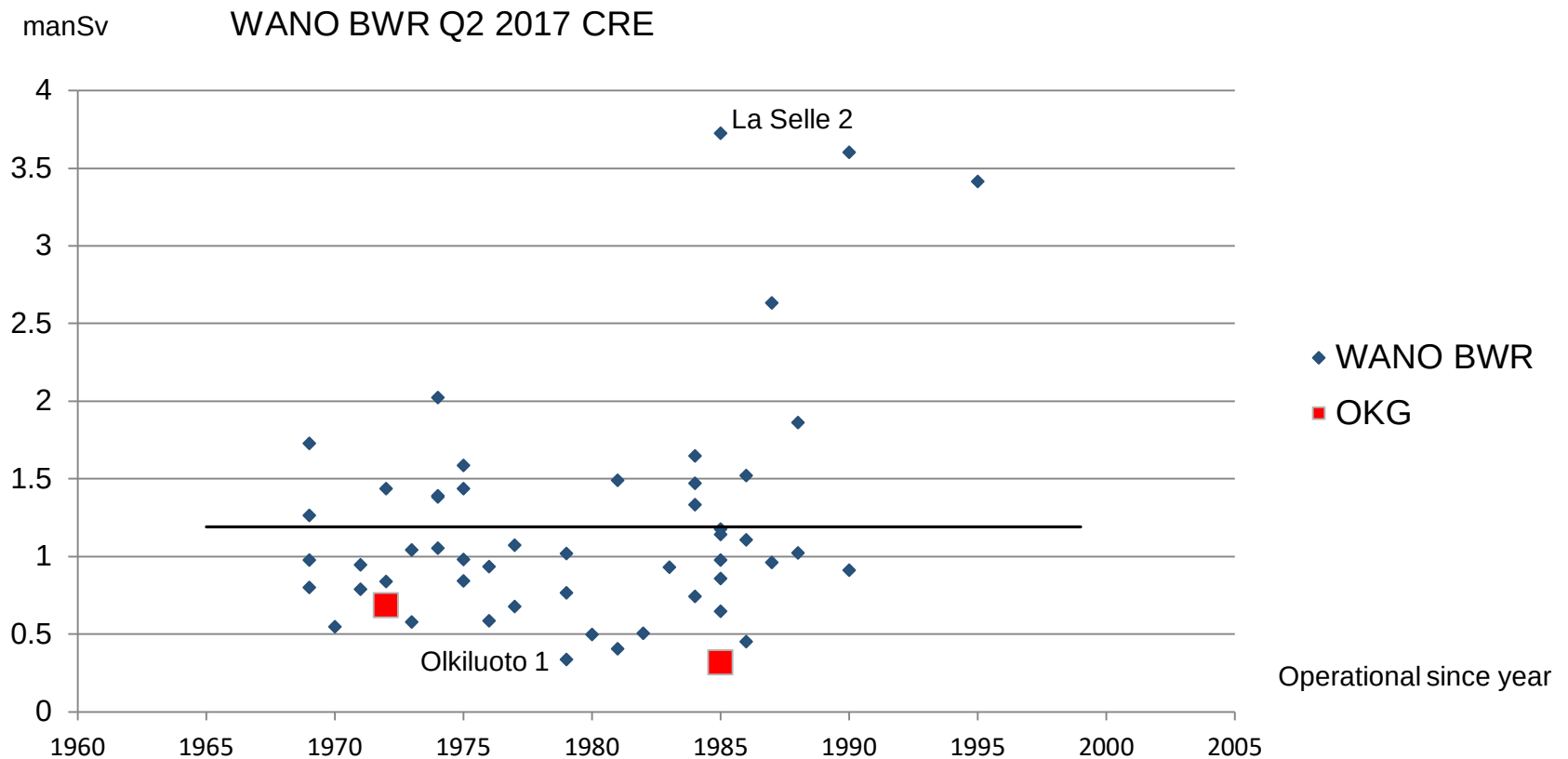




# Collective dose – O3





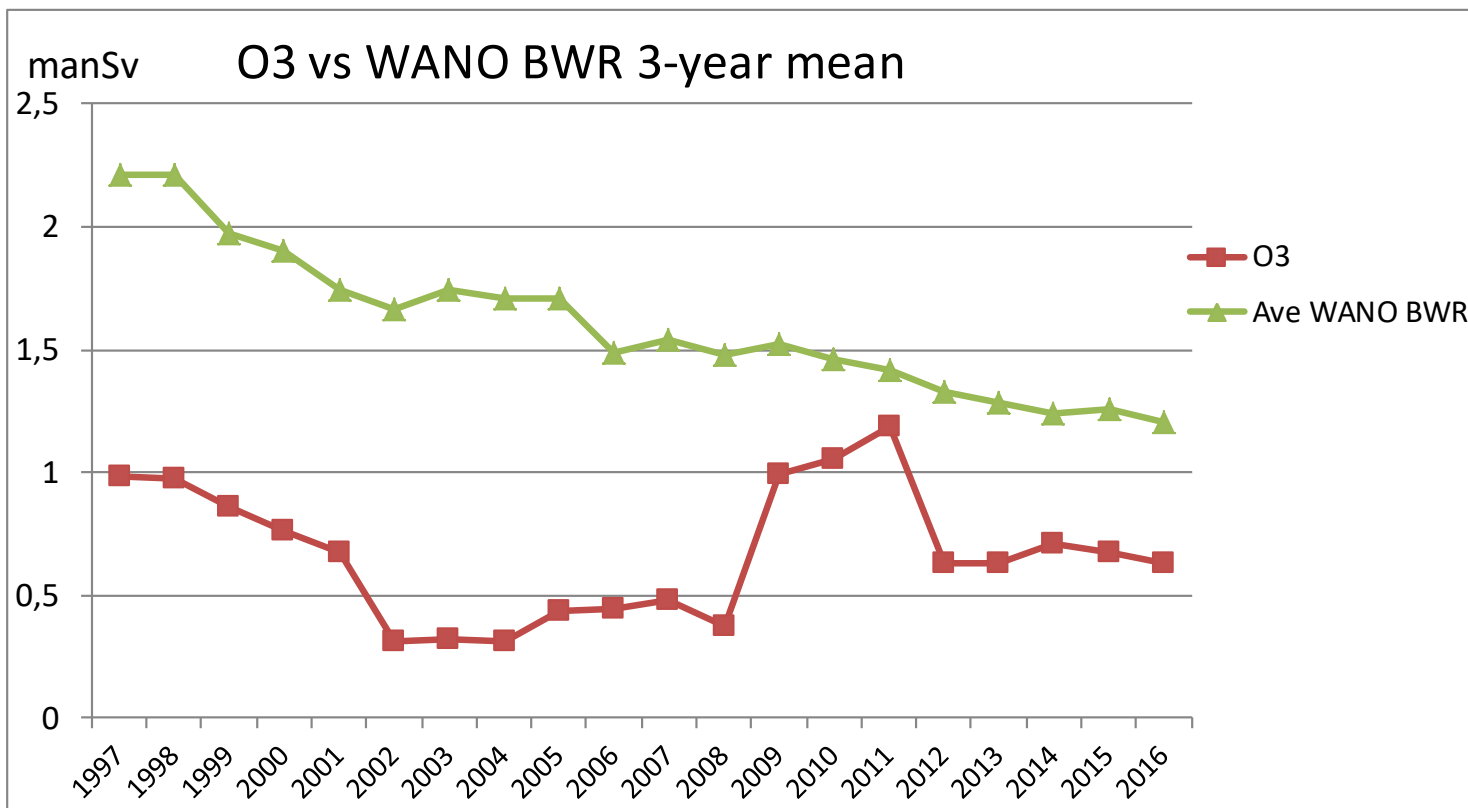


Strategic targets  
OKG NPP, Sweden

Catrin Koch  
Michael Pettersson

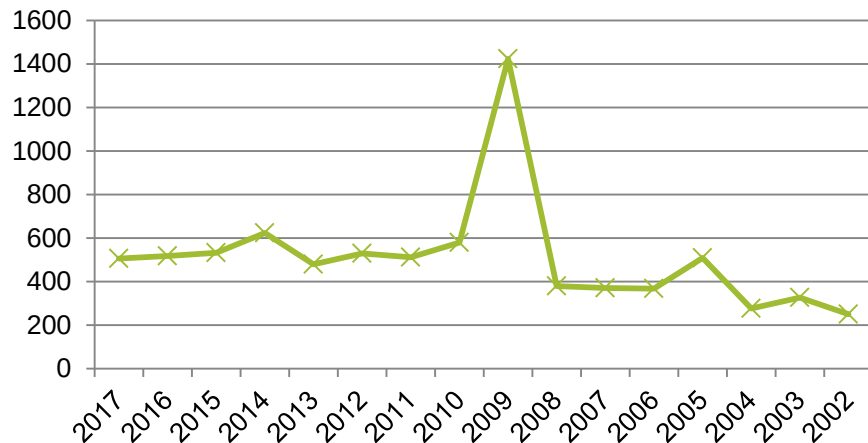
| <i>Year</i> | <i>Collective dose O3 [manSv]</i> | <i>Average BWR [manSv]</i> | <i>O3</i> | <i>Comments</i>                                  |
|-------------|-----------------------------------|----------------------------|-----------|--------------------------------------------------|
| 1997        | 0,98                              | 2,21                       | 17        | 1st place<: Onagawa 2 (0,43 manSv)               |
| 1998        | 0,97                              | 2,21                       | 13        | 1st place: Onagawa 2 (0,47 manSv)                |
| 1999        | 0,86                              | 1,97                       | 13        | 1st place: Onagawa 1 (0,51 manSv)                |
| 2000        | 0,76                              | 1,9                        | 14        | 1st place: Santa Maria De Garona 1 (0,48 manSv)  |
| 2001        | 0,67                              | 1,74                       | 7         | 1st place: F1 (0,32 manSv), O1 5th place         |
