

Utilization of Operating Experience

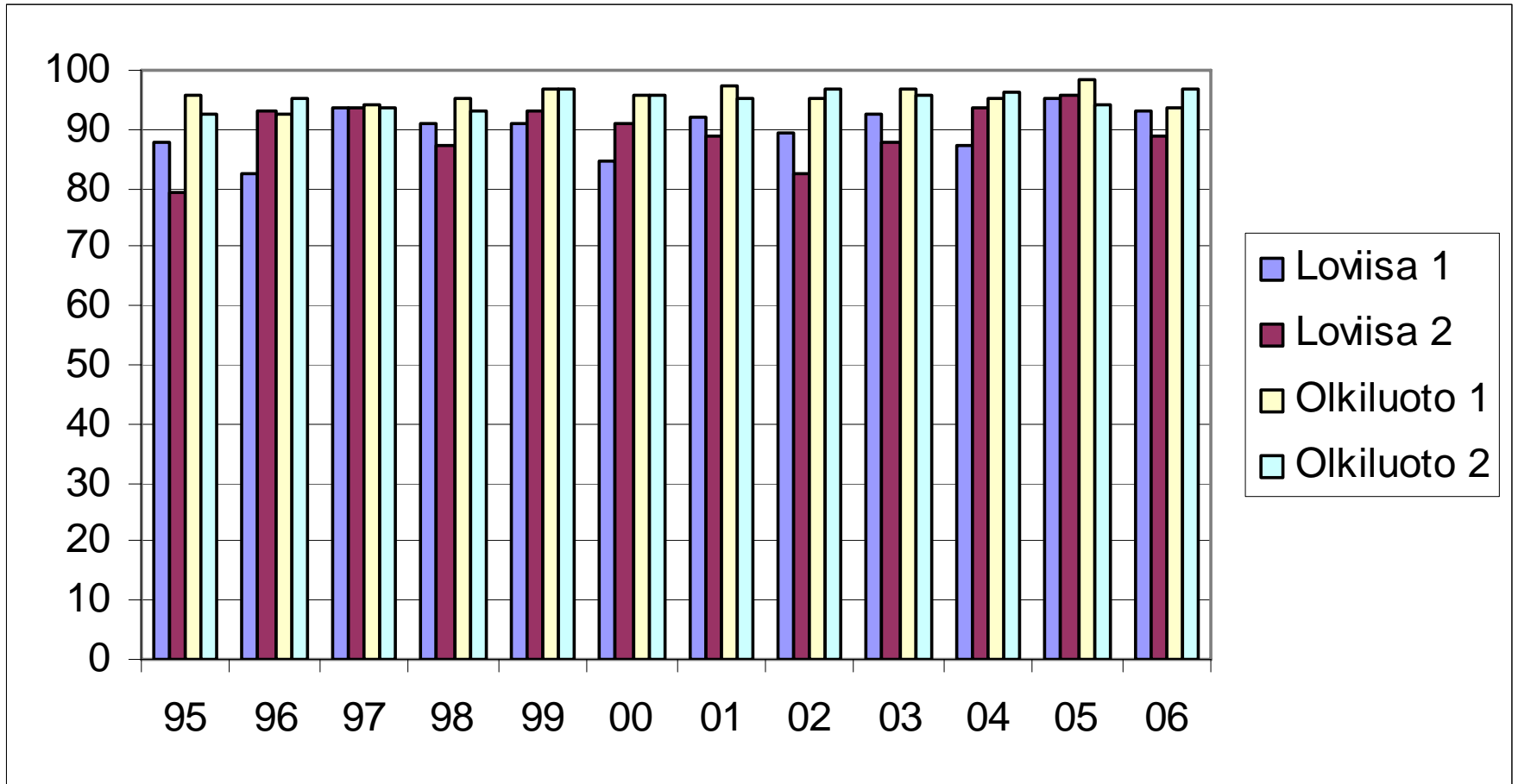
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