# Personnel support integrated application programs as a way to better erosion-corrosion resistance of NPP equipment and piping.

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# A need in personnel support application programs development

One of the main requirements for NPP nuclear and environmental safety is to ensure the boundary integrity of operating media circulation loops. Assuring erosion-corrosion resistance of NPP condensate feed and wet steam lines and equipment holds a prominent place within this mission execution.

In order to solve metal erosion-corrosion problems at its national nuclear power units Russia has adopted **a** Comprehensive Program of failure preventive measures and operational improvements in erosion-corrosion resistance of NPP piping and equipment (№ AES PRG-550K07)

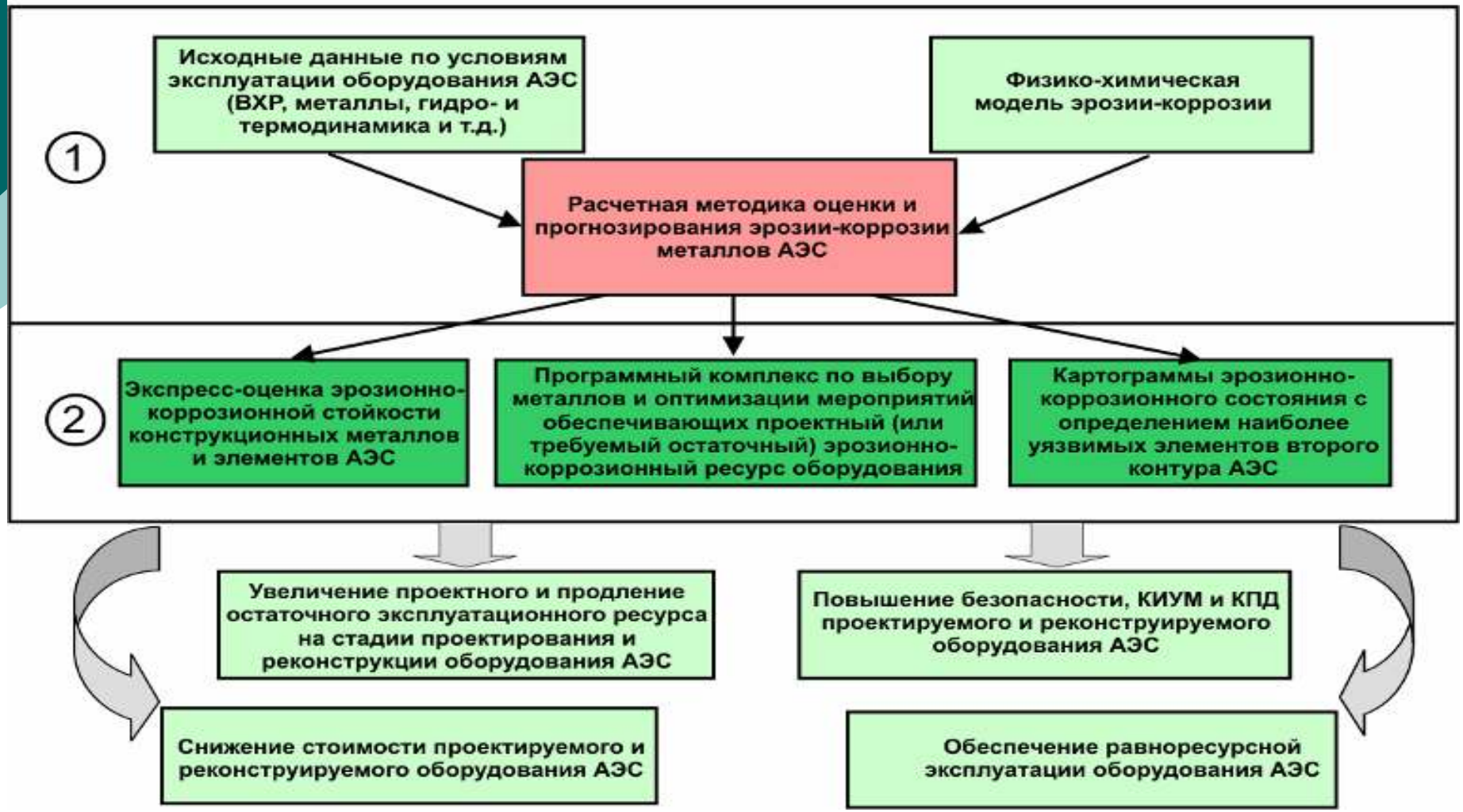
As a final point the Program should yield a number of integrated personnel support computer applications for different reactor types.

