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10 Years of Collaboration Between The Norwegian Radiation and Nuclear Safety Authority and the Polessie State Radiation-Ecology Reserve of Belarus

DSA and the Polessie State Radiation – Ecology Reserve (PSRER) of the Republic of Belarus, the responsible authority for management of the Belarusian exclusion zone, have collaborated actively over the past 10 years with respect to the consequences of the Chernobyl Accident on the territory of Belarus.

Collaboration has focussed on the impacts of the accident on the area and the mitigation of those impacts as well as improving contact and experience exchange between DSA, the Belarusian authorities and other Nordic countries.

The Polessie State Radiation Ecology Reserve

The Chernobyl Accident of 1986 had a severe impact on the territory of Belarus and resulted in extensive radioactive contamination of large areas of the country. The legacy of the accident is still felt today and significant areas of the country remain heavily restricted due to contamination levels. Most of the areas impacted were rural or agricultural and recovery in the contaminated areas has been limited in the three decades since the accident. DSA has collaborated extensively with the authorities responsible for the Belarusian exclusion zone over the past 10 years and provide a general overview of the nature of that collaboration in this document. On February 24, 1988 a nature reserve was established by Belarusian Governmental decree within a 30-km zone radius of the Chernobyl NPP. Initially consisting of 131.3 thousand hectares, the Council of Ministers of Belarus renamed it to the Polessie State Radiation-Ecological Reserve (PSRER) in 1989 answering to the Department for Liquidation of the Consequences of the Accident at the Chernobyl NPP of the Ministry of Emergency Measures of Belarus. Expanded to a total of 216.2

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thousand hectares in 1993, the PSRER occupies part of the Hoyniksky, Braginsky and Narovlyansky areas of the Gomel district which prior to the accident had 92 settlements, now all abandoned. The PSRER is responsible for management of the Belarusian exclusion zone, controlling entry, conducting scientific research etc. The reserve also operates some experimental farms and other sites which function to serve the authorities initiatives in investigating possible uses for the zone. The primary goals of the PSRER in their management of the zone are:

- → Protection of the territory from unauthorized entry and fire prevention;
- → Measures to prevent the spread of radionuclides to adjoining areas,
- → Radioecological monitoring of land, air, water, flora and fauna;
- → Research on the influence of radioactive pollution on flora and fauna,
- → Afforestation, primarily areas subject to wind and water erosion.

DSA - PSRER collaboration over the past decade, both bilaterally and as part of international activities, has been multifaceted and within a number of frameworks.

Radioactive Contamination Of The Territory Of Belarus In The PSRER

Although numerous studies had been conducted within the Chernobyl exclusion zone in the years following the accident, significant uncertainties existed in maps of radionuclide distributions within the territory of PSRER, imposing difficulties in forecasting the future contamination situation. Plans were made to substantially improve current maps to assist in the planning of scientific, experimental, economic and social activity in the PSRER and to allow radiological assessments to be performed appropriately. The project was funded by the NATO Science for Peace program (Contract NATO SfP N 983057) and commenced in 2008 with the final report being delivered in 2011. Seven organizations from Norway, Belarus and Ukraine took part in the project.

Joint DSA-PSRER operations during NATO field work.

The results facilitated a systematic evaluation of the content of ^{137}Cs, ^{90}Sr, ^{238,239,240}Pu and ^{241}Am in soil, plants and animals of the Belarusian sector of the exclusion zone allowing the amounts of radionuclides deposited from Chernobyl on the Belarusian exclusion zone to be estimated more accurately than previously. The project allowed contamination maps for the border zones of Ukraine and Belarus to be linked. For the first time, accurate depictions of the contamination density of $^{238\text{-}240}$Pu and ^{241}Am were developed, forming the basis for development of a long-term strategy for the maintenance of the exclusion zone in Belarus and Ukraine and helped minimization of expenses in remediation of the contaminated territories.

