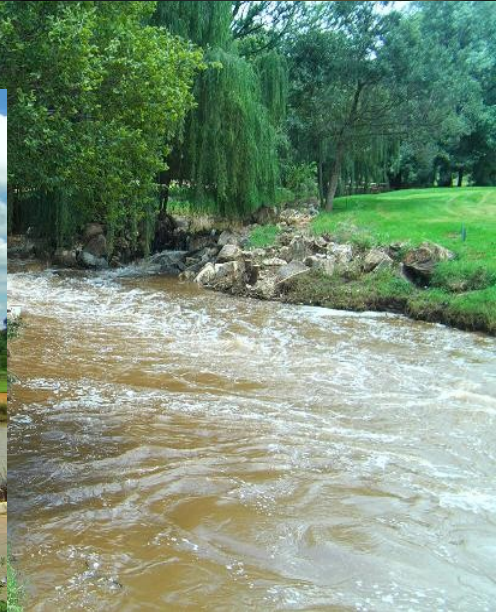


SOLUTIONS TO WATER CONTAMINATION IN SOUTH AFRICA FOR ALL SOCIAL CLASSES

Presented by Radiy (OAO/NNP), Moscow, Russia



It has been reported in the South African and international media that acid mine water under the central Witswatersrand Basin has been rising at an alarming rate of 47cm per day.

By February 2012 the critical environmental level of 150 metres will be reached under East Rand Proprietary Mine's south western vertical shaft in Boksburg. It's less than 1 km from the Cinderella shaft, an old ventilation shaft and the most likely point at which the acid water will emerge.

Acid mine drainage is water that flows over acid-bearing rock which has been exposed through mining. The water turns toxic as it rises to the surface of disused mines and makes contacts with air. It contains sulphuric acid, minerals and metals.

Mining houses had the necessary infrastructure in place to pump this water out, but as mines closed, pumping ceased. This resulted in the underground space created by mining, filling with water.

The space was created by the removal of 1,300 million tons of rock which yielded over 12 million kilograms of gold. Before the floods, the water level was at a depth of approximately 600 metres below ground rising at a rate of 15 metres per month. At that pace, the water would have spilled on to the surface in two and a half years.

However, this rate has increased and mines have been given between six and 18 months before this water reaches the surface. In Gauteng's eastern basin, water has been rising at a rate of 40 centimetres per day making it almost 7 times the usual rate. In the central basin, where the mines under Johannesburg are found, water is rising at 50 centimetres a day, up from 35 centimetres a day.

Millions of litres of highly acidic mine water is rising up under Johannesburg and, if left unchecked, could spill out into the streets of the multi million inhabitants city. It may result in catastrophic consequences for the Johannesburg central business district as well as residential areas. The acid water was 600m below the city's surface but rises rapidly.

If no action is taken, the central Rand Gold Mine's lower levels will flood within six months, with famous Gold Reef City's underground museum following suit in about 18 months. This water will also corrode the steel and concrete foundations of high – rise buildings, pollute drinking water and kill any crops irrigated with it.

The solution, according to Professor Terence McCarthy from the school of Geo-science at Wits University, is fairly simple: Pumping stations and treatment plants would need to be established. The station would pump the water to the surface, and the treatment plants would treat the water (using our technology!) and then drain it into nearby water systems. This would maintain the water level in the underground spaces at 250 metres below ground.

The Ministry of Water Affairs had previously agreed to install one new station and upgrade sludge treatment plants.

