NUKEM Technologies

# Environmental Solutions from NUKEM Technologies

# Environmental Protection Technology
## for Hazardous and NORM waste

Even though NUKEMs expertise is not founded in the field of cleaning, our background in minimizing and stabilizing waste in the Nuclear Industry gives us the knowledge to understand what technology is similar and well proven in the field of nuclear waste treatment, and is easily transferrable into the Oil & Gas sector.
In recent years a great deal of contaminated sludge has been accumulated in both drums and containers, which is currently stored in temporary storage yards, causing a potential problem on operational sites.

There are now the first signs and requests from clients that they want to reduce this stockpile of contaminated waste, in most cases this is due to the lack of storage space, but also the constant danger of hazardous substances getting into the atmosphere and endangering the population.

We see that a number of global operators have already decided to ship their waste to a 3rd-party country, this is an expensive solution, for a problem that can usually be dealt with on-site where the waste is generated.

**NUKEMs portfolio can deliver the following proven technologies for the optimisation and treatment of hazardous wastes for any client, anywhere in the world:**

- Pre-treatment e.g. Screening, Dewatering, Drying,
- Filtration, Centrifuging,
- Solidification, Encapsulation,
- Shredding or Compaction,
- Chemical Physical Treatment,
- Incineration,
- Thermal Desorption,
- Drum Handling and Cleaning,
- Waste Water Treatment.

With more than 60 years' experience in hazardous waste management, NUKEM Technologies Engineering Services GmbH (NUKEM) is well aware of the situation faced by the Oil & Gas industry and can bring all of our nuclear knowledge and experience to benefit drilling operators and refineries.

## Tailor-Made Solutions for the full NORM treatment cycle

**Consulting**

- Implementation of IAEA guidlines
- Personnel Protection
- Feasibility Studies
- Consultancy Service

**Survey**

- Contaminated Material reports
- Collection, Sorting & Transport
- Soil remediation (using our FREMES system)

**Decontamination**
(stationary/mobil)

- Construction of storage yards
- On-site decontamination
- Full service (with a local partner)
- Variety of approaches available

**Treatment**

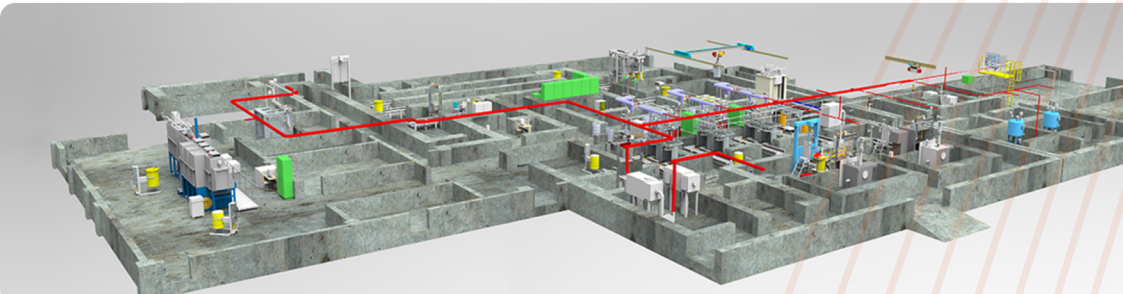
- Solidification
- Drying
- Incineration
- Landfill

**Disposal**

- Utilise our huge network in the nuclear industry
- Client led optioneered solutions
- Possible cross-border partnering

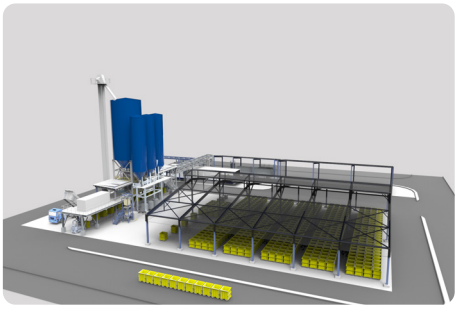
## Advantages

- Financially more attractive for the end user
- no additional bureaucracy (licences etc)
- Good localization (use of local employees)
- Turnkey control by NUKEM (maintenance, service, etc)



To demonstrate our experience in the Environmental Sector, we can highlight on of our most recent successes in the Oil & Gas industry.
As part of the BeAAT Expansion Project, NUKEM has been contracted by INTECSA Industrial for the modification, upgrade and expansion of the facilities in Ruwais to allow the Abu Dhabi National Oil Company (ADNOC) to meet the future waste requirements of the operating company.

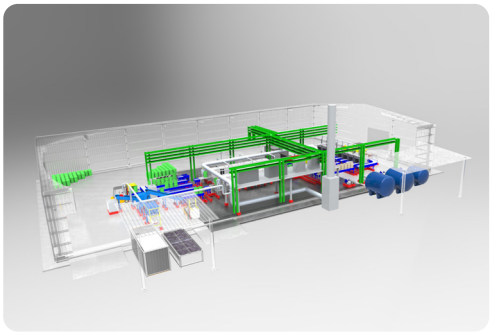
The facilities designed and delivered by NUKEM will be part of a waste treatment centre, which is intended to process chemical solid and liquid waste generated at a number of ADNOC operating sites. The project aims to increase the future waste handling throughput, improve BeAAT facility operation and provide more flexibility in treating wastes.



*Solidification Unit*

Within the new BeAAT facility, waste containing heavy metals will be immobilised by encasement in concrete using a solidification and stabilization process. The Solidification Unit will produce concrete blocks, both physically stable and chemically impermeable, which meet Toxicity Characteristic Leaching Procedure (TCLP) criteria for Landfill safe disposal. Any blocks which do not pass the TCLP will be crushed and returned to the Solidification Unit once again for processing.

Drums filled with either organic or aqueous liquid wastes are received at the Drum Cleaning Facility from the interim storage area. After an initial assessment, the drums are emptied and the liquid wastes are transferred to tank farms for separate storage. The empty drums are then washed and dried and a visual inspection is carried out as well as automatic leak-test of each drum. If any drum fails the inspection/test, it is either sent to be shredded (plastic drums) or compacted (metal drums), and forwarded to the Solidification Unit for processing and disposal at the Client‘s discretion.



*Drum Cleaning Facility*

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