Technology Information	
Area	2
Title	Treatment of contaminated water
Submitted by	NUKEM Technologies GmbH, in cooperation with FEBRAS

1. Overview of Technologies (features, specification, functions, owners, etc.)

The significant volumes of highly contaminated seawater (i.e. reactor building water, tank water, trench water) with the main radionuclides (after Cs-134/7 removal) e.g. Sr-90, Sr-89, Sb-125, Mn-54, Ru-106, Co-60, and TZRU's need purification from radioactivity. However, the high saline content of the water as well as the existence of Ca and Mg makes the removal of Sr isotopes extremely difficult.

In total the processing of up to 1.000 m^3 per day and more will be required.

NUKEMs parent company (the Russian entity ROSATOM) gained valuable experience with similar contamination at their naval installations. To effect a solution the Russian Academy of Science in Vladivostok, together with their Far Eastern Branch (FEBRAS) has developed both materials and processes for the purification of these solutions, by applying fixed bed columns, filled with highly selective absorbers (within prefabricated cartridges), to enable exchange under high radiation.

To solve the on-going issues at Fukushima, NUKEM Technologies proposes to take this tried and tested solution, transfer this lessons learned including all necessary adaptation to the Japanese scenario, to this end a preliminary pilot-module for the treatment of 50 m^3/day has already been prepared by us.

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 proposed technology has been established and operational for many years at the Vladivostok nuclear naval site, to purify contaminated sea water.
- The current system in use in Vladivostok would require to be 'scaled-up' to meet the Fukushima demands but, since simple technology like fixed bed absorbers is applied and no technical issues are foreseen. In addition, the facility will be constructed in modules, to increase the operational flexibility.
- The process would require approx. 8 columns (of some m^3 volume), would need to change the absorber cartridges every week, and would produce 3 t of spent Sr-absorber (the absorption of other nuclides is an easier task).

Challenges:

- The scale-up (from 25 m^3/day to 500 m^3/day), will be required.
- The current radiological environment will require some in-depth investigation.

Others (referential information on patent if any):

Patents:

RU 2118856 C1, RU 2297055 C1, RU 2223232 C1, RU 2218209 C1, RU 2185671 C1, RU 2369929 C1, RU 2321909 C1, RU 2415757 C1, RU 2345833 C1, RU 2427419 C1, RU 2401469 C2