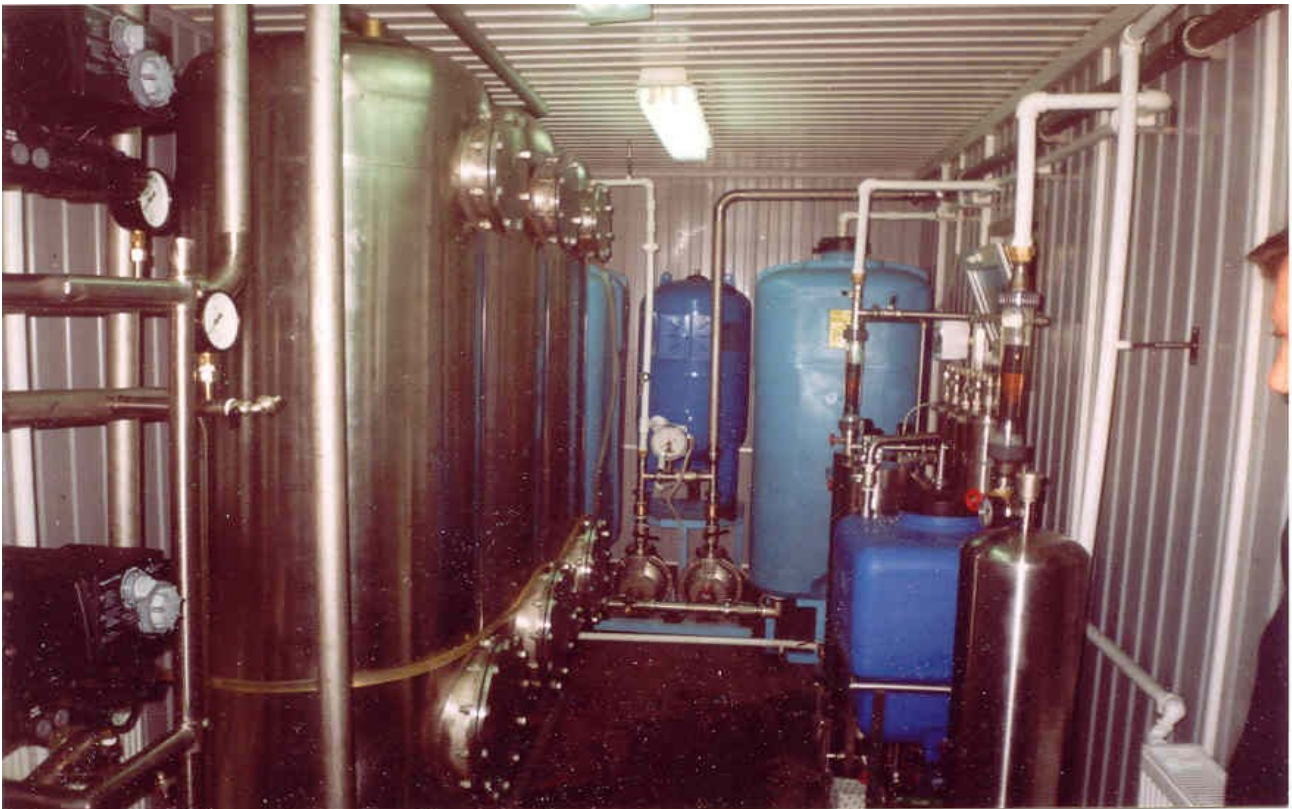
Radiy's water purification technology can be applied and solve the problem of contamination.

These are the general characteristics of our technology:

1. Water in the mine shafts can be decontaminated.
2. Desalination of Sea Water is less energy intensive; our mineral accompanies the usual reverse osmosis technology and this makes it 60% more effective.
3. Artesian sources of fossil water become usable for agriculture and consumption.
4. Average production costs is about 60% lower than usual water treatment.
5. Added minerals make the water become a health supplement.
6. Our SKOV material is designed to treat heavy arsenic as well as nitrates in water at a very competitive cost.
7. Sources which could not be tapped so far now become available.
8. Heavily polluted water can be treated at affordable costs.
9. No Chlorine is needed to keep water fresh and safe.
10. No chemicals are used in our water treatment process.

Rady has developed a new absorbent material that is a highly effective technology for clearing of underground waters as well as installations and the equipment for water preparation (Patents of the Russian Federation: 2050971, 2161066, 216706, 216707, 2238788, 2241535).

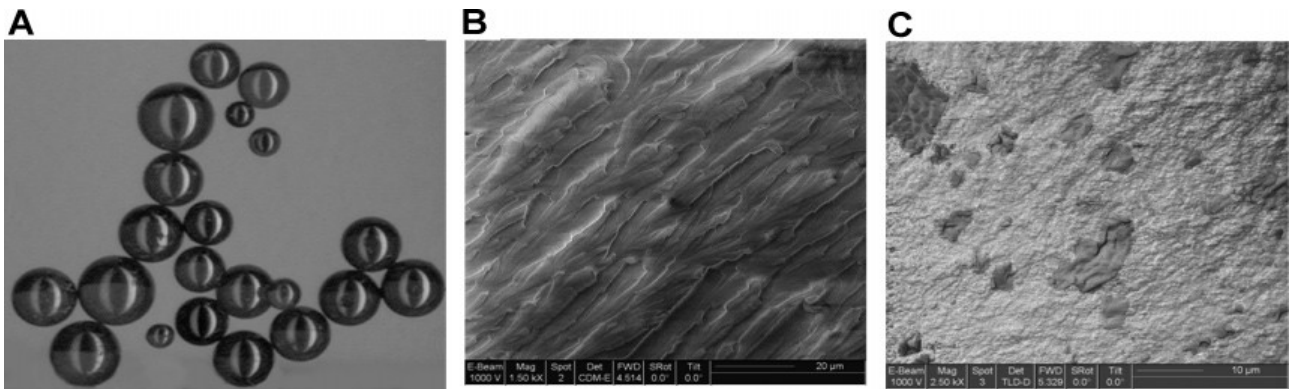
Together with the prestigious Vernadsky Institute of the Russian Academy of Sciences Rady looks back on 30 years of operational experience with artesian waters aiming at solving special technical problems.



