

Partizansk Coal Ash Dam Break and Spill - Observations

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by

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Partizansk is a city in Primorski Krai in the Russian Far East 240 kilometers east of Vladivostok and 40 kilometers north of Nahodka. It is located on the west side of the Partizanskaya River, the main tributary to Nahodka Bay. The Partizansk area has been a site of active coal mining since the late 19th century. Mines in the area extracted more than 1,000,000 tons per year through the 1980s and 1990s, though coal mining has ceased since the end of the Soviet Union. It is home to a large coal-fired electric power plant that consumed up to 3,500 tons of coal per day since it began operating in the early 1950s. The ash from the coal burned in the plant has been disposed of behind a circular dam located on the floodplain of the Partizansk River. In May 2004, portion of the dam broke and coal ash flowed out of the breach (hole) reaching the Partizansk River and Nahodka Bay.

The following observations and photos are compiled from a field trip to the dam site and surrounding area on July 22, 2004 at the Request of Institute for Social Action in Russia – Far East (ISAR – FE) in Vladivostok and their colleagues in the region.

Location Map – Southern Primorski Krai, Russian Far East



Observations

- 1) The dam containing coal ash produced at the Partizansk Coal-fired Electric Power Station broke on May 22, 2004, releasing approximately 160,000 cubic meters of ash into a drainage canal that flowed into a tributary to the Partizanskaya River which empties into Nahodka Bay in Primorski Krai, Russia east of Vladivostok. The break left a hole roughly 50 meter wide in the dam.
- 2) The dam is a ring dike-type impoundment constructed on the floodplain of the Partizanskaya River. Ash from the Partizansk power plant has been accumulating behind the dam since the early 1950s. The ash includes the residue from the burning of coal at the power plant - commonly called "bottom ash" - and portions of the ash collected from the smoke stack at power plant - commonly called "fly ash."
- 3) The dam has been built solely from coal ash and is over full, as ash reaches within 50 cm of the crest of the dam leaving almost no room for accumulation of water from precipitation or future ash generated at the plant. The ring dike encloses an area of roughly 1 kilometer x 1 kilometer x 20 meters and a volume of roughly 20,000,000 cubic meters.
- 4) The Power Plant is a part of the "Dalenergo" unit of United Energy Systems, the Russia-wide electric power consortium. It was initially constructed in the late 1940s and has operated, with periodic modifications, since that time.
- 5) The ring dike includes no piezometers or other systems for monitoring water levels or other structural aspects of the dam either within the coal ash or beneath the ash.
- 6) The drainage canal ditch parallels the west side of the ring dike and flowed to a creek that is tributary to the Partizanskaya River. The drainage canal was completely filled with ash during the spill for the roughly one kilometer between the breach site and the tributary creek. The ash released by the spill covered the bed and floodplain of the tributary creek and flowed into the Partizanskaya River.
- 7) The drainage ditch was approximately 5 m x 5m in cross section. Only about 25,000 cubic meters (5 m x 5m x 1000m) of the spilled fly ash collected in the drainage canal and roughly 135,000 cubic meters of spilled ash were flowed into the Partizanskaya River watershed.
- 8) An emergency drainage system of slotted pipe had been installed at the breach site at the time of a site visit on July 22, 2004 when material was observed being placed in the breach area. The pipe discharges liquid collected from the breach zone to the drainage canal where spilled fly ash had flowed. The 60 cm was flowing at 0.1 liter/second according to a contract geologist working on site.
- 9) No drainage systems or monitoring systems have been installed in any other sections of the ring dike containing the coal ash.
- 10) Monitoring data collected on May 26, 2004 showed copper and zinc concentrations in surface water exceeding water quality standards (PDKs) at all seven sampling points between

the spill site and Nahodka Bay approximately 40 kilometers downstream of the spill site. The copper PDK is 0.001 mg/l and samples ranged from 0.001 to 0.003 mg/l. The zinc PDK is 0.010 mg/l and samples ranged 0.27 to 0.33 mg/l. Other analytes exceeding PDKs included cadmium aluminum, pH, ammonia, among others.

11) No alternative site for disposal of future fly ash from the power plant have been identified. All coal mines in the Partizansk area have closed and are flooding, reducing or eliminating potential for mine backfill of fly ash. Mine water is projected to discharge to the surface in Spring 2005. No plans for treatment or other management of the mine water has been identified.

12) The problems at the Partizansk fly ash dam that contributed to its failure - overfull impoundment, lack of groundwater and stability monitoring, lack of future site preparation, and flood plain location - appear to exist at the Magadan Electric Power Plant and are likely to be occurring at many of the hundreds of coal-fired power plants around Russia and the former Soviet Union due to the widespread lack of monitoring and maintenance waste sites since 1990s.

SELECTED PHOTOS



1 of 7 - View of the breach area being filled in also showing the height of the dam, the discharge point for emergency drainage pipe at the base of the breach area, the slope of dam and the height of mature trees growing in dam



2 of 7 - View of drainage canal filled with fly ash and construction equipment removing portions of toe of dam



3 of 7 - View of crest of dam showing how full completely full it is with coal ash



4 of 7 - View of breach zone from within the ring dike dam



5 of 7 - View of ash where drainage canal discharges to tributary to Partizanskaya River



6 of 7- View of full coal ash disposal dam - a ring dike - at primary power plant at Magadan City located in flood plain of Magadan River



7 of 7 - View of downstream face of Magadan Power Plant coal ash dam showing the toe of the dam located in the floodplain of the Magadan River