

ELECTRICITE DE FRANCE
St-LAURENT des Eaux Nuclear Power Plant

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**OPTIMIZING RADIOLOGICAL PROTECTION IN STEAM GENERATOR
REPLACEMENTS**

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A large number of nuclear power operators worldwide have met difficulties with their steam generators through corrosion of the internal pipes. Electricité de France has not escaped this problem. In four nuclear power stations, we have replaced twelve steam generators by cutting the primary pipes, involving significant exposure for the nuclear workers.

In order to reduce the individual and collective doses, EDF developed a general action policy, applying the ALARA concept during the entire phases of the first operation in 1991, on the DAMPIERRE NPP.

The other Steam Generator Replacements (SGRs) managed in FRANCE and abroad, showed the continual decline of the total exposure received during these operations.

PLANT	YEAR	FORECAST	RESULT	RESULT BY SYSTEM (3 SG / nuclear unit)
DAMPIERRE	1991	4.5 man.Sievert	2.13 m.Sv	0.71 m.Sv
BUGEY	1992	2.6	1.55	0.52
GRAVELINES	1994	1.8	1.45	0.48
ST LAURENT	1995	1.43	0.91	0.30

For the St LAURENT SGR, we have made a breakthrough, reaching one of the best results in the world. In particular, we have reduced by one third of our forecast dose.

The main reasons for the importance of the reduction in our forecast dose are the followings:

- * the very detailed preparation of each elementary task, one year before, by working groups consisting of multidisciplinary members. This fine preparation allowed us to reduce the work duration in the exposed areas by 10 % in comparison with the previous SGRs.

- * the optimized organisation of radiological protection with one person on shift, on each loop, with the unique responsibility for radiological protection and industrial safety; and that during the entire SGR operation in the Reactor Building.

- * a very intensive training and information was given to the subcontractors in order to motivate every one of them to reduce the collective and individual doses.

- * the quantity (about 100 tons) of lead shielding brought into operation contributed to reduce the collective dose.

- * a fine forecast of received dose in each task gives good conditions of real time follow up, and allows to compare the results with the dose forecast, in order to immediately carry out the corrective actions if necessary.

- * the firm will of the source reduction was carried out through a long purification in spite of the impact of the outage duration.

- * after the prototype development period, by our main contractor FRAMATOME, we took benefit of the normal industrial process applied on the french standardized nuclear network, by using the same tools and equipment on the industrial scale; the St LAURENT Steam Generator Replacement was the fourth in France.

The long-term production of nuclear-powered electricity requires the conditions of a good relationship of confidence with the external environment. The demonstration we can manage a large operation while continuously reducing the worker expositions plays a part in the fulfillment of these conditions.