

NOCHAR, a solution to answer to organic liquid storage stakes in France ?

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M. ZILBER

marine.zilber@orano.group



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Context

- ❑ **Orano, as many actors in nuclear sector, needs to develop final solution for various (LL and VLL) organic liquid when they become waste and for example :**
 - Mineral oil (That could be of one kind or several kinds mixed, with or without solvent, with or without aqueous phase)
 - TBP/Dodecane (that might be mixed with oil and/or solvent)
 - Solvent with chlorine and/or fluorine (mostly mixed : oil, solvent, but also aqueous phase sometimes)

- ❑ **Some of those can be sent for incineration, but for many, it is not possible (radioactive activity too high or chemical composition not appropriate). At least a solution has to be approved in France to send those to final storage.**

- ❑ **Nochar could be a solution to evacuate those:**
 - Nochar N910 is compatible with many different kind of waste (only time to solidify and ratio of Nochar vs waste has to be adapted)

 - Nochar is very easy to put in place

 - Nocharized waste can be incorporated into an existing cement Matrix to be sent to final disposal



Trial, scale 1 TRIADE

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What is Nochar ?

❑ NOCHAR Product

- **NOCHAR Products (Petrobond®) are developed polymers, produced by NOCHAR Inc and distributed by Vista Nuclear Solutions**
- **NOCHAR N910 polymer, is hydrophobic and is able to solidify a large range of organic liquids, allowing after treatment to consider those as dispersible solid waste**

❑ Solidification

▪ **After easy mixing NOCHAR N910 with organic liquid, it becomes solid**

- Organic liquid is incorporated into the porous network of NOCHAR N910 product
- The result of the operation is a dispersible solid waste :
 - It can then be directly included into an existing waste container
 - Or, mixed into a cement matrix to produce a homogenized mixture

▪ **Return on Experience:**

- Various organic liquids have been solidified with NOCHAR N910 for test or industrial trial:
 - Mineral oils, mixture of TBP/Dodecane, chlorine solvent
- NOCHAR N910 performance has been measured through several tests and analysis; testing several kinds of liquids



Solidified oil

NOCHAR REX

❑ INDUSTRIAL REX (ATPu Cadarache) – (2015-2016), LLW

▪ Organic oil

- Organic Oil has been treated with Nochar N910 and included into 5m³ container :
 - Andra has provided a derogation to accept it for final storage
 - 118L drums of NOCHAR solidified oil were produced and added into the 5 m³ box
 - “Normal” waste could be added into containers to avoid dead spaces



Chantier dans la cellule de l'INB 54



solidified oil in waste package (7A)



Inactive test (TRIADE)

▪ TBP/dodecane (50%/50%)

- Solidified with N910 and then blocked into a cement matrix
- Put into 3 packages (1 made of plastic and 2 small 30 L drums) and after into 118 L drum
- Final container being the 5m³ container and sent to Andra final storage who accepted it with derogation

❑ Main solution studied today remain solidification of organic liquid with Nochar N910 and incorporation of the dispersible waste obtained into a cement matrix

Remaining challenges

- ❑ Today, liquids are strictly forbidden in final storage, whatever their form could be. This rule is the same for all Storage (VLLW, LLW, HLW)
- ❑ REX is existing on industrial processes to treat organic liquids with NOCHAR. Knowledge on performance of final product exists as well : Many tests have been conducted and analyzed
- ❑ However, long term evolution (~ 300 years) is still under discussion with Andra and formal demonstration of durability is not easy to prove.
 - **How to Demonstrate long term durability of our proposed solution ?**
 - How to extrapolate results from short term (a few month) to long term (~300 years) ?
 - What type of test should be run ?
 - What do we need to measure ?
 - What are the acceptable criteria ?
- ❑ Questions raised up with Nocharized waste illustrate difficulties we are facing in France to define robust solutions to send organic liquids to final storage. NOCHAR problematic can be extrapolated to other type of solutions investigated (geopolymer matrix,...).



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