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Design, Implementation Considerations, and Response of the WOSMIP Remote Workshop Organized by the Pacific Northwest National Laboratory During the COVID-19 Pandemic

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INTRODUCTION

The Eighth Workshop on Signatures of Man-made Isotope Production (*WOSMIP-8*) was scheduled to take place the week of June 21, 2020 in Stockholm, Sweden. In March 2020, the COVID-19 pandemic interrupted most activities in the United States and other countries. Discussions with the local organizers of WOSMIP-8, the Swedish Defence Research Institute (FOI), were conducted in late March and it was decided that WOSMIP-8 could not be held at the previously planned time. Participants were notified that a delay of approximately one year was being considered.

Shortly following the announcement, it was decided that momentum should continue in this important area and therefore a concept entitled, "*WOSMIP Remote*" was advertised. The basic principles for the concept of *WOSMIP Remote* were that information could still be exchanged in a video exchange format, noting that professional videographers were generally not available; and parties that have traditionally been interested in WOSMIP were largely working from home. Due to these constraints, it was decided that PNNL would solicit interested parties to record short videos (10-15 minutes) and post them to the WOSMIP.org website for all to view. The Provisional Technical Secretariat for the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization was contacted; however, they declined to participate in the creation of videos. They were involved as observers in the Virtual Roundtable for Stack Monitoring Data, held at the end of the virtual workshop.

The concept of a fully interactive virtual workshop was discussed, in which attendees could participate over videoconferencing services available at the time. However, due to the time zone differences between usual *WOSMIP* participants and the varied requirements on the videoconferencing software that was allowed by different participants, it was decided that a fully interactive format would not be pursued. The option for the recording of presentations with a few participants was utilized to make use of available videoconferencing platforms. This added a dimension of interactivity for WOSMIP Remote and allowed for some limited question and answer periods. PNNL had approvals and access to utilize several video conferencing services including Microsoft Teams, Skype, Webex, and Zoom, all of which were configured so that videos could be recorded in real-time.

DETAILS AND AGENDA

After reaching out to several past WOSMIP attendees, PNNL received feedback from almost two dozen external *WOSMIP Remote* contributors that were interested in participating and recording a video. To keep up momentum over an extended period, the concept of "*WOSMIP Wednesdays*" commenced. This mass emailing was enacted to notify the community of new batches of several *WOSMIP Remote* videos. Appendix 1 below shows the agenda of the workshop consisting of 21 presentations, 2 virtual tours, and a roundtable discussion.

Topics that have been covered during traditional *WOSMIP* workshops include background measurements, medical isotope production status, sources of xenon emissions, emission mitigation technology, stack monitoring, and far field xenon monitoring technologies. In *WOSMIP Remote*, PNNL solicited presentations in these general areas, and was generally successful in getting willing participants. In most cases, the slides used in the presentations were made available for download from (www.wosmip.org/wosmip-remote). Figure 1 below shows a few photographs representative of some of the presentations.

