

Where It All Begins

by Sasha Henriques

Safeguards inspectors travel to nuclear facilities around the world, but few have ever seen a uranium mine — the source of the raw material for nuclear fuel. The IAEA organises training exercises for inspectors so



1 Dolni Rozinka is a uranium mine in the Czech Republic, situated 180 km (113 miles) east of Prague. Training for IAEA safeguards inspectors begins with a trip down the mine shaft.



2 Accompanied by the sounds of dripping water and creaking steel, inspectors travel 1050 metres below the surface to witness firsthand the underground uranium mining operations. Here, two IAEA staff members gingerly exit one of the mine's lifts.



they can become familiar with the so-called ‘front end’ of the nuclear fuel cycle. This photo essay records one such exercise carried out at a uranium mine in the Czech Republic.



3 Miners drilling shot holes so they can blast out the uranium-bearing rock at Rozna I, the last active uranium mine in central Europe. They work up to 1200 metres below the surface, for six straight hours, five days a week. Because miners are exposed to ionizing radiation, they are only allowed to work 2100 shifts underground in their lifetime. For a number of years the Czech Republic has been between the eighth and the tenth largest uranium producer in the world.



4 On the surface, one of the head frames for the mine’s elevators rises high into the sky. Czech mines supply around 30% of the uranium requirements for the country’s two nuclear power plants.



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Uranium ore is processed into a concentrate known as yellowcake, which is produced at a plant a few kilometres from the mine.



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At the uranium processing plant, an IAEA safeguards inspector gets ready to take a sample of yellowcake for analysis.



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Yellowcake is packed in special, tightly sealed steel drums similar in size to oil barrels. Each weighs no more than 350 kg when full.

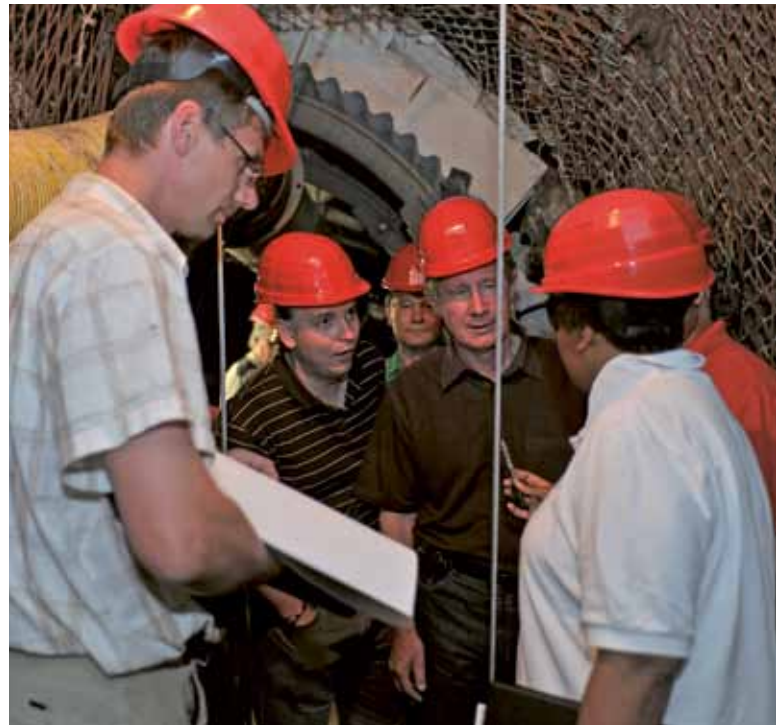


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Inspectors check the barrels which are ready to be shipped abroad. Only countries that have an Additional Protocol are required to declare their yellowcake stockpiles to the IAEA. As of March 2010, only 95 countries had Additional Protocols in force.



9 Inspectors' curiosity is aroused by waste water treatment technology using both ion-exchange and reverse osmosis processes to remove uranium and heavy metals from wastewater. The water treatment plants are located inside the uranium remediated areas as well as in the chemical processing plant.



10 When abandoned mines are flooded, the water rising to the surface contains some uranium and other contaminants. So, it must be treated before being discharged into the surrounding area. Here, mine managers discuss the finer points of water collection and treatment with the inspectors.



11 Aboveground, inspectors go through more training exercises designed to improve their skills with technologies and procedures that they could expect to use during inspections at uranium mining and ore processing facilities.



12 Inspectors need to learn how to read a site's landscape to detect signs of possible clandestine nuclear activities. Here, the trainers use the area's decommissioned mine shafts and remediated land to create realistic exercises for inspectors.