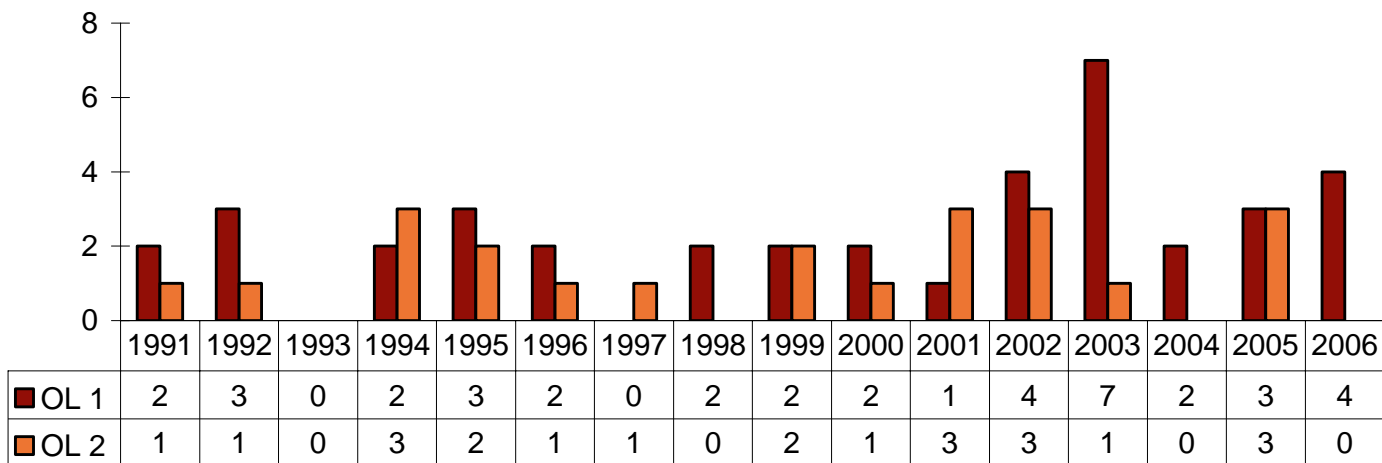
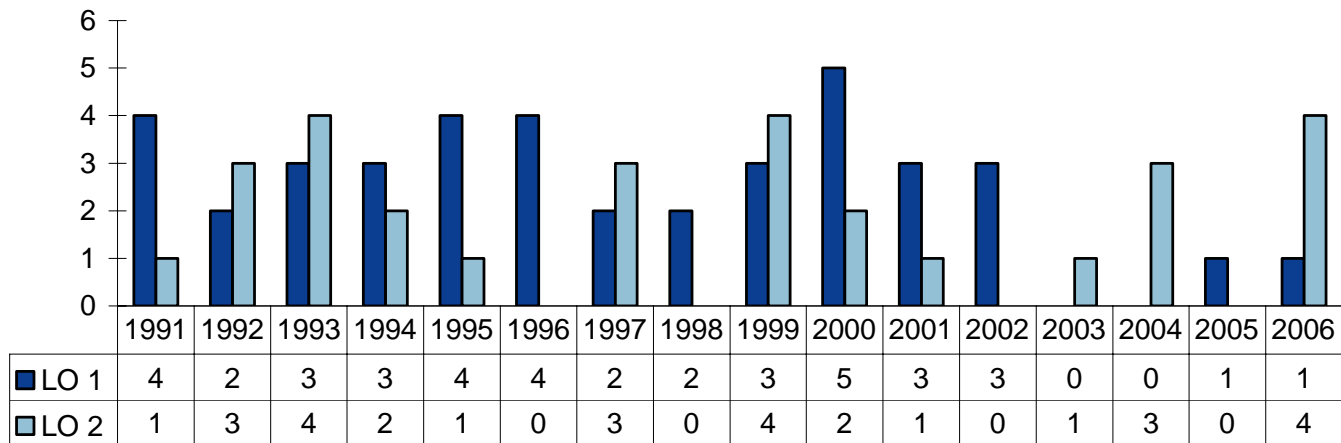
Outline

