Case Study

CHEMICAL SPILL
RED SLUDGE

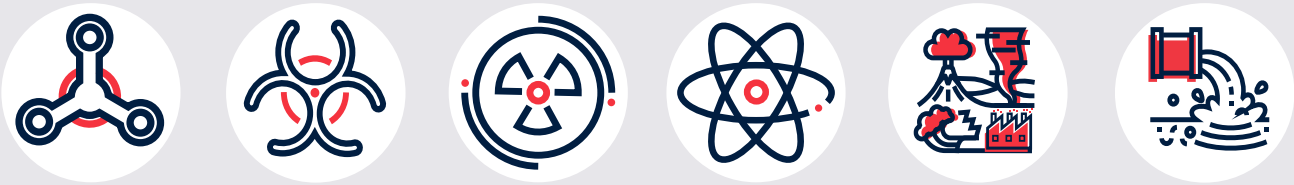
Technological and Biological (CBRN) Hazards

Hungary, 2010

IFRC

MAGYAR VÖRÖSKERESZT · HUNGARIAN RED CROSS

TECHNOLOGICAL AND BIOLOGICAL (CBRN) HAZARD PREPAREDNESS PROGRAMME



Contact information:
Martin Krottmayer, Senior Officer, Technological and Biological (CBRN) Hazard Preparedness, IFRC

Address: Chemin des Crêts 17, Petit-Saconnex, 1209 Geneva, Switzerland
Postal address: P.O. Box 303, 1211 Geneva 19, Switzerland
T +41 22 730 42 22 | E secretariat@ifrc.org | W ifrc.org

Timeline

2010

- **4 October:** Dam breach at alumina plant. Flood of toxic sludge. Hungarian Red Cross (HRC) mobilizes.
- **5 October:** Search and rescue / Emergency relief.
- **6 October:** State of Emergency declared.
- **5 - 7 October:** HRC info-points and needs assessment.
- **8 October:** Local population evacuated. HRC tasked with coordinating overall NGO response.
- **9 - 14 October:** Second evacuation. Construction of defence dykes.
- **11 October:** Environmental impact assessment. Contamination of Danube averted.
- **18 October:** Alumina plant put under state supervision.

2011

- **February:** Safer 'dry technology' introduced at plant.
- **July:** New housing and health centre completed. Families relocated. Contaminated soil cleared. State of Emergency lifted. Company supervision suspended.

2012

- Stronger national laws adopted [1] for chemical hazards.

1. *Act No. CXXVIII of 2011 concerning disaster management and amending certain related acts, adopted on 1 January 2012.*

Key Data

- Toxic spill of 1.8 million m^3 strongly alkaline liquid red sludge.
- Seven villages and 4,000 hectares flooded (1,035 ha of agricultural land).

- Ten people killed.
- Close to 300 people in need of medical care, with 120 hospitalized.
- Over 7,000 people affected due to displacement and loss of livelihoods.

- Loss of 386 homes.
- Areas of contaminated land cleared: 870,000 m^3 of contaminated substances and 146,000 m^3 of demolition rubble removed to designated dumps.
- On-going relief and financial assistance provided to 350 families.

I. Overview

At mid-day on 4 October 2010, the retaining wall of a caustic waste reservoir, owned by the Ajka Alumina plant, collapsed. Close to two million cubic metres of toxic alumina residue was released into the surrounding area. The thick wave of red sludge, up to two metres deep in places, reached the village of Kolontár within minutes and quickly flooded several nearby villages. Ten people were killed and close to 300 injured, with more than 120 requiring hospitalization due to chemical burns.

Because the accident occurred during daytime, when most people were away from their homes, casualties were not as high as might otherwise have been the case. Locals were completely unaware of the risks posed by the waste reservoirs, even though many of them were employed by the Ajka Alumina plant. In the immediate aftermath of the disaster, residents rushed back to save their animals and possessions, unwittingly exposing themselves to the toxic residue. This was also the case for first responders, including fire-fighters and Hungarian Red Cross (HRC) branch members, several of whom sustained burns from the seemingly innocuous 'dirty red water'.

The settlements of Kolontár, Devecser and Somlóvásárhely were the worst affected by the disaster. The flood swept away cars, tractors, fences – and caked everything in toxic mud. The government rapidly took the decision to demolish all buildings in the worst-contaminated areas. As a result, more than 300 families lost their homes and all of their belongings, and had to be permanently relocated.