Impact of Forest Fires on Radioactive Contaminants in the PSRER

The Chernobyl exclusion zone is vulnerable to forest and wild fires and such fires can re-suspend and transport contamination outside the territory of the zone as well as constituting a radiological hazard for the local area and staff. Between 2012 and 2014 the Norwegian Ministry of Foreign Affairs funded a bilateral project between Norway and Belarus on the matter of forest fires and their impacts within the PSRER (Grant Number BLR-11/004). The project involved a detailed assessment of the impacts of previous fires with respect to levels and the form and behaviour of such contaminants over time. Redistribution of contamination within the PSRER as a result of forest fires was assessed. The role of fire with respect to the uptake of contaminants by plant species was also assessed. The results of the project fed into the PSRERs management strategy with respect to fire incidents.

Forest fire damage on contaminated lands of the PSRER.

Emergency Preparedness: Nordic – Belarusian Collaboration

DSA coordinated two collaborative projects between the PSRER and relevant Nordic authorities in relation to emergency response during the period 2015 to 2016.

Nordic and Belarusian participants in the NKS funded GAMFAC project.

The purpose of these projects was to facilitate technical and experience exchange between the Nordic and Belarusian partners as well as providing an opportunity for the Nordic partners to conduct operations within a highly contaminated area. Both projects were financed under by the Nordic Nuclear Safety (NKS) organisation (contracts: AFT_NKS-B_2015_5 and AFT/B(14)4)). The projects focussed on field operations using emergency response systems and assets. The first project was oriented towards rapid mapping of fallout using vehicle mounted systems in areas of high contamination. The second project involved the use of in-situ based technical systems for determining levels of fallout and the behaviour of contaminants in a variety of environment types. The projects served to establish better contact between the Nordic authorities and the PSRER as well as enabling experience and technical exchanges between the countries.

Management of Forest Resources

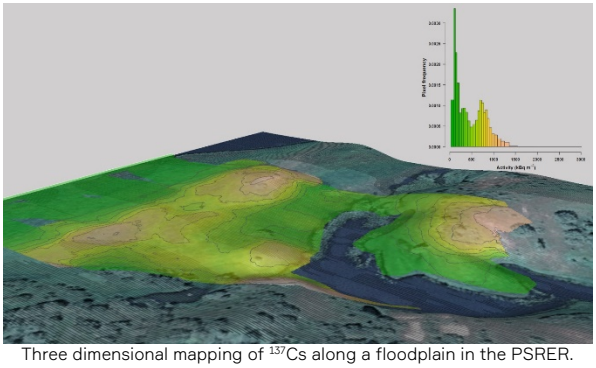
The area of Belarus with the most forest coverage is the Gomel region and some 2 million ha (21 % of the forest fund area) continues to be impacted by contamination derived from Chernobyl. Wood harvesting is prohibited in areas with contamination densities in excess of 1.4 MBq m^2.

Joint DSA – PSRER field work in developing field methods for assaying trees for contaminants.

The ability to estimate the contamination levels of trees prior to harvesting reduces costs associated with planning harvesting, reduces waste related to timber being found to be above regulatory limits after harvesting and makes forest management more effective. In collaboration with the University of Stirling, UK, a technical solution facilitating the estimation of contamination in trees prior to harvesting was developed allowing rapid, robust estimation of the ^{137}Cs content of trees prior to harvesting and provided a means of reducing costs and effort in ensuring trees selected for harvesting were below regulatory limits.

Redistribution of contamination within the PSRER

Contamination deposited over the PSRER has behaved dynamically within the environment and understanding the redistribution processes is vital in future management and understanding of the exclusion zone. A joint project between the UK, Belarus and Norway aimed at applying advanced techniques for understanding the behaviour of ^{137}Cs on the landscape level and the effect of natural processes on that behaviour.



Three dimensional mapping of ^{137}Cs along a floodplain in the PSRER.

The results of the project provided important information as to the role of environmental factors in controlling the distribution and mobility of contaminants within the ecosystem and how various factors governed the nature of the deposition at the time of the accident. Such information contributes to a better understanding of contaminant behaviour and how the effects of environmental and climate change may impact the contaminant load of the PSRER in the future.

Further reading

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