- Performance indicators
- Operating experience feedback
 - Some examples related to external events
 - Radiation protection of workers
 - Event investigations in Finland
- New construction and experience feedback
- Conclusions

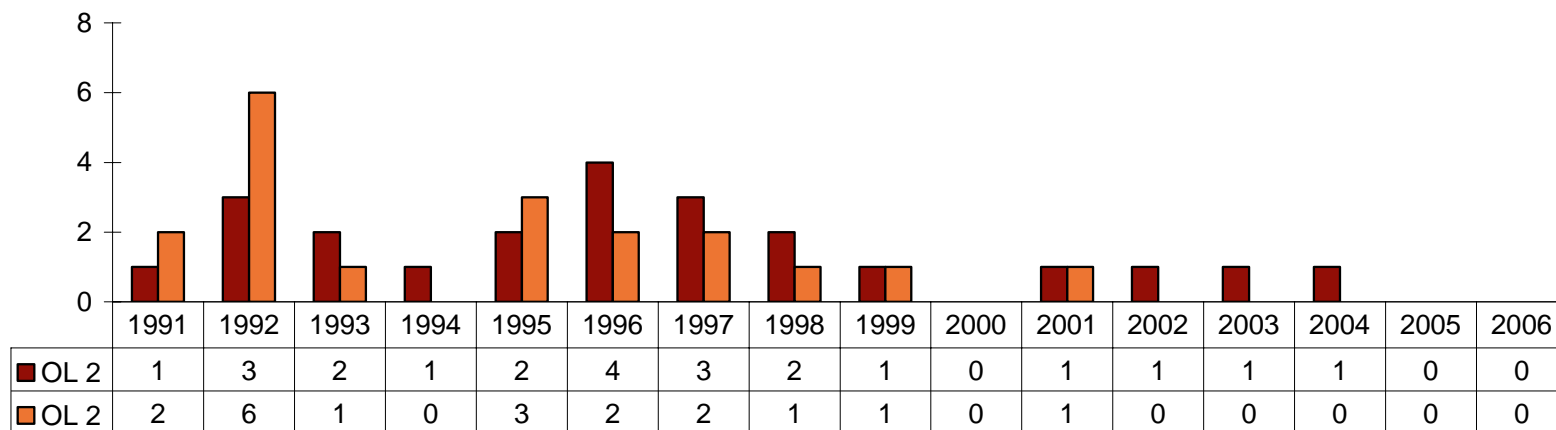
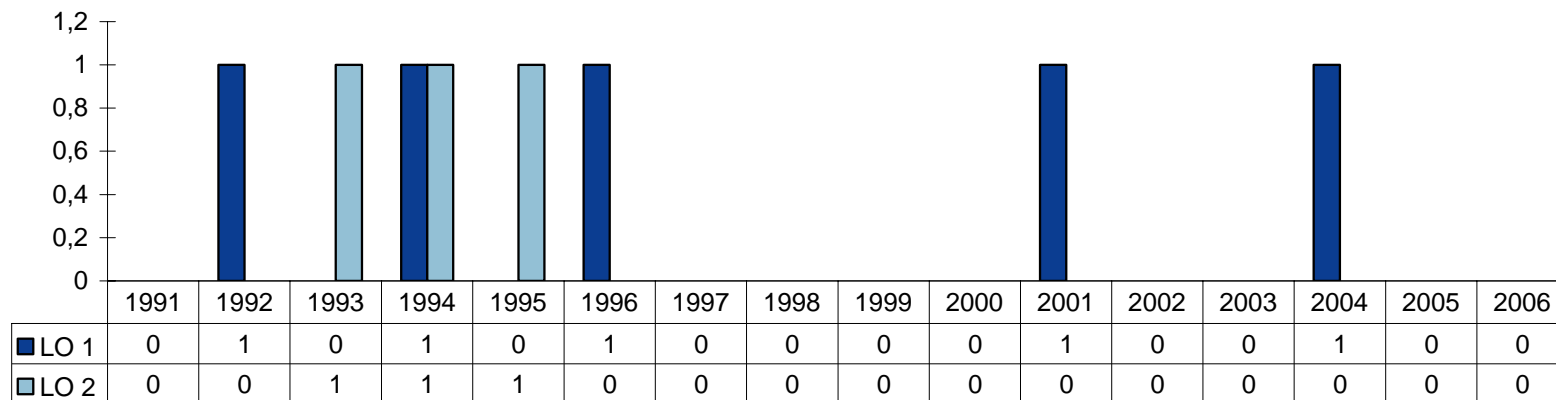
Load factors



Number of significant events (special reports)