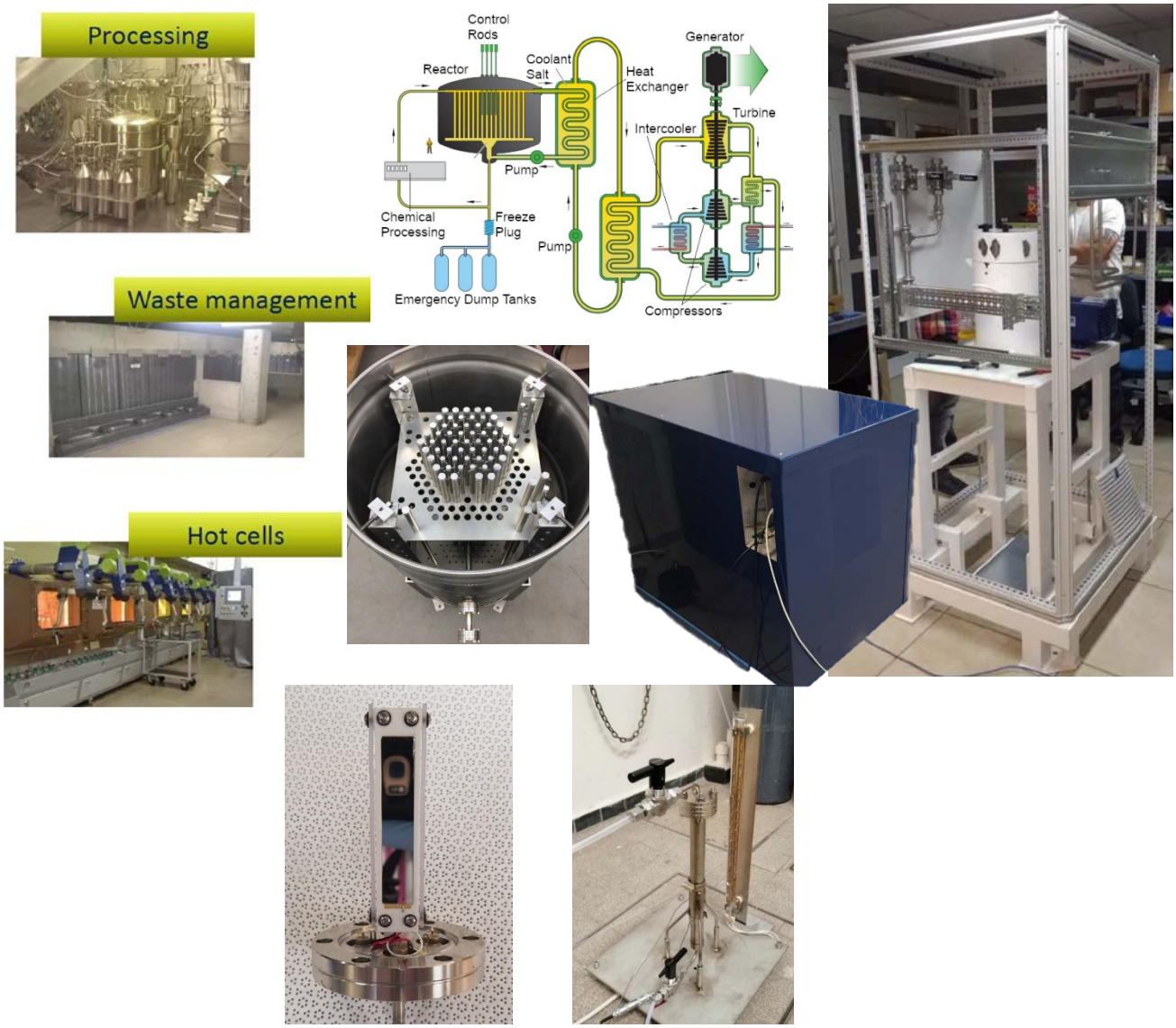

Figure 1. Representative photos of some of the science and technology presented during WOSMIP Remote.

STACK MONITORING DATA ROUNDTABLE DISCUSSION

Prior to the COVID-19 pandemic, the French Alternative Energies and Atomic Energy Commission (CEA) had offered to host a meeting to discuss methodologies for using stack monitoring data, such as from the Source Term Analysis of Xenon (STAX) project. Because of the interest shown by CEA on this topic, PNNL approached Dr. Sylvia Generoso to lead the 60-minute roundtable discussion. The roundtable focused on the following questions:

1. How will you use the data from a stack monitoring system to improve nuclear explosion detection? Are you planning on folding stack data in a global model, or are you planning to use it for local, ad hoc corrections?
2. What 'product' do you envision coming out with the use of stack monitoring data? For example, a flag or a modified event bulletin, etc.?
3. Will the use of stack data be useful or are reported 'averages' good enough? This a follow-on to an email thread regarding the ATM Challenge?
4. What additional data, if any, would be useful to augment stack data?
    a. For example, local ATM data?
5. How do you think quality stack data can help further the science of ATM by having source term and remote detection technologies?