The environmental impact was also substantial. Over 4,000 hectares (40 km^2) of land were contaminated, of which 1,036 hectares of arable land. The sludge also found its way into local rivers, killing fish and livestock. Even though subsequent monitoring showed lower toxicity than feared, overall levels were still high enough to be dangerous.

In total, more than 7,000 people were affected. The authorities consider this to have been Hungary's largest-ever industrial and environmental catastrophe.

Red Sludge

The process used at the Ajka plant extracts aluminium oxide, or alumina, from bauxite ore, which is then used to produce pure aluminium. The waste, known as red mud, is a mix of solid impurities, heavy metals (such as cadmium, cobalt and lead), and chemicals used in processing. This caustic mixture can burn skin on prolonged contact and is considered an environmental hazard.

II. OVERALL RESPONSE TO THE DISASTER

© Red Sludge. Hungarian Red Cross, 2010.

EMERGENCY PHASE

In the immediate aftermath of the disaster, local fire brigades, police, and civil protection officers were deployed to the area. The local branch of HRC was on the scene within hours, assisting with search and rescue operations, and evacuations.

The immediate priorities were:

- **Saving lives;**
- **Providing emergency relief and shelter;**
- **Cleaning and decontaminating areas in public use;**
- **Assessing water quality and eliminating sources of contaminated water.**

The Hungarian Red Cross (HRC) immediately mobilized a team of 50 staff and volunteers from the local branch, national HQ and the Budapest branch. They were subsequently commended for their work in search and rescue, in the very short time available before demolition of contaminated houses began. All ten fatalities were recovered, enabling families to find a measure of closure.

An additional 60 HRC volunteers were also mobilized to assist with evacuations in Devecser, in response to the risk of a second spill following the appearance of cracks in remaining dam structures.

A rapid needs assessment was undertaken by HRC during the first days. This highlighted the high levels of anxiety within the community and the need for up-to-date and accurate information. HRC responded by setting up two Information Points and hosting bi-weekly community meetings.

HRC was also tasked by the government to act as a 'bridge' between NGOs and authorities, and to coordinate the overall relief operation being undertaken by a range of charitable and religious organizations.

"When we got here the mud was two metres high," he says, sweeping his arm over the panorama of destruction. Roland's team of 50 staff and volunteers quickly set to work, erecting searchlights, and going house-to-house to look for survivors or those in need of rescue. At the same time, relief teams brought beds, blankets, food, and water to the hundreds of displaced people.'

Roland Grubert, Disaster Manager Hungarian Red Cross (on left), reached the scene of the disaster just hours after the wall of mud poured from the nearby alumina factory.

Source: Joe Lowry, IFRC, 5 October 2010

MAIN RESPONSE ACTIVITIES

© Red Sludge. Hungarian Red Cross, 2010.

Main HRC activities during the emergency response phase consisted of:

- Assisting with immediate search and rescue, and evacuations from Kolontár (550 people) and Devecser (200 people).
- Providing first-aid and transporting the injured to medical facilities.
- Delivering mineral water and distributing relief items (e.g. blankets, camp beds, tinned goods) to worst-affected settlements – approximately 350 families overall.
- Providing meals to both the local population and first-responders.
- Distributing protective equipment provided by national authorities (e.g. protective masks, goggles, rubber boots) to people at greatest risk.
- Setting up temporary shelters to accommodate evacuees [2].
- Providing on-going information and psychosocial support to the communities.
- Coordinating local relief activities.
- Ensuring communications and technical support from HRC National HQ.

2. *Most of the affected population chose to stay with relatives, and the temporary shelter in Várpalota was subsequently suspended. HRC continued to manage the shelter at the Ajka Sports Centre for 12 evacuees.*

RECOVERY PHASE

HRC launched a national fund-raising campaign, to provide financial assistance to the displaced over the longer term. A dedicated hotline and bank account resulted in cash donations of over HUF 193 million (USD 613,000 / EUR 530,000), in addition to goods in kind. These funds were used over the mid/long-term to assist displaced families with relief and household items, in close coordination with local authorities to avoid duplication.

Due to its close ties with all seven affected communities, the local HRC branch played a particularly crucial role in community engagement and in rebuilding resilience over the longer term. HRC branch staff and volunteers already benefitted from a high level of trust with the local population - in particular with the elderly, who were among those most severely affected by the disaster. After suddenly losing a lifetime's worth of labour, they had also lost all hope. Although generally wary of outsiders and experts (such as psychologists), locals felt comfortable talking to HRC. Appropriately trained community-based HRC volunteers were thus able to provide much-needed psychosocial support within a trusted environment.

