

National Research Institute for Nuclear Decommissioning

Proposal – to RFI for Contaminated Water Issues at TEPCO's Fukushima Daiichi Nuclear Power Station

FORM 2

TECHNOLOGY INFORMATION

AREA : (2) Treatment of Contaminated Water (Tritium etc.)

TITLE : Neutralization Procedure for Contaminated Water in the Storage Tanks

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OVERVIEW :

The technology and procedure we are proposing below is for Neutralization of the currently accumulated contaminated water in the storage tanks. The usage of our Reagents according to the Procedure will completely Neutralize all the stored water and can be safely disposed off within a short time. All the currently erected tanks can be dismantled except a few for backup. There will be no need for new tanks to be installed.

Features :

- All Neutralization Reagents are Organic and Non Toxic.
- There are four different formulas which will be used as described in the procedure below.
- After the procedure is completed, there will be more than 95% reduction in Radioactivity levels.
- After the procedure is completed, the resultant liquid will be pH neutral and can be disposed off safely.
- After the procedure is completed, all TDS (Total Dissolved Solids) will precipitate and settle in the bottom. These precipitate particles are completely Non Hazardous neutral minerals and can be disposed off safely. Any gases formed during the procedure are Neutral and Non flammable and Non Hazardous.
- The whole Neutralization process is estimated to be completed in 72 hours.
- All the currently stored contaminated water stored in the tanks can be Neutralized within a short period of time.
- All the liquids and particulates remaining after Neutralization can be safely discarded and the tanks can be emptied and dismantled immediately after Neutralization

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FORM 2

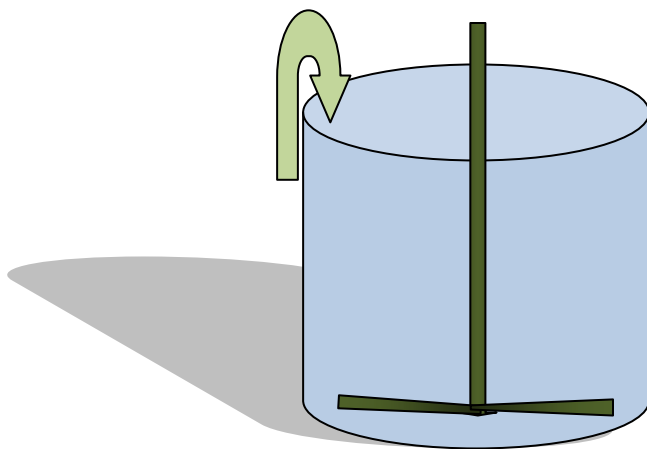
Procedure :

The Procedure for Neutralization is Four Steps. A stirring mechanism will have to be attached to each tank. Constant gentle stirring will have to be done while the formulas are being mixed in each tank. The whole process would be complete in less than 4 days.

We are assuming that the volume is about 1000 tons in each tank, the diameter is 12 meters and height is 10 meters.

Step 1:

- About 10,000 liters of Formula 1 will be pumped into the tank at a constant rate for 1 hour.
- The exact quantity and time may vary slightly depending on measurements of radioactivity in the tank before pumping.
- Precipitates will start forming in the tank during this step.
- Radioactivity levels will reduce approximately by 70-75%.



Add Formula 1 for one hour and provide constant gentle stirring.

Step 2 :