# Main objectives

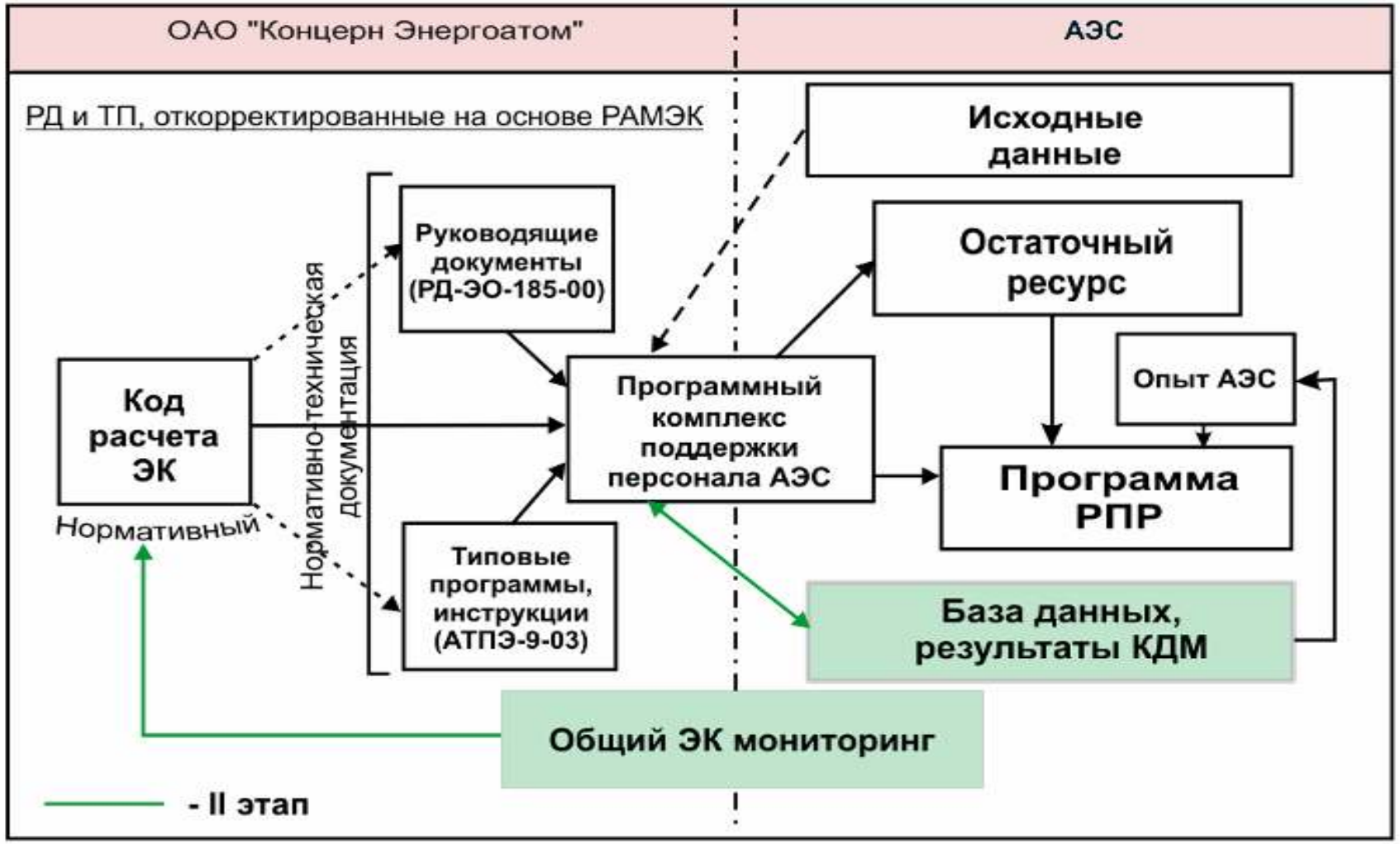
**Main objectives of personnel support integrated application programs:**

- **proper collecting, processing and archiving primary data and the results of field inspections of metal wall thickness in condensate feed and wet steam lines;**
- **targeted chemistry analysis of metal piping components as one of the major factors affecting the rate of erosion-corrosion wear;**
- **prescheduling of timely replacement of piping components and equipment damaged by erosion-corrosion during operation;**
- **better efficiency of measures aimed at service life prolongation or upgrading the NPP piping and equipment exposed to erosion-corrosion wear;**
- **precluding occurrence possibilities for abnormalities, emergencies and injuries caused by an uncontrolled break of piping components and equipment due to erosion–corrosion thinning.**