Recovery activities undertaken by local authorities focused on clearing and cleaning public areas, decontaminating property (forecourts and courtyards, as well as vehicles and machinery), and continuously monitoring water sources, and air quality for dust concentration.

© Cleaning and clearing areas affected. Hungarian Red Cross, 2010.

RECONSTRUCTION PHASE

The government-appointed Disaster Relief Commissioner took firm control of reconstruction and rehabilitation activities, resulting in a clean-up and rebuilding effort which has drawn international attention as an example of effective management in the aftermath of a disaster.

Within nine months, all those who had lost their homes had been re-housed – the majority in newly-built communities, with fully-furnished houses designed specifically to reflect local needs and building styles. Others accepted compensation to relocate. In addition, over a thousand hectares of contaminated soil was removed and/or rehabilitated. A newly built health centre began operating in Devecser less than a year after the disaster.

As part of the longer-term recovery, HRC initiated a Community Resilience Programme to help the displaced regain their sense of community, and to rebuild ties between the different age groups and socio-economic segments of the population. A wide array of activities was organized by HRC on a regular basis until 2015 – ranging from first-aid training to cooking competitions – and many of these have now been integrated into village life. HRC also established a community centre in Devecser, which continues to thrive ten years later. HRC's initiative is seen as an exemplary resilience-building project and sets the template for future community engagement efforts.

© Community-based activities. Hungarian Red Cross, 2010.

III. SPECIFIC CHALLENGES

Nature of disaster

The disaster was sudden, unexpected, and multi-faceted – with severe **humanitarian and environmental consequences** - leading to the immediate evacuation of over 300 families. The unstable dam structure created an on-going threat. Initially, people (including first responders) were unaware of the extreme toxicity of the 'red mud' and, over the first few days, focused their efforts on saving homes and cleaning-up. The subsequent realization that houses would have to be demolished and whole communities relocated came as an additional and serious shock. Soil and water contamination meant that livelihoods were also affected. Added to this, the legal liabilities and uncertainty regarding the future of the Ajka plant – a significant employer in the area – heightened prevailing levels of uncertainty and anxiety.

Coordination

Initial coordination at the local level was hampered by the fact that local elections had been held the day before the disaster, and newly-elected officials were suddenly in charge of an unprecedented event for which they were ill-prepared. The national government quickly took control of all aspects of disaster response, with **well-defined decision-making structures, and clear goals for recovery**, for which it has been commended. The main focus was on compensating and relocating victims, mostly to newly-built communities – accomplished within nine months, as planned. Because of its strong links to the communities and its prior experience in disaster response, HRC was tasked by the government with

coordinating humanitarian relief amongst a host of local NGOs and religious charities. HRC also acted as a 'bridge' between these organizations and the authorities. Following this disaster, the government formally established a six-member 'National Humanitarian Committee' [3] - of which HRC is a member - to act as a coordinating body during national emergencies (e.g. the current COVID-19 response).

Communications

Due to a **lack of prior awareness-raising**, the communities surrounding the Ajka reservoirs were unaware of the potential risks involved, nor did they understand the toxic nature of the 'red mud' which flooded their homes. This led to some preventable injuries. Over the course of the recovery phase, communications from the authorities focused primarily on compensation and re-housing issues. Early on, HRC recognized the **need for regular and reliable communications** to assuage people's anxieties. HRC immediately set up two humanitarian information points for the affected communities, and held 'town hall' meetings on a bi-weekly basis, disseminating up-to-date information on healthcare and the availability of relief and other forms of support. Although the communities involved were small and rural, they were not homogenous and included a substantial Roma minority. This posed some additional challenges, in terms of trying to meet a range of varied expectations.

"Public awareness is a crucial task for the Red Cross during such times. Local communities prefer to accept guidance from the Red Cross, because we're part of their community. They have confidence in us."

