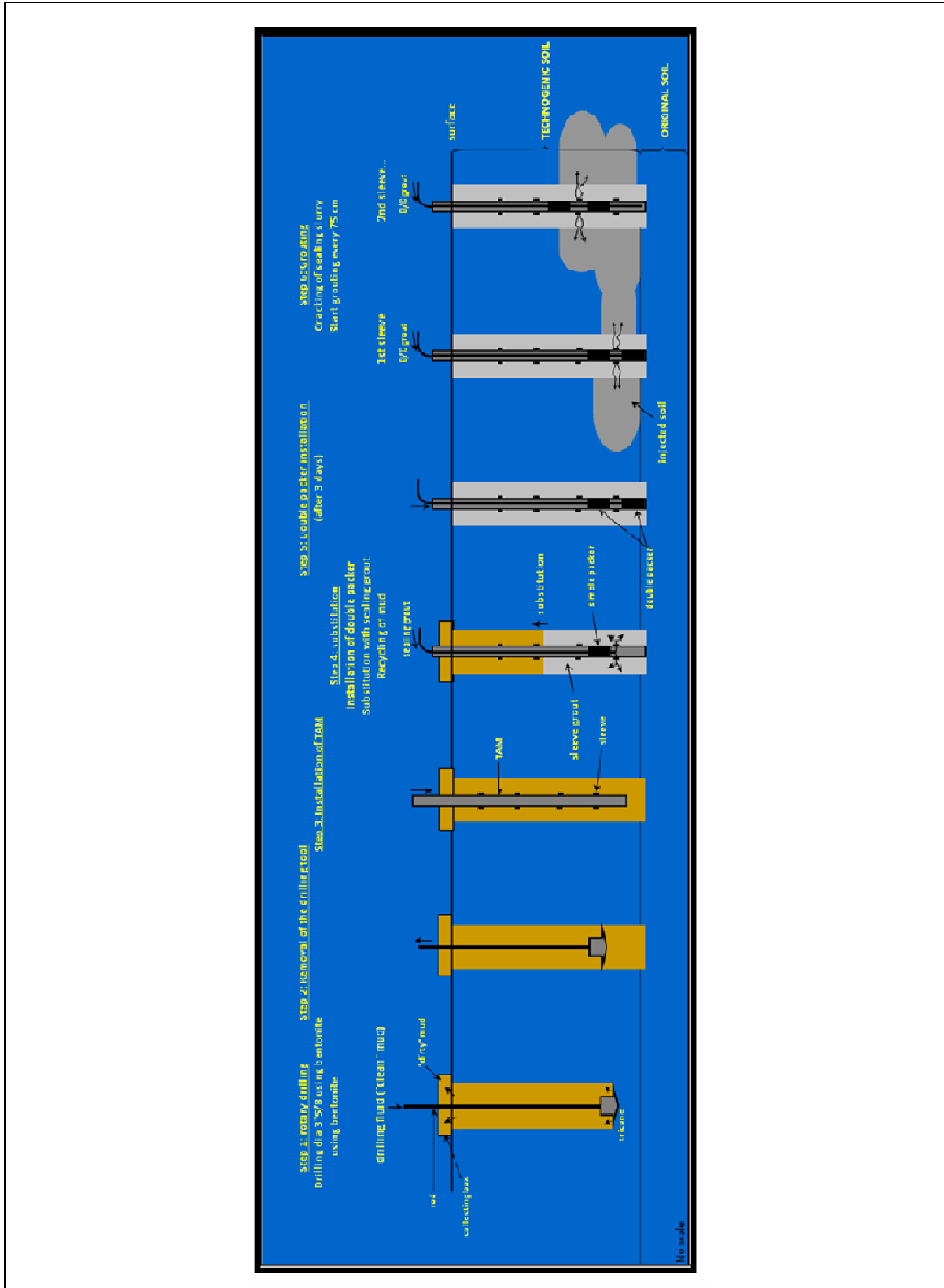
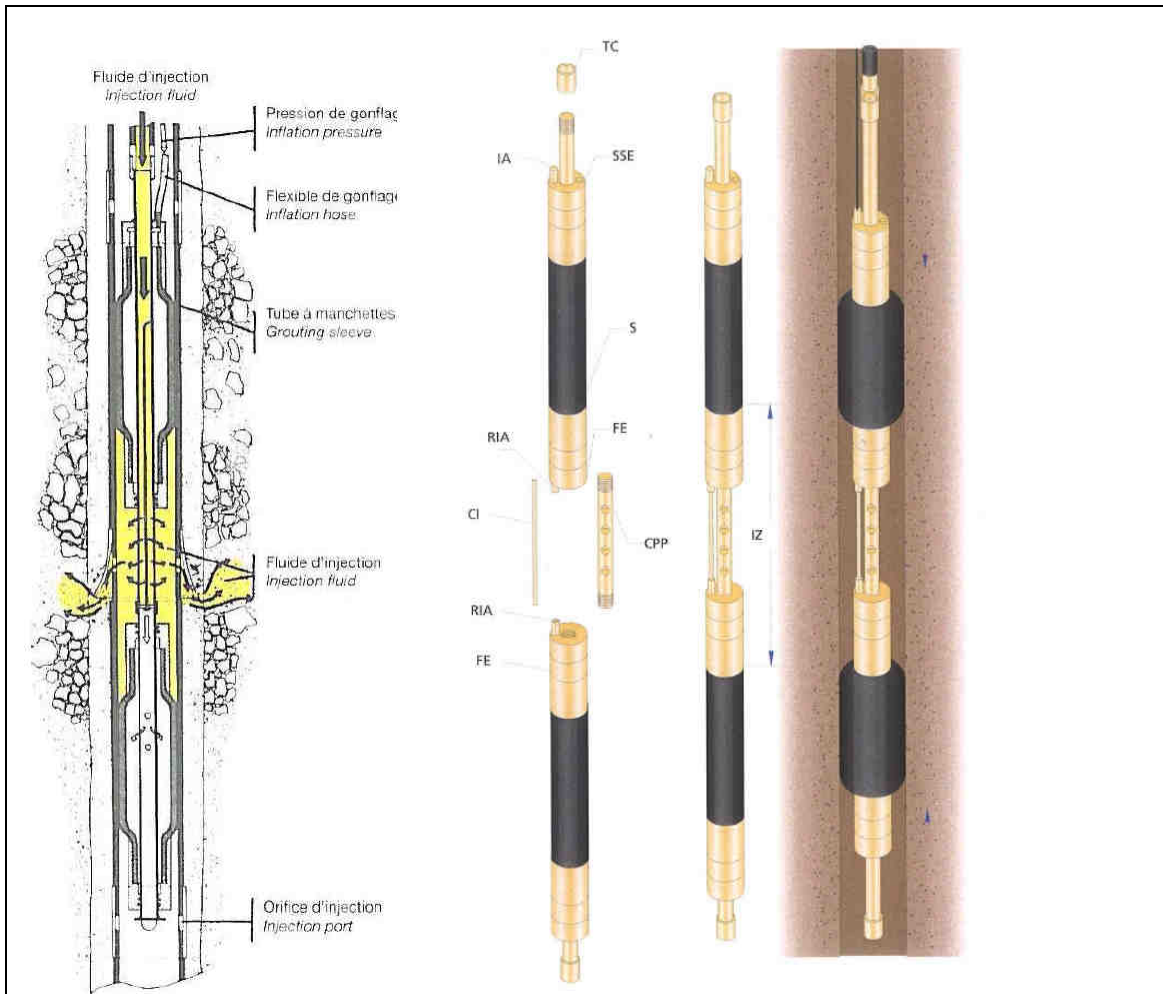