Approximately 30 participants joined and actively participated in the discussion (see Figure 2). No specific conclusions were reached during the roundtable discussion; however, a follow-up workshop is planned to occur in person in 2021 in Paris.

Figure 2. Image created with screen capture taken during the WOSMIP Remote Stack Monitoring Data roundtable discussion. Approximately 30 scientists participated from almost a dozen countries.

OUTREACH

One of the important aspects of the concept of WOSMIP and especially for *WOSMIP Remote* is to provide a platform in which many people, including those who are not solely traditional workshop attendees, would have access to information regarding the main topics of *WOSMIP.* In addition to *WOSMIP Remote* having a dedicated URL for access to the videos by anyone (https://www.wosmip.org/wosmip-remote), it was decided that additional outreach through social media would be useful. Both the Department of State and the National Nuclear Security Administration (NNSA) Twitter accounts tweeted several times regarding the *WOSMIP Remote* videos. In addition, NNSA ran a story, "What do you do when a pandemic disrupts a vital conference on nuclear detection? You take it online, of course!" on the concept of *WOSMIP* Remote and included a quote from Deputy Administrator for Defense Nuclear Nonproliferation Brent Park.

> *"The Workshop on Signatures of Man-Made Isotope Production addresses key issues in nuclear explosion detection. Since the meeting could not be in person, I am proud of our work to keep momentum in this area through a virtual presence. This is a critical international effort."*

At the time of the writing of this report (June 2020), the *WOSMIP Remote* URL had over 2000 hits from 36 countries and every continent (except Antarctica). Figure 3 below shows a color-shaded map of the countries accessing the WOSMIP webpages showing the relative weight of webpage hits.

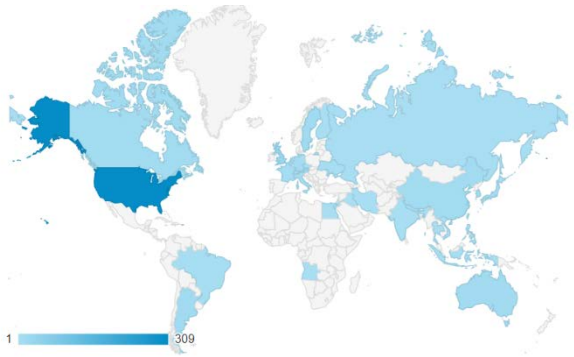

Figure 3. Shaded map showing the WOSMIP.org webpage hit locations.

Related efforts to inform the nuclear explosion monitoring and medical isotope production communities of ongoing work in this area include a recent article titled 'Ultrasensitive Measurements Keep Tabs on Nuclear Explosions' as well as a *PNNL Pods of Science* Podcast; ' Exploring Radioxenon' which is linked within the article.