| 2002        | 0,31                              | 1,66                       | 1         | 2nd place: F1 (0,44 manSv)                       |
| 2003        | 0,32                              | 1,74                       | 1         | 2nd place: Olkiluoto 1 (0,48 manSv)              |
| 2004        | 0,31                              | 1,71                       | 1         | 2nd place: F3 (0,42 manSv)                       |
| 2005        | 0,43                              | 1,71                       | 1         | 2nd place: F3 (0,44 manSv)                       |
| 2006        | 0,44                              | 1,49                       | 1         | 2nd place: Onagawa 1(0,45 manSv)                 |
| 2007        | 0,48                              | 1,54                       | 1         | 2nd place: F3 (0,48 manSv)                       |
| 2008        | 0,37                              | 1,48                       | 1         | 2nd place: Olkiluoto 2 (0,47 manSv)              |
| 2009        | 0,99                              | 1,52                       | 16        | PULS, 1st place: Olkiluoto 1 (0,47 manSv)        |
| 2010        | 1,05                              | 1,46                       | 16        | PULS, 1st place: OL 2 (0,39 manSv); O2 5th place |
| 2011        | 1,19                              | 1,42                       | 23        | PULS, 1st place: OL 1 (0,44 manSv); O2 7th place |
| 2012        | 0,63                              | 1,33                       | 5         | 1st place: Olkiluoto 2 (0,37 manSv)              |
| 2013        | 0,63                              | 1,28                       | 8         | 1st place: Olkiluoto 1 (0,34 manSv)              |
| 2014        | 0,71                              | 1,24                       | 12        | 1st place: Olkiluoto 2 (0,27 manSv)              |
| 2015        | 0,67                              | 1,26                       | 12        | 1st place: Olkiluoto 1 (0,29 manSv)              |
| 2016        | 0,63                              | 1,20                       | 12        | 1st place: Olkiluoto 2 (0,33 manSv)              |
| 2017        | 0,48                              | 1,22                       | 3         | 1st place: Olkiluoto 1 (0,39 manSv)              |

