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Development of a modernized radionuclide laboratory system to support the new generation of IMS systems

Michael Foxe, Ian Cameron, Thomas Hallen, James Hayes,
Lance Lidey, Michael Mayer, Jennifer Mendez, Rose Perea, Johnathan Slack
Pacific Northwest National Laboratory

Pacific Northwest NATIONAL LABORATORY

INTRODUCTION

As part of the IMS, the United States operates one of the radionuclide laboratories with radioxenon capabilities, USL16-NGL. Radioxenon samples are sent to the laboratory for reanalysis.

METHODS/DATA

Within USL16-NGL, we aim to develop a new noble gas system to improve long term sustainability and enhance the capabilities for processing larger xenon samples automatically.

START

RESULTS

We have designed a system to incorporate technical advances from Xenon International into a USL16-NG style system for automatically processing up to four samples in series.

CONCLUSION

The updated system utilizes a cryocooler to reduce the requirement for liquid nitrogen. Building is complete and initial testing is underway.

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Introduction

The IMS includes a network of radionuclide labs (16) able to remeasure samples from stations for QA/QC and verification

- The U.S. lab (USL16) includes radioxenon measurement capabilities

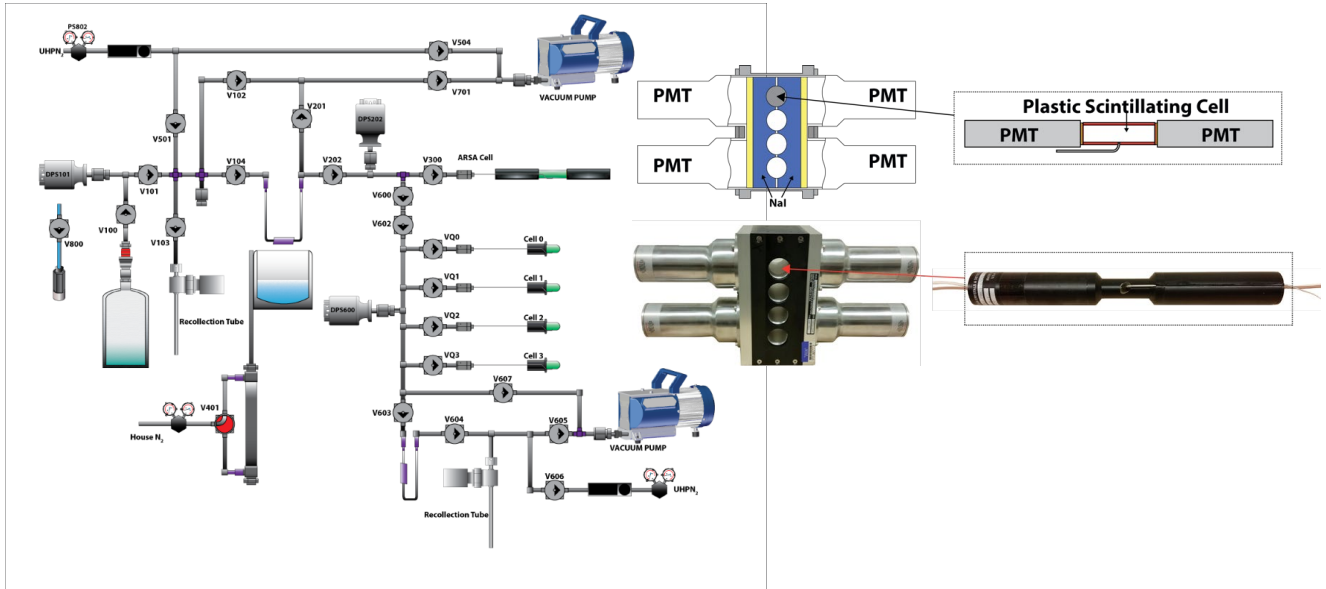
Objectives

Update the current USL16-NGL system to allow for improved sustainability

- System was developed more than 10 years ago and parts are becoming less available

Incorporate new generation radioxenon system technology from Xenon International

- Using new technology ensures that USL16-NGL can optimize for more and larger samples.