Number of scrams



Operating experience related to external events at Loviisa NPP

- Oil shipments have increased in the vicinity of Loviisa plant
 - alternate cooling water intake from the outlet has been established (extra pumps physically separated from RHR chain systems)
 - improved stop logs to prevent oil intruding into the sea water channel
 - responsibilities for notifications in accident cases has been clarified
- High sea water level at Loviisa plant in January 2005
 - improved procedures for plant shut down in case of high water level
 - reliability of plant drainage systems has been evaluated
 - forecasting sea water level behavior and early notification of licensees
- Continuously higher sea water temperatures
 - need for continuous measurement and analysis of the residual heat removal chain capacity
- Risk of sea weed causing a loss on ultimate heat sink due to a blockage of chain basket filters
 - an automatic power and flow reduction system has been installed to reduce the risk of filter breaks due to high pressure difference over filters

Operating experience - Loviisa

- Blockage of diesel generator air in-take by snow or freezing rain during a storm
 - dampers opening automatically on pressure difference were installed to enable supply of combustion air directly from DG rooms
- Exceeding design basis temperatures in the steam generator compartment
 - power cables were replaced and cable routing was changed
 - extensive analyses of the hot spots - improved insulation
 - changes in the ventilation systems to decrease temperatures

Operating experience related to external events at Olkiluoto NPP

- Continuously higher sea water temperatures
 - capacity of the essential service water pumps has been increased and piping systems have been modified (design basis temperature of EDG cooling increased from 25 to 30 C)
 - need for continuous measurement and analysis of residual heat removal capacity
- Degradation of sea water channels and structures due to corrosion
 - repairs in the sea water channels and pump holes (both concrete)
 - installation of cathode protection and monitoring system
- Measures to prevent loss of ultimate heat sink
 - a system circulating warm water to the intake of sea water channel has been installed to prevent the crystal ice formation and blocking of the coarse bar screen
 - debris filters have been installed in service water system to prevent marine life entering the system
- Snow storm blocked the air intake filter of air suction channel to the diesel generators
 - dampers opening automatically on pressure difference were installed to enable air intake directly from DG rooms

Radiation protection of workers - Loviisa

- Measures to decrease radiation levels
 - decontamination of the primary system at Loviisa 2
 - optimized water chemistry to eliminate (dissolution of) corrosion products and their deposition
- Improved tools to enable remote or protected working
 - new equipment for cleaning of the reactor pit
 - new radiation protection measures for vessel head inspections
 - movable cleaning equipment for pool water
- Administrative improvements
 - primary loops filled with water when working close by
 - possible change of outage order between units
 - improved training of workers

Radiation protection of workers - Olkiluoto

- Material issues
 - replacement of original components in the primary circuit with stellite free materials
 - change of material used in the fuel (spacers) to decrease amount of Cobalt-58 in the primary system
 - optimized water chemistry to eliminate (dissolution of) corrosion products and their deposition
- Modifications
 - lower steam moisture - new steam separator and dryer
 - new equipment for decontamination
- Administrative improvements
 - improved working methods for ASME and fuel inspections
 - improved training of workers

Event investigations in Finland

- 1/00 Non-compliances with Technical specifications and human-based common cause failures in the Finnish nuclear power plants
- 2/00 Delays and deficiencies in implementation of a risk reducing modification at Loviisa nuclear power plant
- 1/02 Degradation of low pressure turbine valves at Olkiluoto 2 and a temporary turbine protection system modification
- 2/02 Non-compliances in approval procedures of non-destructive testing companies and testers at Loviisa nuclear power plant
- 1/06 Management of safety requirements in subcontracting during the Olkiluoto 3 NPP construction phase

New construction and experience feedback

- Consideration of operating experience feedback in the design of new plants
 - Regulators: update of safety requirements, use of IRS, GSI databases
 - Plant vendors and operators
 - access to operating experience feedback information?
 - sharing information limited by competition?
 - role of WANO, other arrangements
- Collecting and sharing of construction experience
 - Experience related to design, civil works, manufacturing, installation, commissioning...
 - Special areas: project management issues, QA issues...
 - Applicability of e.g. IRS system? Other means for sharing information?
 - Great importance
 - sharing information and experience - similarities between “Concrete investigation” (Olkiluoto 3 in 2006) and NUREG 1055
 - creating database for the operating period of the plant

Conclusions

- Generally good performance and small number of significant operating events at Finnish NPPs
- Other operating experience
 - Changes in the environmental conditions (weather, sea water temperature, infrastructure) have caused re-analysis and plant modifications
 - Special attention has been paid to radiation protection of workers at both plants - still room for improvement
 - “Organizational events” are fruitful source to improve safety at NPPs
- Sharing experience related to new construction needs some consideration