# Collective dose – O3

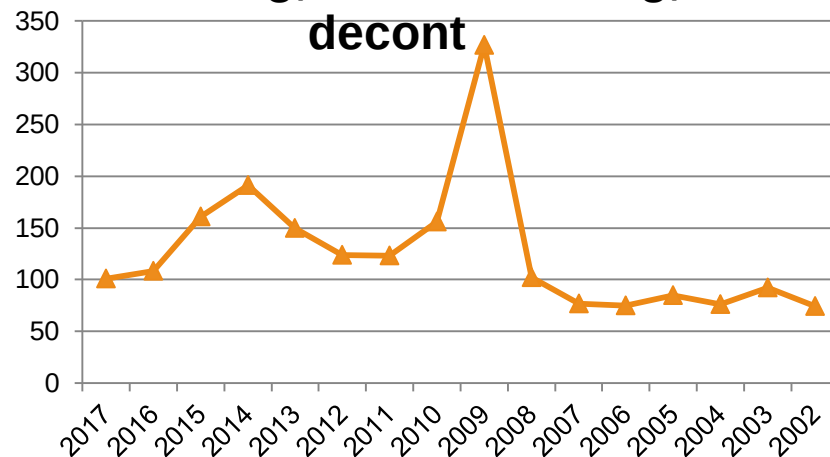


# # personer – O3 2017

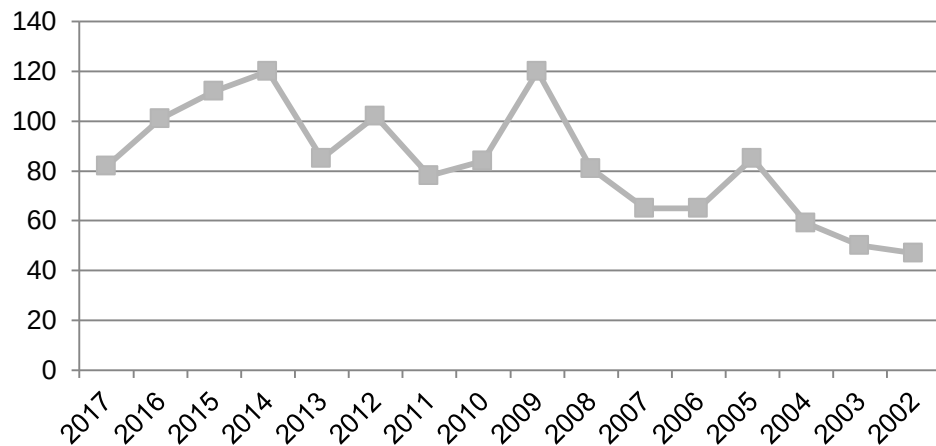
## Mechanical



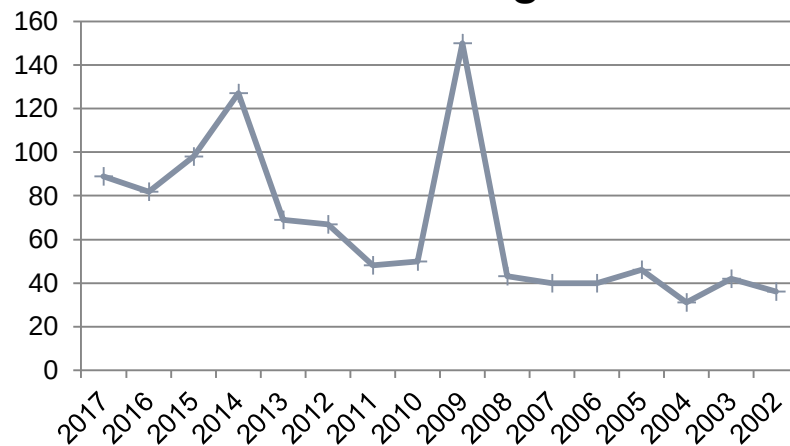
## Cleaning, waste handling, decont



## Health Physicis

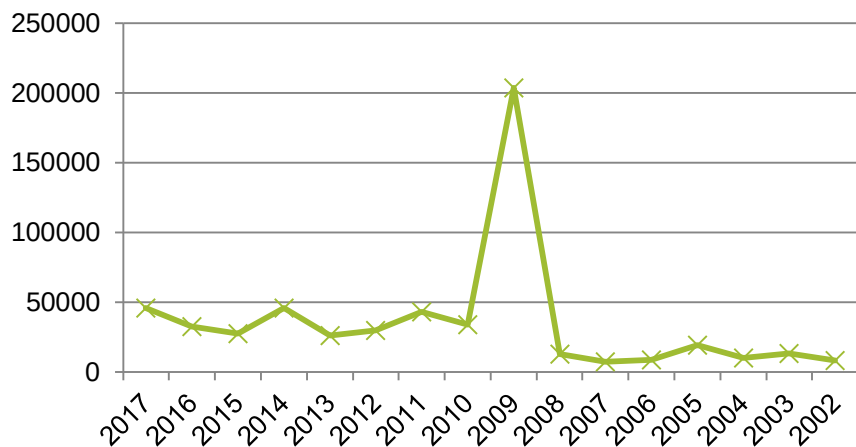


