

NORM

Service from A to Z



We handle NORM contamination

Introduction

The generation of Naturally Occurring Radioactive Material (NORM) often occurs through exploration and production activities, particularly in the oil and gas industry. It can lead to the accumulation of radioactive waste in plant equipment and components. Due to the exposure hazards of NORM, handling of such material must ensure that no negative impacts are felt upon the environment or on human health.

The primary radioisotopes of concern are the Uranium-Radium (^{238}U) and Thorium (^{232}Th) decay series, as their daughter nuclides are potentially mobilized in subsurface formations during exploration and crude oil production.

Decontamination of water, soil or tools impacted by NORM is an integral part of Bauer's portfolio of services. Bauer has developed an effective environmental, technological and economical decontamination process in order to treat NORM contaminated equipment.

Bauer utilizes the industry's safest means of NORM waste handling whilst ensuring compliance with all applicable legislative requirements. Additionally, we emphasize the importance of minimizing the generation and treatment of secondary waste. Furthermore, we offer a comprehensive range of consultancy services to satisfy both customer and legislative requirements.

Consultancy:

- Risk assessment and feasibility studies
- Radiation protection services
- NORM awareness training
- Process design
- Procedures and Protocol
- Personal dosimeter and calibration services
- Consultancy for NORM waste treatment, storage and disposal

On Site Service:

- NORM monitoring
- Classification
- Documentation
- Sampling for NORM

Operations:

- Transport
- Segregation
- Descaling / Decontamination

Waste:

- Processing
- Conditioning
- Packaging
- Radiation Measurement
- Clearance Measurement
- Radiological Analysis
- Documentation
- Tagging
- Transport
- Treatment of Sludge and Scales
- Disposal

Consultancy

The Bauer NORM team is composed of certified and highly trained experts. They provide the full scope of consultancy services ranging from site assessments, data collection, radiation protection, and awareness training, to process design for complex treatment facilities.

Bauer has a business commitment to ensuring that all its services comply with all applicable legislation.

Furthermore, Bauer procedures are based on a culture and philosophy of "safety first". This motto is an integral part of the way in which we do our business. Bauer acknowledges its duty to provide safe working conditions and ensuring that safe work practices are followed.



On Site Service

Bauer's safety philosophy strives to achieve a goal of ZERO INCIDENTS. Since the health risks of NORM exposure are cumulative in nature, Bauer implements state of the art monitoring techniques, to ensure the long term health of personnel and the environment.

In order to assess the site conditions we conduct gamma radiation surveys utilizing dosimeter and radiation monitoring equipment. In addition to systematic monitoring, professional sampling and analysis is undertaken. These procedures help us to properly characterize the site and the associated waste.

NORM descaling / decontamination

Bauer operates both mobile and stationary NORM decontamination plants. These are equipped with both water and off-gas treatment systems to ensure the effective removal of NORM deposits from the affected tubular and tools. The modular design of the plants offers the customer an easily transportable and quick installation (and dismantling) solution, resulting in a professional and expedient NORM decontamination service.

The plant is comprised from the following components:

- Central decontamination unit
- Clearance measurement unit
- Ultra-high pressure water jetting system
- Roller conveyor system
- Water treatment system
- Off-gas treatment system
- Process control system
- Power supply unit
- Radiation protection package



Our cleaning method removes contamination, using precisely engineered ultra-high pressure water jetting technology. Water is recycled within the water treatment system for reuse in the subsequent decontamination processes, which in turn minimizes the volume of secondary waste. Both, inside and outside cleaning are applied in the decontamination cabinet. NORM clearance measurements and quality checks are executed in a controlled "clearance" container.

Operations

Recognition of Bauer as a world renowned environmental contractor is based on global operational experience and proficiency. Bauer's experience extends across various operational sectors within the environmental industry, thereby combining expertise in water treatment, NORM descaling, and waste management.

Bauer's proficiencies in NORM waste include: NORM surveys and on-site evaluation, interim storage management, radioactive waste disposal, and the operation of NORM waste treatment facilities.

Waste

It is essential to adhere to appropriate environmental controls and procedures for the safe transport, storage and disposal of NORM waste. Storage and transportation of NORM receptacles are described and executed under Bauer's "NORM Waste Transfer Protocol". NORM waste such as scale or sludge, may be stored in plastic or metallic drums. Tubulars, pipes and casings are stored using wrapped or welded polyethylene sheets.

Approval and operation of (very) low-level radioactive NORM waste disposal sites "near surface" occurs, for example, in the United States, Canada, Australia and the United Arab Emirates. Landfill disposal is a consideration for NORM contaminated pipes displaying excessive corrosion, possibly with perforations, as these do not permit efficient and safe descaling. Bauer provides state-of-the-art waste storage and disposal options, in addition to the procedures necessary for handling, transportation, and conducting inspections.



OUR SERVICES AND SKILLS

- Consulting
- Engineering
- Execution
- Operation
- Service

SELECTED REFERENCES

- **Remediation of radioactive contaminated site** (Hanau, Germany 2005)
- **Dismantling of a Nuclear Reactor** (Kahl, Germany 2005)
- **Mobile Descaling Operations** (Oman, 2011)
- **Establishment and Operation of an interim NORM Storage** (Abu Dhabi, 2013 - 2016)
- **Assessment of NORM Waste** (Qatar, 2014)
- **Design and Installation of a NORM Descaling Facility** (Abu Dhabi, 2015 - 2016)



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