

## Uraniferous Mine Reclamation

The North Dakota AML Program reclaimed the Belfield uraniferous lignite surface mine during the 2004 summer construction season. The Belfield AML Site is located in the southwestern portion of the state. Some of the coal deposits found on this area contained higher than normal concentrations of uranium.

The nearby volcanics were originally the host material for the uranium. As this overlying formation eroded groundwater leached the uranium from the uranium-bearing formation and transported the uranium downward and laterally through the permeable sandstone strata located above the coal bed. The uranium-bearing water percolated downward and reached the coal. The uranium remained in the coal because the carbonaceous material acted as filters to concentrate and cause fixation of the uranium as a result of ion exchange or by the formation of organo-metallic compounds.

The Belfield mine was a surface mine where scrapers removed the overburden. Once the lignite's uraniferous zone was reached the uranium bearing coal was piled in the pit and burned. The burning process concentrated the uranium in the ash. The uraniferous ash was loaded on trucks and hauled to a processing plant in the nearby town of Belfield.

The spillage of the uranium ash in the pit resulted in higher than normal radiation levels within the mine. A scintillometer (Ludlum Meter) was utilized to conduct a radiation survey of the site. Background count within this area is between 15 and 20 microrentgens/hour. Pre-reclamation Ludlum Meter readings at the Belfield Site were between 30-300 microrentgens/hour. Most of the site had readings between 40 and 70 microrentgens/hour. Two small piles of contaminated material on-site had readings as high as 300 microrentgens/hour.

Selective handling and disposal of the contaminated material was incorporated into the reclamation operation. The pit bottom was sealed with non-radioactive spoil material then the radioactive material was disposed of in the pit between two 200' by 100' 16 mil polyethylene pit liners. The remaining pit was filled with non-radioactive spoil material. The project also included the elimination of 3200 feet of dangerous highwall left at the uraniferous strip mine. The construction contractor moved approximately 60,000 cubic yards of material to eliminate the hazards from this 14-acre site.

Post-reclamation scintillometer readings were between 20 and 30 microrentgens/hour except for a small area in the east hillside where the readings were above 35 microrentgens/hour. However, after topsoil was respread the average scintillometer readings were 25 microrentgens/hour for the entire site.

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