## Scaffolding

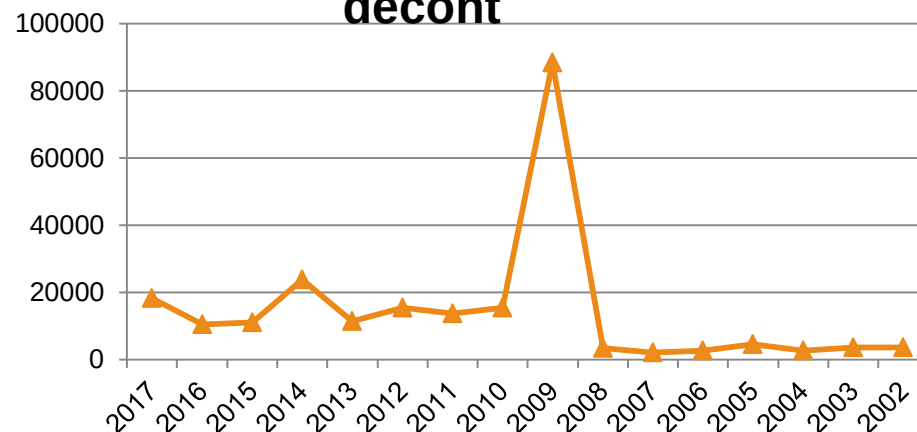


# Manhours – O3 2017

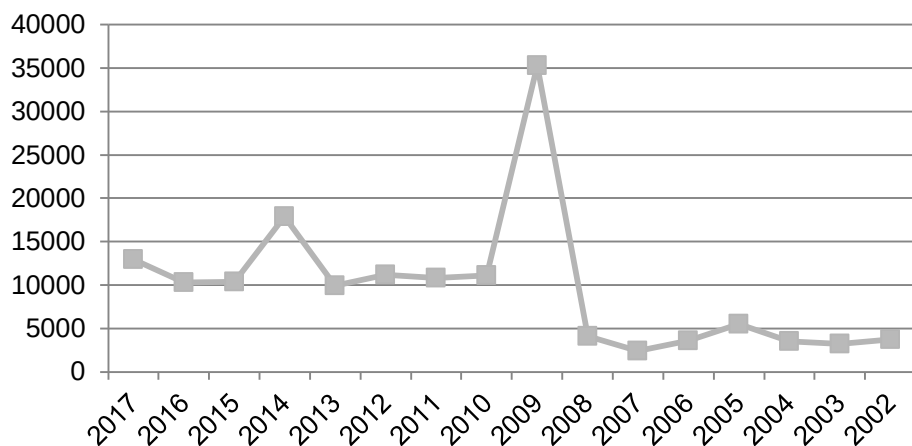
## Mechanical



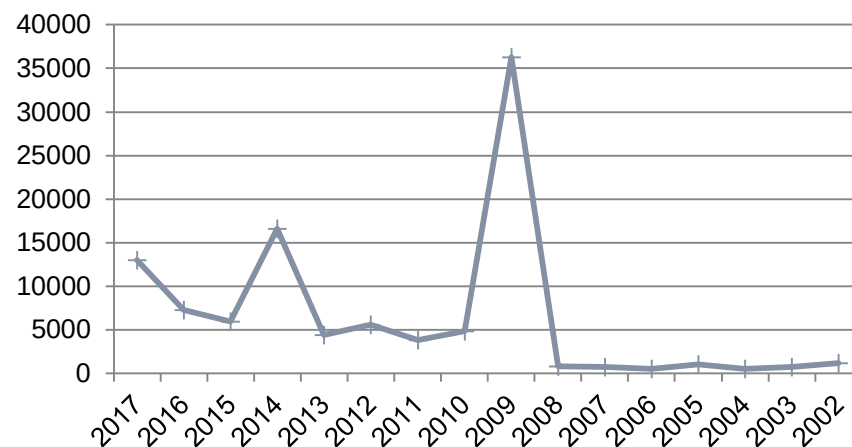
## Cleaning, waste handling, decont



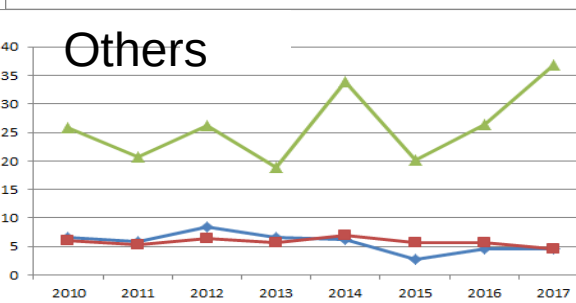
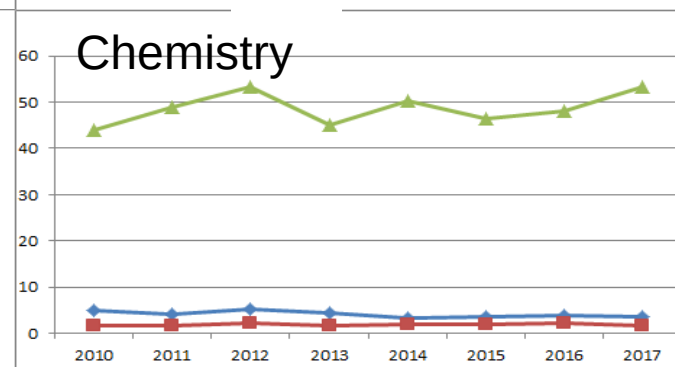
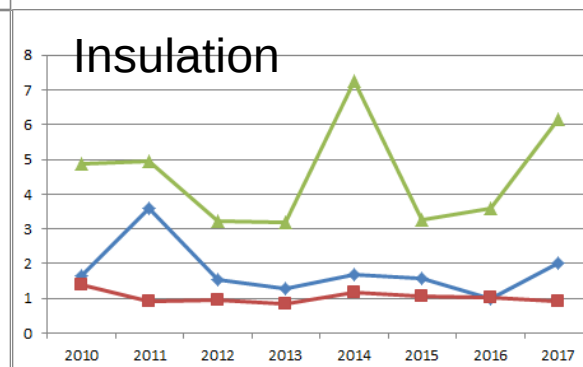