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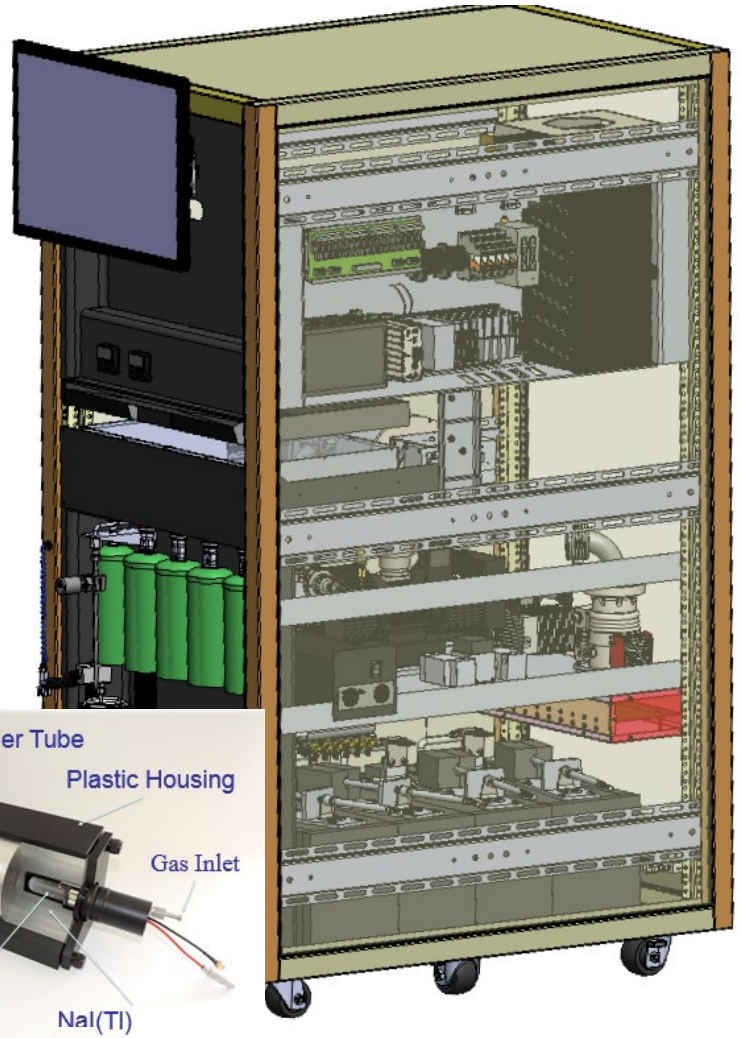
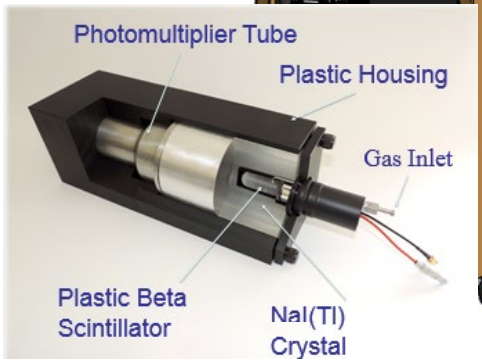
Methods

Key Updates for the new System

- Cryocooler instead of liquid nitrogen for sample collection
- Four detectors that include coated beta cells with single PMT readouts
- Low volume 3D printed manifolds
- Processing of up to 4 samples in series automatically
- Automated recollection or remeasurement of samples is possible

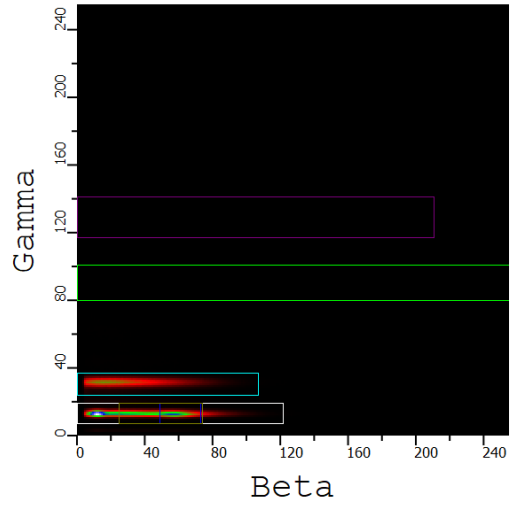


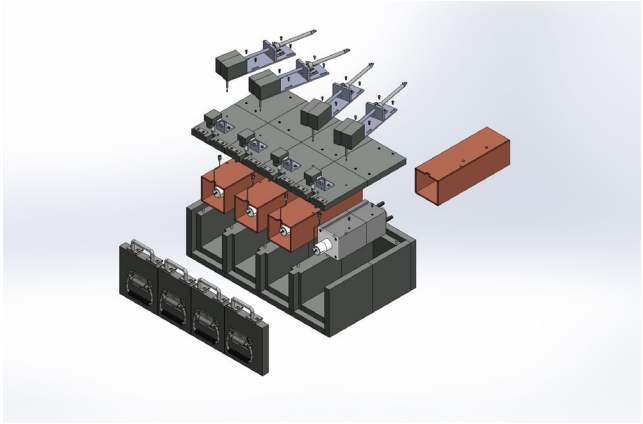


Results

Current system status

- Detectors have been calibrated and are implemented with individual cave modules
- Four QC sources will allow for independent detector monitoring
  - No requirement to QC all of the detectors at once
- System has been plumbed and electrically wired
- Benchmarking is underway





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Conclusions

- Developed a new system to aid in sustainability of USL16-NGL
- Implemented processing techniques and parts from Xenon International
  - Long-term maintainability
- Will allow for the processing of four samples within approximately 8 hours
- Automatic unload and post-processing is possible
- Currently in the initial testing phase of the development

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