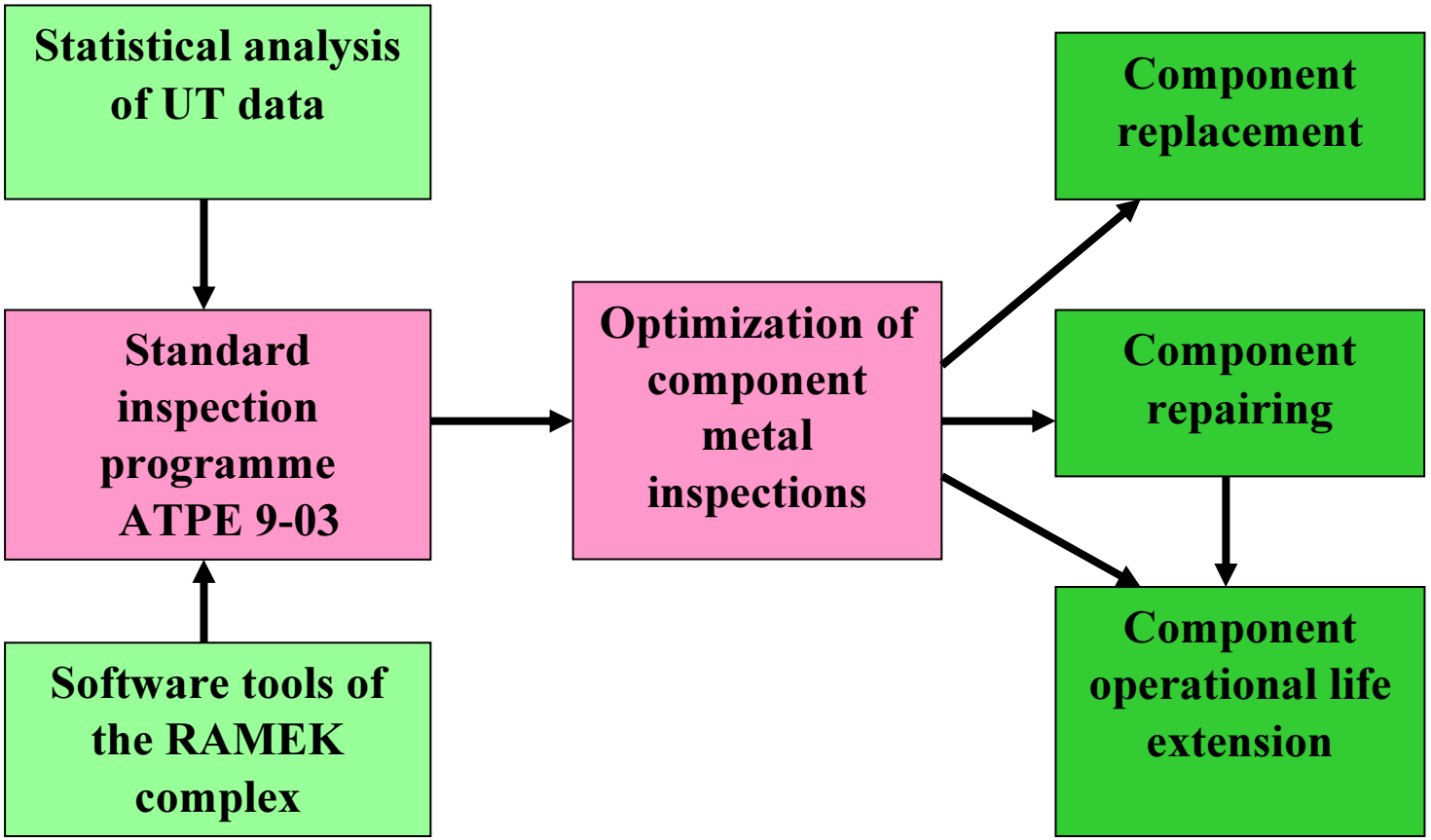
# Better erosion-corrosion resistance of NPP equipment through an integrated computer application use