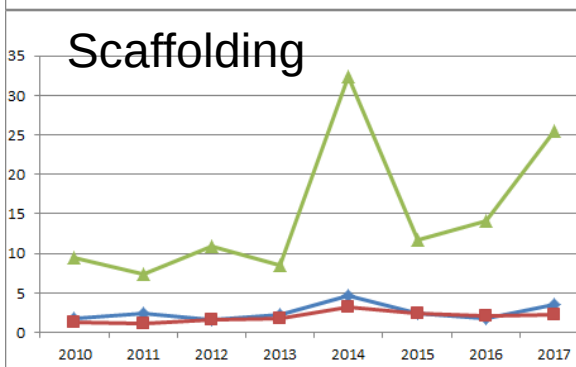
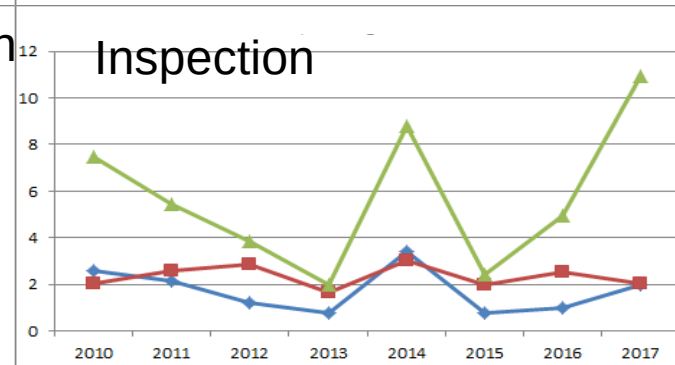
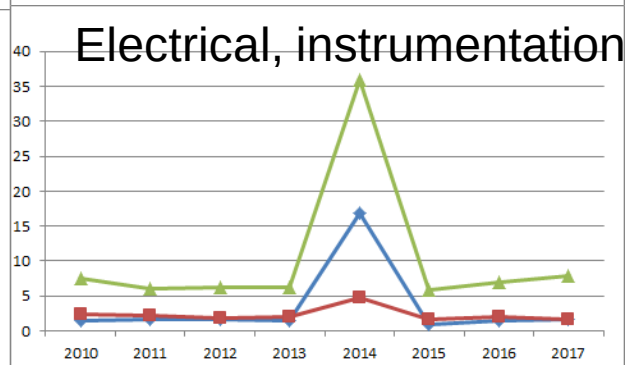
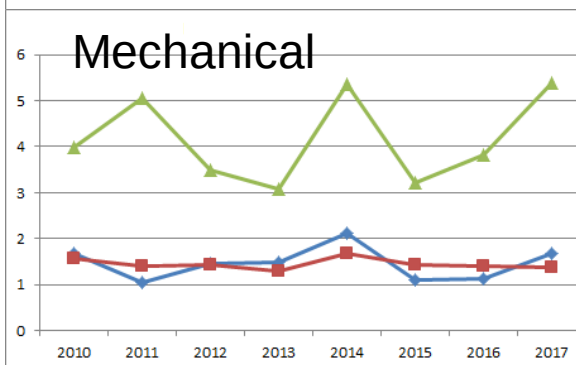
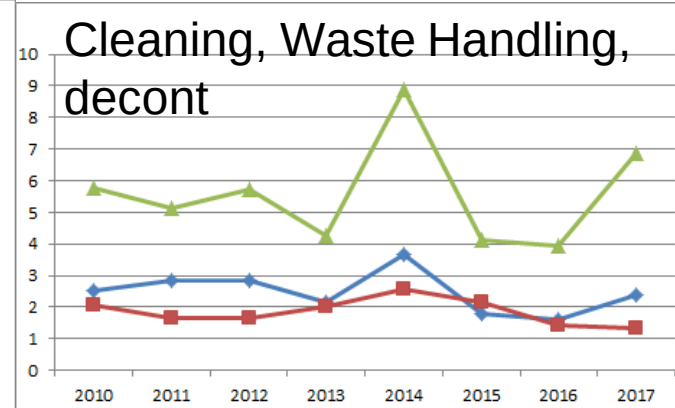
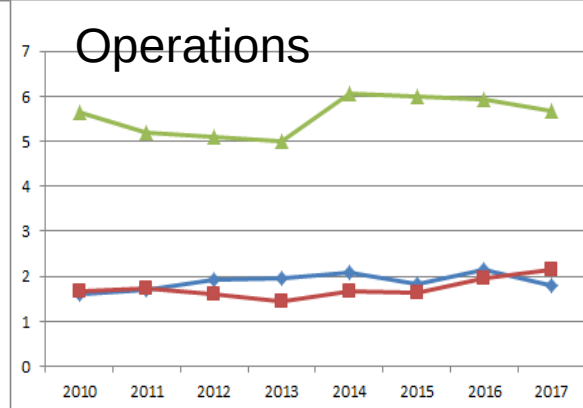
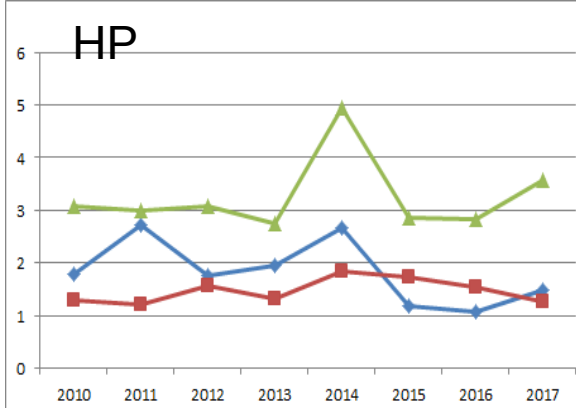
## Health Physics