Dr. Brigitta Sáfár, Head of Disaster Management,
Hungarian Red Cross

3. *There was no dedicated humanitarian coordination structure in Hungary at the time of the disaster*

IV. RCRC PERSPECTIVE – KEY RECOMMENDATIONS

Based on their experience from the 'Red Sludge Disaster' of 2010, the Hungarian Red Cross shares the following observations and recommendations:

1. **MULTI-HAZARD RISK ASSESSMENT:** There is a need to clearly identify the potential risks posed by industrial facilities. At a minimum, National Societies have an **advocacy role** to play vis-à-vis governments (national and local), and the private sector. Once technological and CBRN hazards are identified, NSs could also play a greater role in **awareness-raising and technological hazard preparedness activities.**

2. **COMMUNITY AWARENESS-RAISING:** Public awareness is **crucial if unnecessary injuries and deaths are to be avoided.** People need to be informed of the risks posed by local industrial facilities, and what to do in the event of a disaster. The availability of pre-printed risk communications material, with key messages, would be a useful tool for National Societies and facilitate a rapid response to any unexpected technological/CBRN disasters.

3. **USING RCRC STRENGTHS AND SOLIDARITY:** Lessons learned from similar disasters have enabled RCRC to improve its overall response capacities and develop specific areas of expertise. These include **psychosocial support and community engagement** – both of which were used most effectively by HRC in this instance. National Societies should also take advantage of the full range of support available to them internationally – including DREF and emergency appeals, surge capacity, and other well-established multilateral and bilateral mechanisms. In future, these mechanisms could be enhanced by specialized expertise from an **IFRC CBRN technical advisor**, as well access to **regional PPE stock** when in-country supplies are insufficient.

4. **COORDINATION:** National Societies have an important coordination role to play as auxiliaries to the public authorities, and should not hesitate to put themselves forward, even when their role in the event of a technological/CBRN disaster has not been fully defined. They should also work with national authorities to ensure that alert mechanisms are fully functional and timely, to enable an immediate response to all types of disasters on the part of NSs and other civil society actors.

IV. FINAL WORD

"I think it was both an ecological catastrophe and an industrial accident. And I feel strongly, and many people feel strongly here, that it was preventable, that people should have seen it coming, there should have been a system which predicted it, and warned us in advance. As it was, we had no warning whatsoever."

Tamás Toldi, the Mayor of Kolontár, one year after the disaster, as he watches the remaining wall of the post office crumble.

Source: 'On mud and miracles', Nick Thorpe, Hungarian Review, Vol. XI, No. 5, 15 September 2011)

Sources:

- 'A Flood of Red Sludge One Year Later', Alan Taylor, The Atlantic, 28 September 2011 https://www.theatlantic.com/photo/2011/09/a-flood-of-red-sludge-one-year-later/100158/

- 'Hungarian Red Cross mobilizes, as toxic mud spill leaves three dead, dozens injured', Joe Lowry, IFRC Communications Manager, Europe Zone, 5 October 2010, https://reliefweb.int/report/hungary/hungarian-red-cross-mobilises-toxic-mud-spill-leaves-three-dead-dozens-injured

- Hungarian Red Cross, Activity report for the period of 7– 14 October 2010

- 'HUNGARIAN RED SLUDGE DISASTER: Crisis Intervention and Aftercare – Proposed Protocols and Feasibility', Annamária V.Komlósi, Júlia Richter, Sándor Rózsa & János Fodor, European Journal of Mental Health 10 (2015) 23–43 DOI: 10.5708/EJMH.10.2015.1.2 https://issuu.com/mental-health/docs/2015_1_web_8581e673711cdd

- Hungary – Red Sludge Report 2010, Hungarian Government Yearbook 2011 https://www.katasztrofavedelem.hu/application/uploads/yearbook/public/2010/red_sludge_en.pdf

- 'Hungary: Chemical Spill' - Information Bulletin no. 1, IFRC, 13 October 2010 https://www.ifrc.org/docs/appeals/rpts10/IB131010HU.pdf

- 'Hungary: Toxic red mud destroys a lifetime's work' - Joe Lowry, IFRC Communications Manager, Europe Zone, 6 October 2010 https://www.ifrc.org/en/news-and-media/news-stories/europe-central-asia/hungary/hungary-toxic-red-mud-destroys-a-lifetimes-work/?print=true

- 'On mud and miracles', Nick Thorpe, Hungarian Review, Vol. XI, No. 5, 15 September 2011, http://www.hungarianreview.com/article/on_mud_and_miracles

Contact information

Martin Krottmayer
Senior Officer, Technological and Biological (CBRN) Hazard Preparedness, IFRC
martin.krottmayer@ifrc.org
https://media.ifrc.org/ifrc/techbiohazards/

IFRC

MAGYAR VÖRÖSKERESZT · HUNGARIAN RED CROSS