Appendix 1

WOSMIP Remote Agenda

Released – April 27, 2020		
Videos	**Presenter**	**Presentation Link**
Overview of WOSMIP Remote and Plans for WOSMIP VIII	Dr. Ted Bowyer, Pacific Northwest National Laboratory	
Where is WOSMIP Coming From?	Dr. Paul R.J. Saey, WOSMIP Scientific Advisor	
Source Term Analysis of Xenon (STAX) Update	Dr. Judah Friese, Pacific Northwest National Laboratory	Source Term Analysis of Xenon (STAX) Update.pdf
The Impact of Molten Salt Reactors	Dr. Jon Burnett, Pacific Northwest National Laboratory	The Impact of Molten Salt Reactors_Burnett.pdf
TXL Deployments	Mr. Ian Cameron, Pacific Northwest National Laboratory	
Released – May 13, 2020		
Videos	**Presenter**	**Presentation Link**
R&D on Xe Trapping at SCK CEN	Mr. Christophe Gueibe, Belgian Nuclear Research Centre (SCK CEN)	R&D on Xe trapping at SCK CEN C GUEIBE.pdf
Overview of UK NDC's Use of STAX Data	Dr. Ashley Davies, Atomic Weapons Establishment	UK NDC STAX Data Ashley Davies.pdf
INVAP's Progress with the STAX System	Dr. Mariana di Tada, INVAP	STAX Mariana di Tada.pdf
STAX Data Pipeline Demo	Dr. Mattias Auer, Instrumental Software Technologies, Inc.	STAX_DataProcessing Auer.pdf
Nuclear Research Reactors and Noble Gas Monitoring	Dr. Ian Hoffman, Radiation Protection Bureau, Health Canada	Nuclear Research Reactors and Noble Gas Monitoring- I. Hoffman.pdf
Released – May 27, 2020		
Videos	**Presenter**	**Presentation Link**
Current Status of the Ongoing 3rd ATM-Challenge 2019	Dr. Christian Maurer, ZAMG - Zentralanstalt fuer Meteorologie und Geodynamik, Vienna, Austria	Current Status of Ongoing 3rd ATM.pdf
Impact of Civilian Nuclear Emissions	Dr. Harry Miley, Pacific Northwest National Laboratory	Impact of Civilian Nuclear Emissions.pdf
New Feasibility Study for Mo-99, 'The SMART Project'	Dr. Benoit Deconninck, Institute for Radioelements (IRE)	New Feasibility Study for Mo-99, "The SMART Project".pdf
IRE LEU Conversion Updates	Dr. Valery Host, Institute for Radioelements (IRE)	IRE LEU Conversion Updates.pdf
Released – June 10, 2020		
Videos	**Presenter**	**Presentation Link**
Mobile Ground-based Atmospheric Radioxenon Measurements	Dr. Anders Ringbom, Swedish Defence Research Agency (FOI)	Mobile Ground-based Atmospheric Radioxenon Measurements.pdf
Radioxenon Emission Estimates for Molten Salt Reactors	Dr. Derek Haas, The University of Texas at Austin	Radioxenon Emission Estimates for Molten Salt Reactors.pdf
Radioisotope Production at Niowave	Mr. Robert Whalen, Niowave, Inc.	Radioisotope Production at Niowave.pdf
The Mirion Spectroscopic Stack Monitor	Dr. Jim Zickefoose, Mirion Technologies (Canberra), Inc.	The Mirion Spectroscopic Stack Monitor.pdf
The Case for Silicon in Beta-Gamma Radioxenon Detectors	Dr. Michael Foxe, Pacific Northwest National Laboratory	The Case for Silicon in Beta-Gamma Radioxenon Detectors.pdf
Released – July 10, 2020		
Videos	**Presenter**	**Presentation Link**
Xenon International	Dr. James Hayes, Pacific Northwest National Laboratory	Xenon International.pdf
A Review of WOSMIP Remote	Dr. Ted Bowyer, Pacific Northwest National Laboratory	
Roundtable for Stack Monitoring Data	Virtual Roundtable for Stack Monitoring Data	Roundtable Questions.pdf
Virtual Tour		
Virtual Tour of Mirion Technologies, Inc.	Mirion Technologies, Inc. Virtual Tour	
Bonus Material		
INVAP Virtual Tour	INVAP Virtual Tour	

Appendix 2

Samples of WOSMIP Remote Topics

Overview of WOSMIP Remote and Plans for WOSMIP VIII

Presenter: Dr. Ted Bowyer, Pacific Northwest National Laboratory

Where is WOSMIP coming from?

Presenter: Dr. Paul R.J. Saey, WOSMIP Scientific Advisor

Source Term Analysis of Xenon (STAX) Update

Presenter: Dr. Judah Friese, Pacific Northwest National Laboratory

Presentation: Source Term Analysis of Xenon (STAX) Update.pdf

The Impact of Molten Salt Reactors

Presenter: Dr. Jonathan Burnett, Pacific Northwest National Laboratory

Presentation: The Impact of Molten Salt Reactors_Burnett.pdf

TXL Deployments

Presenter: Mr. Ian Cameron, Pacific Northwest National Laboratory