## Scaffolding







Blue – collective dose  
Red – # persons  
Green – # manhours



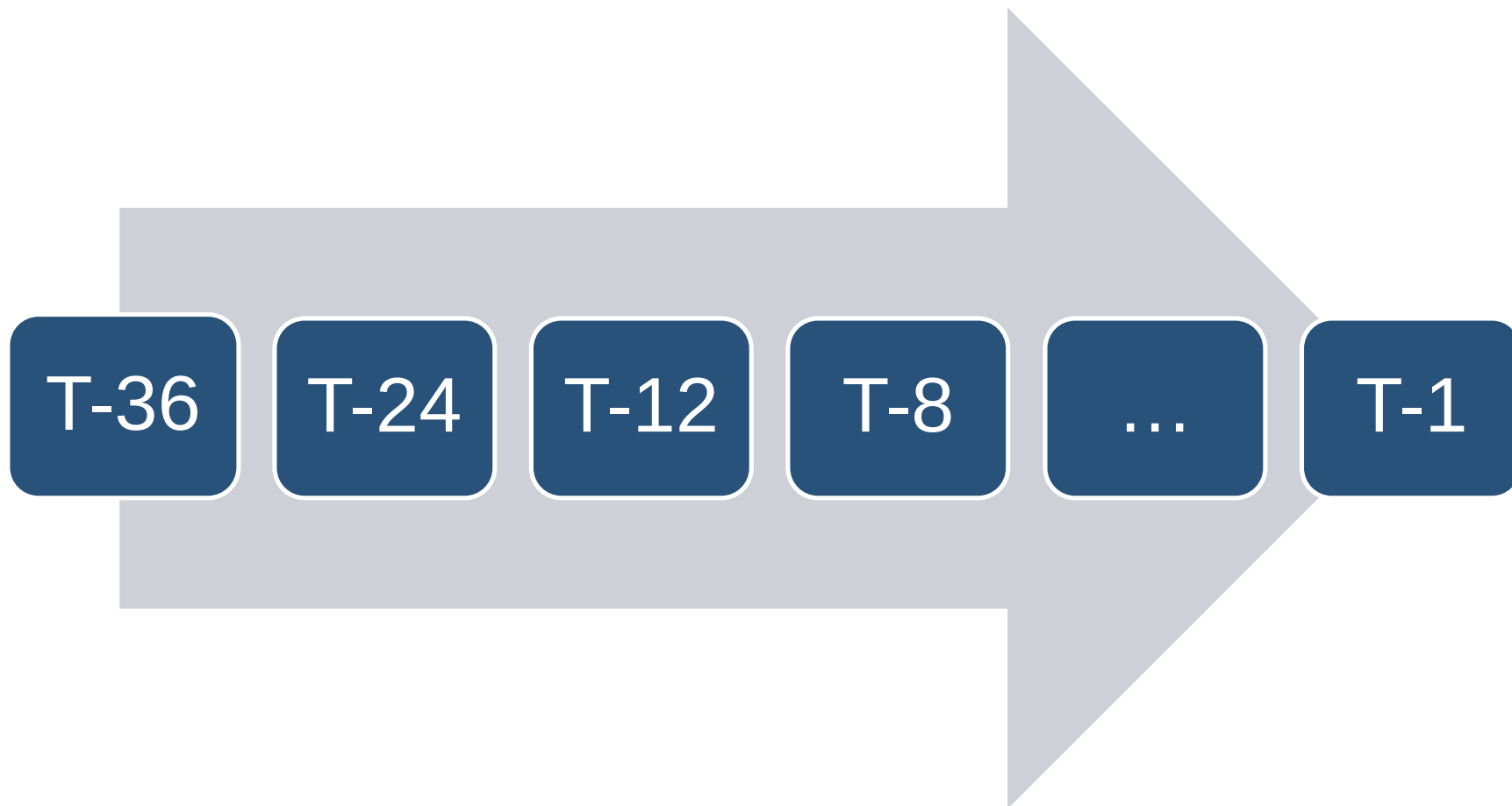
# Dose intervals – O3

| Dose interval [mSv] | Plant personnel | Outside personnel | Total       | Total (all) |
|---------------------|-----------------|-------------------|-------------|-------------|
| < 0,0001            | 43              | 129               |             | 172 (10,1%) |
| 0,0001 - 0,1        | 282             | 488               | 770 (50,5%) | 770 (45,4%) |
| 0,1 – 0,5           | 73              | 286               | 359 (23,6%) | 359 (21,2%) |
| 0,5 – 1             | 37              | 127               | 164 (10,8%) | 164 (9,7%)  |
| 1 - 2               | 29              | 119               | 148 (9,7%)  | 148 (8,7%)  |
| 2 - 3               | 6               | 49                | 55 (3,6%)   | 55 (3,2%)   |
| 3 - 4               | 5               | 13                | 18 (1,2%)   | 18 (1,1%)   |
| 4 - 5               | 0               | 8                 | 8 (0,52%)   | 8 (0,47%)   |
| 5 - 6               | 0               | 1                 | 1 (0,066%)  | 1 (0,059%)  |
| 6 - 7               | 0               | 0                 | 0           | 0           |
| 7 - 8               | 0               | 1                 | 1 (0,066%)  | 1 (0,059%)  |
| > 8                 | 0               | 0                 | 0           | 0           |
|                     |                 | <b>Total</b>      | <b>1524</b> | <b>1696</b> |
| >4                  |                 |                   | 10 (0,66%)  | 10 (0,59%)  |
| >3                  |                 |                   | 28 (1,8%)   | 28 (1,6%)   |