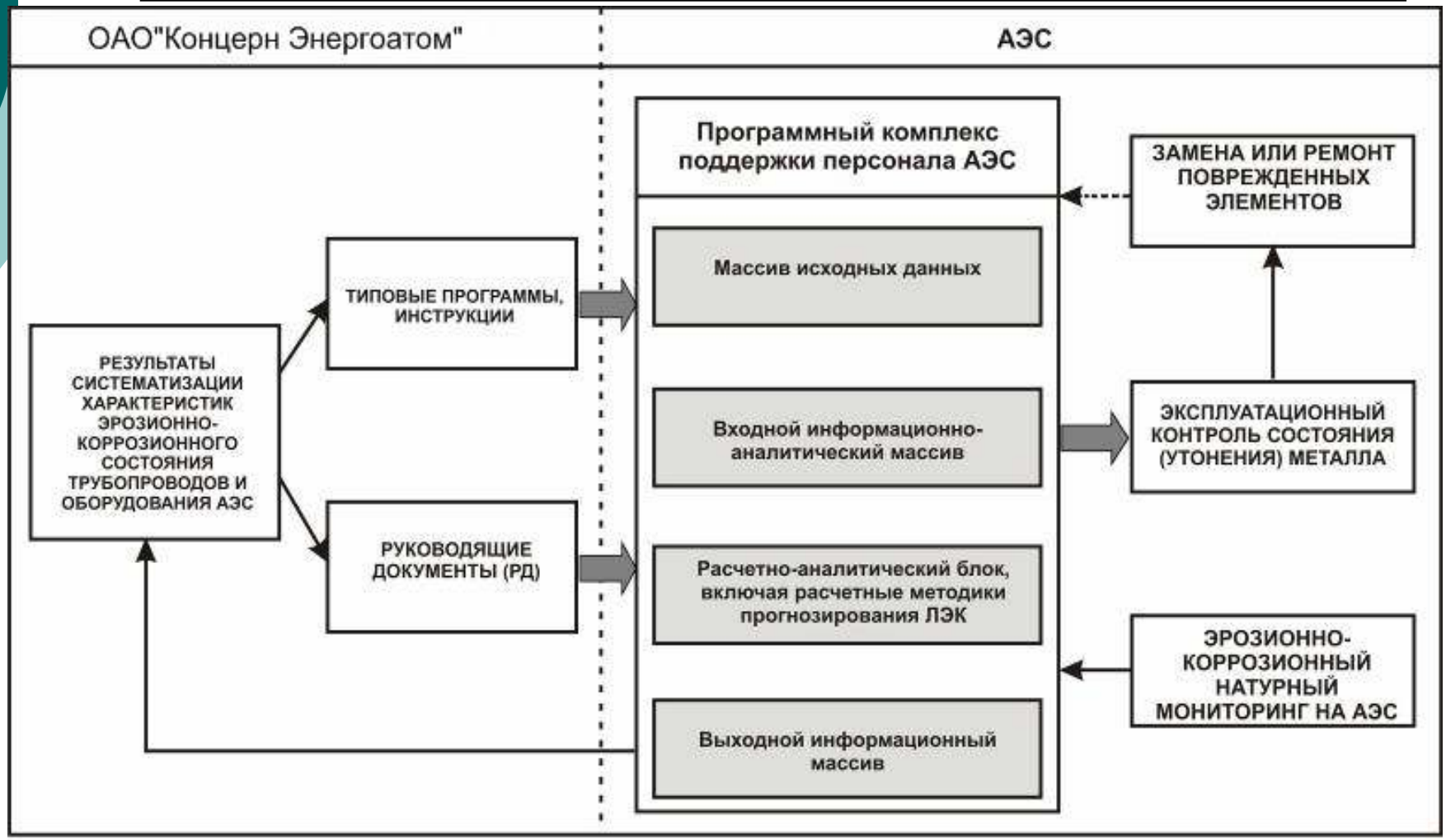
# Organization of residual life assessment and preventive maintenance activities on secondary circuit pipelines at VVER-1000 power units



# Organization of field inspections of parent metal condition in the secondary circuit equipment and piping at VVER power units.



# Basic principles of metal condition (thinning) monitoring at nuclear power plants with personnel support application program



# Basic structure of the NPP personnel support application program for a more efficient metal condition monitoring and maintenance of erosion-corrosion affected components

# Structural composition of the program output data

# Targeted approach

- **Conceptually the program is based on the principle " from the power unit as a whole to individual components" which permits to eliminate "losses" and consequently the cases of uncontrolled failure of equipment and piping components due to erosion-corrosion influence thus increasing the efficiency of field inspections**
- **The main point is to develop a branch information analytic database system in the format of 3D-models representing the layout and geometry of the media channels in the pipelines and main equipment of the power unit in total and its individual production process equipment groups; identification cards and hydrodynamic models; as well as the criterial parameter databases, data on residual life and recommendations issued in the form of a field inspections schedule developed for the total lifetime of a component.**

# Organization of NPP piping and equipment field inspections in compliance with current norms and regulations for parent metal thinning prevention

# Conclusions

- The use of this personnel support program meets the key requirements of the Comprehensive Program and should result in better erosion-corrosion resistance of the piping and equipment components at operating nuclear power plants
- Development and use of similar programs at NPP design stage in general and AES-2006 Project in particular, can form a sound base for the choice of structural elements and materials regarding their corrosion resistance and to find an optimal layout of the piping subjected to erosion-corrosion effects.
- The suggested approach is able to improve the economy of new nuclear power units.

# Thank you for your attention!