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Nuclear Research Reactors and Noble Gas Monitoring

WOSMIP Remote

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Contents

Introduction

- The CTBT community is aware of many facilities that impact noble gas monitoring. These facilities generate a noble gas background:
  - **Medical Isotope Production (MIP)**
  - **Nuclear Research Reactors (NRR)**
  - Nuclear Power Plants (NPP)
  - Hospitals with nuclear medicine facilities

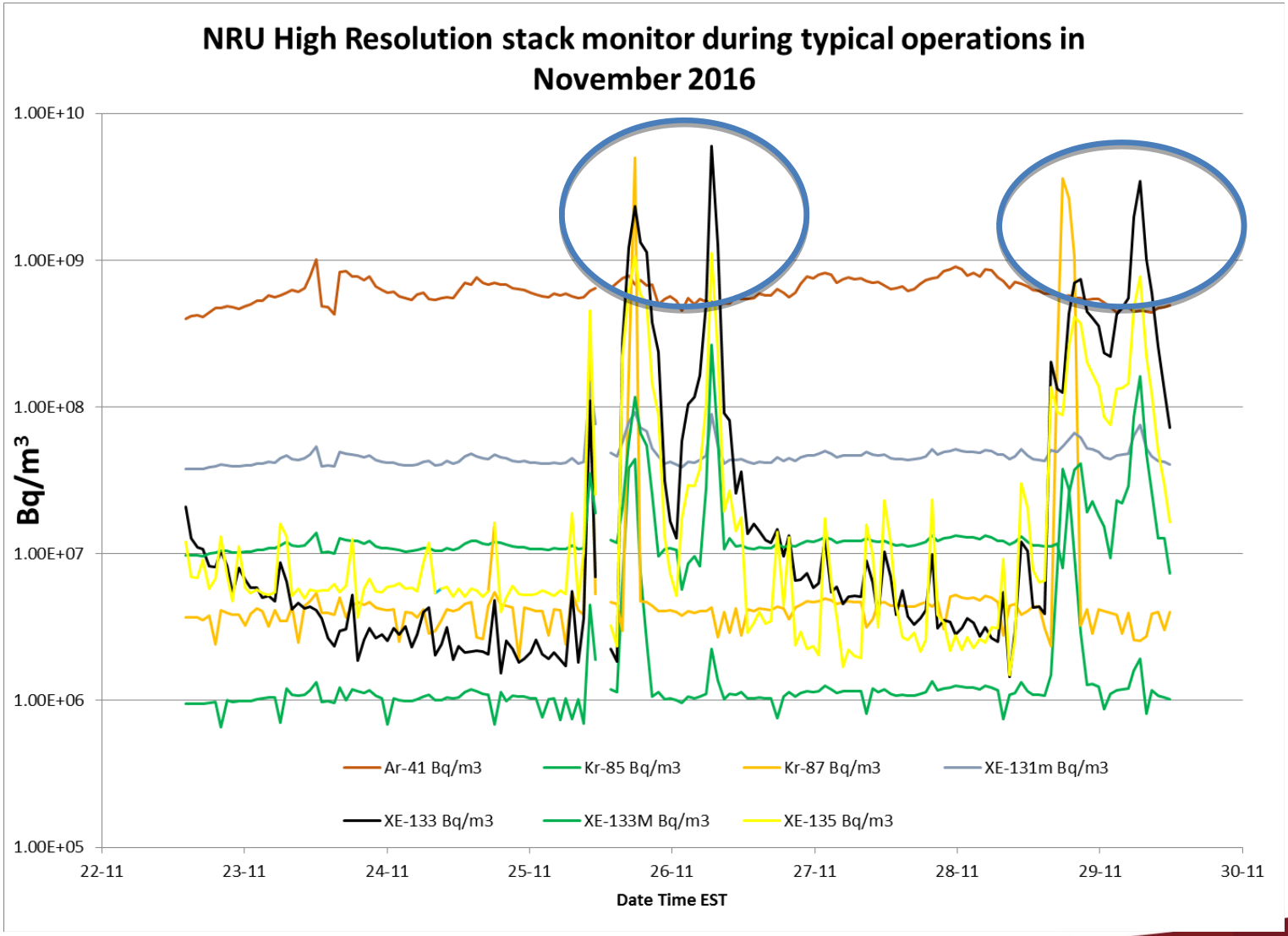
- These emissions must be characterized so that they can be distinguished from Nuclear Weapons Tests.

Nuclear Research Reactors (NRR)

- Worldwide assessment of NRR emissions estimated 3.5x 10^{12} Bq per year (Single MIP can be up to 10^{15} Bq/year)

- Emission measurements and regional monitoring show, that at least in the case of the now decommissioned Canadian NRU, NRR releases can be considerably larger
  - ^{133}Xe emissions from NRR over short time periods can be commensurate with releases from MIP…

A week in the life of NRU



NRU Emission Estimate

An estimate of ^{133}Xe released

- ~7 hr in excess of 10^9 Bq/m^3
- ~55200 s x 15 m^3/s x 10^9 Bq/m^3 ~ 4 x 10^{14} Bq
- Or about 2 x 10^{16} Bq annually for continuous operation

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Conclusions

- While MIP is the predominant source of radioxenon, other sources are important at least episodically with current measurement capabilities
- Next generation noble gas monitoring equipment will detect these other sources more frequently and characterization and understanding of them will be increasingly important.
- Effective CTBT monitoring requires an understanding of both MIP sources and others source such as NRR and others