WOSMIP V – 2015

The fifth Workshop on Signatures of Medical and Industrial Isotope Production (WOSMIP) was held in Brussels, Belgium on May 12-14, 2015. The focus of the workshop was to bring together representatives from the medical isotope production (MIP) and nuclear explosion monitoring communities to discuss ways to mitigate the effects of radioxenon emissions from fission-based MIP on the verification efforts for the Comprehensive Nuclear-Test-Ban Treaty (CTBT). Discussions at this workshop focused on new developments in International Monitoring System (IMS) noble gas network and sensors, the science of radioxenon emissions and atmospheric transport, updates from medical isotope producers on production processes and facilities, technologies used to measure radioxenon stack releases, research and development targeted at reducing radioxenon emissions and methods for data sharing between the communities. This overview presents major outcomes from the workshop.

WOSMIP V featured the largest representation of current and prospective isotope producers of any WOSMIP workshop to date. Fourteen current or prospective medical isotope producers attended the meeting and shared detailed information on current and future MIP. This information will aid the community to better understand the effects of MIP on monitoring. Additionally, several producers announced their intent to work toward achieving the voluntary radioxenon release goal of $5x10^9$ Bq/day as derived from scientific studies presented at WOSMIP IV, and one major producer states that it is already meeting the goal in routine operations.

During the introductory session, the International Atomic Energy Agency (IAEA) introduced a coordinated research project (CRP) on the sharing and developing of protocols to further minimize radioactive gaseous emissions to the environment in MIP. This CRP, which complements the WOSMIP effort, will seek to identify important technical issues related to radioxenon releases from current and possible future MIP facilities with the goal of creating guidelines on how to minimize and mitigate radioactive gaseous emissions. The IAEA has already received several requests from member states to participate in the CRP, and other interested parties are encouraged to participate.

The session focused on stack release measurements detailed the potential for stack release data from MIP facilities to assist the CTBTO in studying the impact of MIP on IMS network performance and assisting NDC experts in their tasks related to treaty verification. Using stack release data along with atmospheric transport modeling (ATM) has the potential to quantify the effect of MIP releases on the observations made at stations of the IMS. While several producers have already shared stack data on a provisional basis, several additional producers also offered to share stack release data. Additionally, the CTBTO announced that it will begin collecting stack data on an experimental basis for the purpose of scientific studies relevant to the CTBT. The CTBTO will also continue to work with producers on issues related to data confidentiality and data surety.

A session covering other aspects of MIP combined several diverse subjects including: lessons learned from highly enriched uranium (HEU) to low enriched uranium (LEU) conversion and how they relate to radioxenon emissions; and development of disposable radioxenon scrubbers. Furthermore, representatives from the Republic of Korea discussed the importance that they place on minimizing radioxenon emissions from their future production facility so as not to negatively affect continued efforts to monitor for nuclear explosions.

During the session on the ATM technology, as well as during the introductory session, various numerical simulation studies using hypothetical values of MIP emissions were reported. The focus of those studies is the impact that MIP emissions have on global radioxenon background, as exhibited in the IMS network. A new line of developments was drawn with scientific studies undertaken to estimate uncertainties in an atmospheric transport model. It was also emphasized that all presented studies would largely benefit from a reliable inventory of stack release data. Moreover, as illustrated with the results from the ATM Challenge, these inventories coupled to the IMS measurements, constitute an invaluable framework for further development, testing and validation of the atmospheric transport models. Findings on the importance of reliable inventories of stack release data for the IMS network performance were complemented with experimental studies illustrating their potential interference with underground detection capabilities during an on-site inspection for the CTBT.

In the final session of the workshop, research on new emission abatement technologies was shared with the community. Currently, the Belgian Nuclear Research Centre (SCK•CEN) has a contract from the CTBTO under EU funding to develop equipment that will soon be tested at the Institute for Radioelements (IRE) and potentially other isotope production facilities. In addition to technical solutions, the importance of communicating with the technical personnel at medical isotope production facilities was stressed. It was agreed that abatement remains the ideal solution to the radioxenon background problem, but other approaches such as sharing of stack release data are also important and can have significant impact.

Overall, WOSMIP V was a great success. Several positive outcomes from the workshop were achieved. The IAEA CRP for the reduction of gaseous emissions from MIP has been initiated. Many producers are working toward reducing radioxenon emissions and are willing to cooperate in sharing of stack release data. The CTBTO has agreed to accept stack data on an experimental basis, and advancements in mitigation technology are being made in several areas.