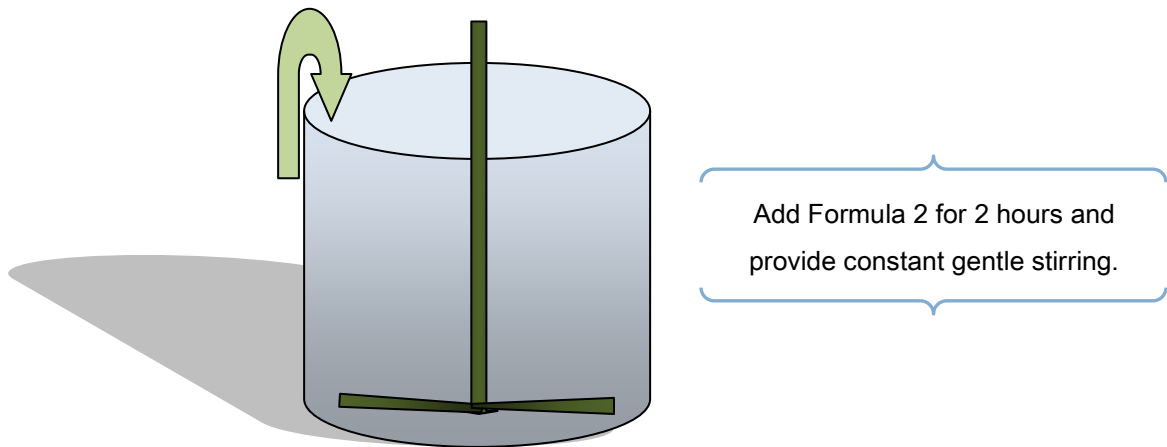
- After Step 1 step 2 has to be commenced immediately within 15 minutes.
- About 10,000 liters of Formula 2 will be pumped into the tank at a constant rate for 2 hours.

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FORM 2

- The exact quantity and time may vary slightly depending on measurements of radioactivity in the tank before pumping.
- At the end of this step, stirring is stopped for 30 minutes to allow the TDS (Total Dissolved Solids) to settle at the bottom of the tank.
- The pH of the mixture in the tank is now neutral.
- There will be a further reduction in Radioactivity levels by an additional 15-20%



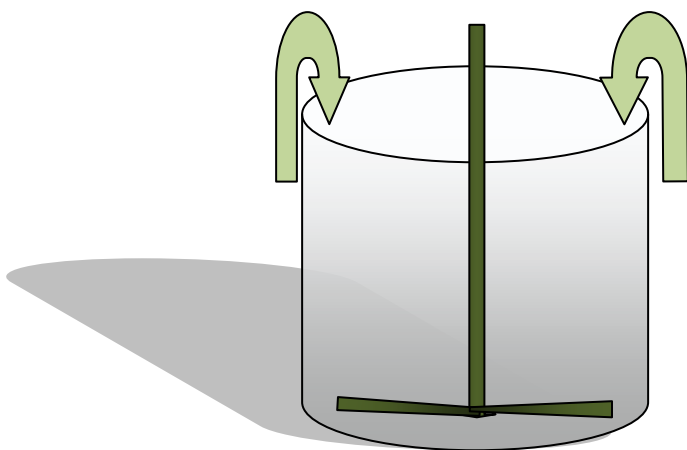
Step 3 :

- After Step 2 and settling of TDS for 30 minutes, Step 3 has to be started.
- About 5,000 liters of Formula 3 and 5,000 liters of Formula 4 will be pumped simultaneously into the tank at a constant rate for 45 minutes.
- The exact quantity and time may vary slightly depending on measurements of radioactivity in the tank before pumping.
- This stage Neutralizes and Oxidizes all materials whether liquid or solid or slurry.
- There will be a further reduction in Radioactivity levels by an additional 15-20%
- All gases generated are harmless.

National Research Institute for Nuclear Decommissioning

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Add Formula 3 and Formula 4 simultaneously for 45 minutes and provide constant gentle stirring.

Step 4 :

- After Step 3, Stop Stirring and let the treated mixture Stand alone for 72 hours.
- After 72 Hours all the Radioactivity will be completely neutralized. All the contents from the tank can be completely removed and safely disposed. Any gases emitted are harmless.
- The tanks can be dismantled if there is no further need.

TECHNOLOGY READINESS LEVEL :

- The technology is completely ready and Demonstrable.
- Slight modifications in quantities and timings may vary based on the Radioactivity measurements in the tanks.

CHALLENGES :

Need Assistance for the necessary permits and logistical support for demonstration of this technology and Procedure.