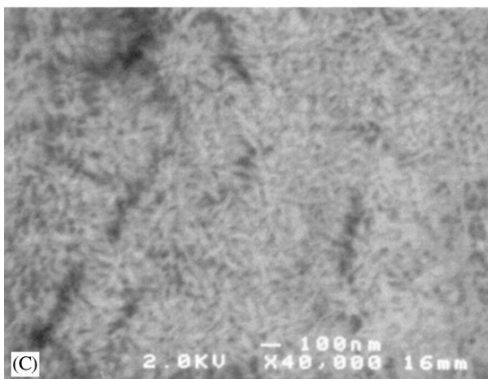
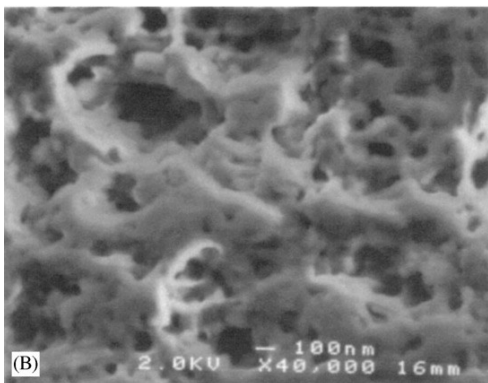
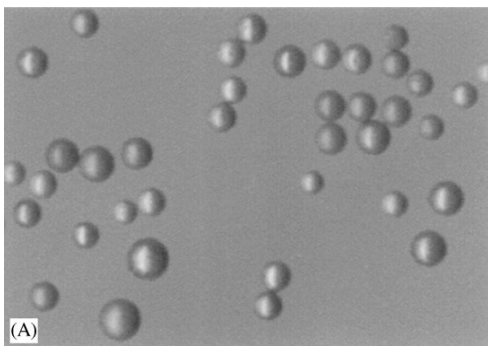
Rady has more than 20 installations in the areas of Siberia and the Far North and extensive experience in treating heavily contaminated underground waters.

The concept is based on the reverse osmosis method that features the usage of nano-sized absorbents.

Cationic resins with evenly spaced micro- and nano-particles of iron oxide hydrate



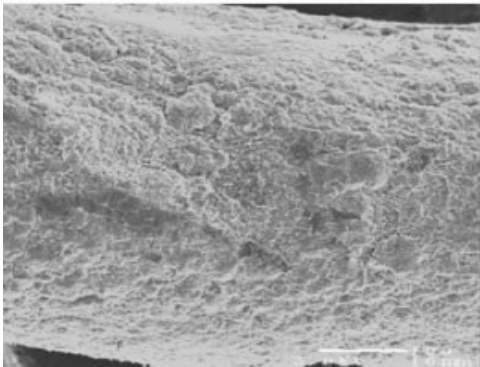
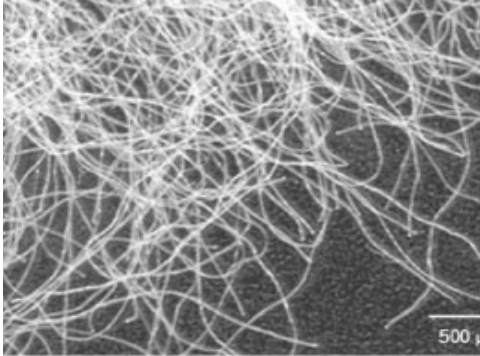
Cationic resins with evenly spaced micro- and nano-particles of iron oxide hydrate



Rady discovered a new absorbent material named **SKOV** (Patented in the Russian Federation: 2316479 and International (WiPO) patent: WO/2007/111531) which contains the base of natural hydrosilicate magnesium. Rady has a license to develop 100 million tons of said SKOV material.

Serpentinites

$(\text{Mg,Fe})_6[\text{Si}_4\text{O}_{10}](\text{OH})_6$ with the admixtures of Fe_3O_4 , Cr_2O_3 , NiO , MnO , CoO , CaO and Al_2O_3 . The basis is $(\text{MgOH})_2\text{SiO}_3$



Elementary hollow-fibre serpentine:
internal diameter equals 13 nanometers,
external equals 26 nanometers.

Domestic Units



On the left is a prototype unit for household water treatment. Radiy started production of units such as these in 2008.

These small installations can be brought down to the size of a dishwasher, and once in mass production will also not cost significantly more.

Business Units



On the left is a typical installation for an output of 240 tons per day for businesses.

The unit pictured here was installed by Radiy in a children's health and rehabilitation centre in the Volokamsk District of the Moscow Region.

Industrial Units



On the left is a typical installation for an output of up to 2000m³ per day for industry.



Radiy is actively supported by the Russian government as well as the party "United Russia" of Vladimir Putin. The President of the Russian parliament (the Duma), Boris Gryslon (above centre) visited Radiy's water purification plant recently and received first hand information from Radiy's president Magomet Konov (above left) and chief scientist Professor Dr. Ruslan Khamizov (above right).



Results of Independent Tests

Removal of iron from brackish well water in cyclical processes - absorption-back washing.

Initial Fe -content: 6.1 mg/l, TDS=4.9 g/l (Total mineralization).

Sorption material - granulated SKOV, 1-1.5 mm of grain sizes

Column bed: L = 350 mm

S= 2950 mm²

BV = 1 litre.

Independent tests performed by the "ECOSOFT" JSC, Kiev, Ukraine

Contact Us

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