Technology Information	
Area	4
Title	Management of contaminated water inside the buildings
Submitted by	Bouygues Construction Services Nucléaires
<p>1. Overview of Technologies (features, specification, functions, owners, etc.)</p> <p><b>Challenge:</b></p> <p>Waterproofing in the periphery of building in high radiation areas.</p> <p>BCSN / ByTP as member of NOVARKA has implemented soil grouting technologies nearby the Chernobyl sarcophagus to increase the bearing capacity of the heterogeneous backfill dumped in the area after the accident. It covered an area of circa 8 000 m<sup>2</sup>. The total volume of soil to be treated nears 42 000 m<sup>3</sup>.</p> <p><b>Technology</b></p> <p>The nominal sequence for any injection is as follows:</p> <ul style="list-style-type: none"> <li>• Drilling;</li> <li>• Installation of the grouting pipe;</li> <li>• Sealing;</li> <li>• Grouting.</li> </ul> <p><u>Drilling:</u></p> <p>The drillings, diameters ranging from 3"5/8 to 3"11/16 (93.7 mm), are performed with a tricone (granular soils) under bentonite (natural clay) drilling fluid or with a vibrator and temporary casings.</p> <p>The drilling equipment can be fitted with a shielded cabin to resist the level of radiation.</p> <p>The technique to be implemented at Fukushima shall be optimized and defined depending on the soil characteristics.</p> <p><u>Sealing:</u></p> <p>The sealing operation consists in placing a sealing grout to support the final grouting pipe in place and to prevent the upward grout flow around the pipe, while grouting. The grouting through each sleeve can start when this sealing grout has hardened (around 3 days).</p> <p><u>Grouting:</u></p> <p>After completion of the sealing grout operation, a minimum of three days are necessary before the grouting work itself, to let the sealing grout strengthening.</p> <p>The grouting is performed from the bottom to the top of the borehole, every 50 cm and starting from the lowest sleeve to be grouted up to the highest. A double air inflatable packer is raised step by step within the grouting pipe and inflated in front of each sleeve to be grouted.</p>	

The peripheral drillings of any zone (including tested areas) will be first injected to circumscribe the injection work under the concrete slab only. To create such a peripheral injected curtain, specific slurry should be implemented as a Silicate/Cement slurry. The tested area will show or not the pertinence of such slurry.





Their efficiency and their reduced need for personnel implication made the project possible at a dose rate background nearing several hundred  $\mu\text{Sv/h}$  locally.

These techniques can be adapted for permeation grouting at Fukushima.

2. Notes (Please provide following information if possible.)

- Technology readiness level (including cases of application, not limited to nuclear industry, time line for application)

The technologies are standard and well documented however, as for all structural works, additional data are required for further adaptation to the specificities of Fukushima site.

- Others (referential information on patent if any)

**【Areas of Technologies Requested】**

- (1) Accumulation of contaminated water (Storage Tanks, etc.)
- (2) Treatment of contaminated water (Tritium, etc.)
- (3) Removal of radioactive materials from the seawater in the harbor



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- (4) Management of contaminated water inside the buildings
- (5) Management measures to block groundwater from flowing into the site
- (6) Understanding the groundwater flow