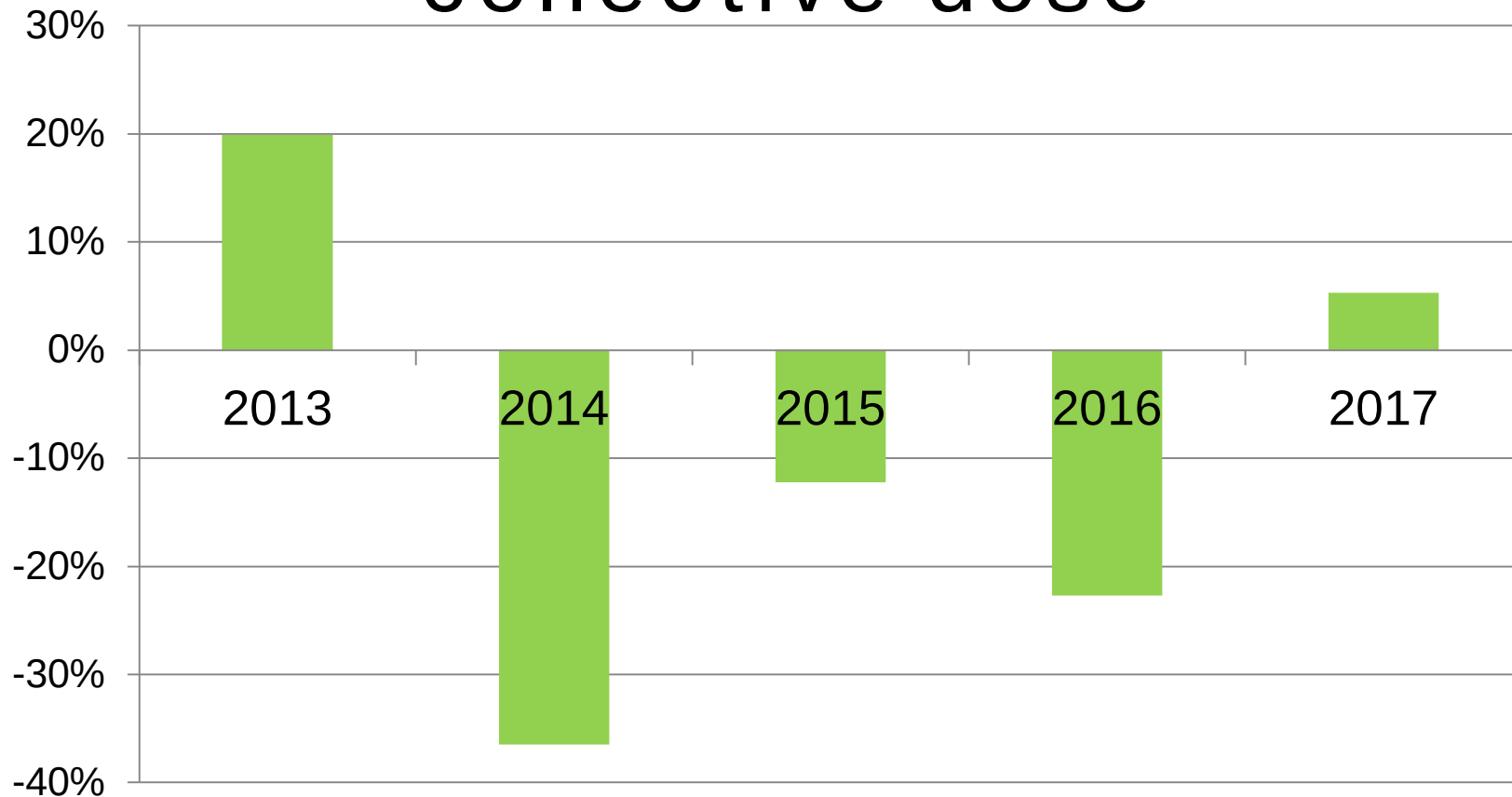
# Dose intervals – OKG

| Dose interval [mSv] | Plant personnel | Entreprenörer | Total        | Total (all)  |
|---------------------|-----------------|---------------|--------------|--------------|
| < 0,0001            | 44              | 120           |              | 164 (7,6%)   |
| 0,0001 - 0,1        | 455             | 634           | 1089 (54,7%) | 1089 (50,5%) |
| 0,1 – 0,5           | 134             | 301           | 435 (21,8%)  | 435 (20,2%)  |
| 0,5 – 1             | 65              | 135           | 200(10,0%)   | 200 (9,3%)   |
| 1 - 2               | 33              | 139           | 172 (8,6%)   | 172 (8,0%)   |
| 2 - 3               | 4               | 54            | 58 (2,9%)    | 58 (2,7%)    |
| 3 - 4               | 4               | 11            | 15 (0,75%)   | 15 (0,70%)   |
| 4 - 5               | 4               | 10            | 14 (0,70%)   | 14 (0,65%)   |
| 5 - 6               | 2               | 4             | 6 (0,30%)    | 6 (0,28%)    |
| 6 - 7               | 0               | 0             | 0            | 0            |
| 7 - 8               | 0               | 1             | 1 (0,050%)   | 1 (0,046%)   |
| 8 - 9               | 0               | 2             | 2 (0,10%)    | 2 (0,093%)   |
| > 9                 | 0               | 0             | 0            | 0            |
|                     |                 | <b>Total</b>  | <b>1992</b>  | <b>2156</b>  |
| >4                  |                 |               | 23 (1,2%)    | 23 (1,1%)    |
| >3                  |                 |               | 38 (1,9%)    | 38 (1,8%)    |

# Dose budget



# Dose budget vs actual collective dose





# Measures to optimise individual and collective doses

- **Right person at the right place**
  - **Optimise # persons for a specific job**
  - **Right equipment for a specific job**
  - **Right education for a specific job**
  - **Right instructions, work permits**
  - **Mock up training**
-

# Radiological Protection Working Group's Mission

- Share best practice & pool industry knowledge, ideas and concerns.
- Provide means by which industry can systematically oversee international developments in RP research, standards and regulations.
- Estimate the impact that any potential or new standards might/will have on nuclear fuel cycle.
- Engage with international organisations to ensure that due consideration is given to proportionality and implementability of any changes in the RP system.



# Major Topics for Consideration

- **Optimisation / ALARA**
- **Research on low dose radiation.**
- **Emergency preparedness and response.**
- **Environmental protection.**
- **Radon.**
- **RP culture and ethics.**
- **Communications and stakeholder engagement.**