11 Key actors of the red sludge disaster in Hungary

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Introduction

The case study refers first to the concrete, specific and single case, but science is also interested in the abstract and general character (Flyvbjerg, 2011). The difference between the single and concrete case and general character means an old philosophical problem. A case study allows the following type of generalization: 'If it *is* valid for this case, it *may be* valid for all (or many) cases.' So the case study says what *is* true for a mining company *may be* true for all mining companies that caused some kind of environmental pollution. I think that the method of the case study is a very productive and heuristic method which leads to interesting hypotheses, but, of course, not theses. These hypotheses are needed for further research to confirm.

All industrial accidents (e.g. the Bhopal gas tragedy in 1984, the Exxon Valdez oil spill in 1989, the Baia Mare cyanide spill in 2000) have common actors: the *polluter*, the *victims* and the *environmental protection agency*. In this chapter I will study the behaviour of these three key actors of the red sludge disaster in Hungary. This disaster occurred on 4 October 2010 when a reservoir burst at the huge Ajka Timföldgyár Zrt. aluminium plant, located around 165 kilometres southwest of Budapest. The Ajka alumina factory was taken over by Hungarian Aluminium Production and Trade Company (MAL Co. Ltd).

We expect the company to be liable, and the agency to be working fairly. Theoretically just or fair government agency should balance the interests of the company and the local residents (potential victims). The case of toxic sludge catastrophe in Hungary shows that the company (MAL) worked negligently and the authority was permissive to the company. The government agency prefers the interests of the big company to the local residents (potential victims). In my opinion, these problems are not only characteristic of the MAL, but usually of the big companies and their regulating authorities, as well.

International outlook

Aluminium is produced from bauxite in two stages. Stage 1 is converting bauxite to alumina by Bayer process. Stage 2 is converting alumina to aluminium by the Hall–Heroult process. Bauxite is one of the (not very common) components of the Earth's crust. It is produced by surface mining. The world's three top bauxite producer countries are Australia, China and Brazil. In 2003, Hungary was ranked as sixteenth largest bauxite producer in the world, with about half a million tonnes a year. Later this value dropped by half since then, as today, only MAL produced bauxite in Hungary (Jávor and Hargitai, 2011: 124–5).

Bauxite contains a mix of minerals, including aluminium, iron oxides and titanium dioxides. It is dug out of the ground and washed with hot sodium hydroxide as part of the Bayer process, invented in the nineteenth century. This extracts the aluminium oxide, or alumina, from the ore that is subsequently 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 the processing chemicals. The caustic mixture can burn skin on prolonged contact and is an environmental liability, and is difficult to store (Jha, 2010). During the production of four tonnes of bauxite, four tonnes of red mud is formed, while only one tonne of aluminium can be produced.[1]

The biggest challenge for every alumina producer is the proper red mud storage. Presently this by-product cannot be processed or recycled in an economic and efficient way. Some countries, such as France, Greece and Japan, still dispose washed red mud slurry into the sea, saying that alkali contents of red slurry is neutralized by certain components of seawater. This solution is not allowed by EU laws; however, France has gained permission for sea disposal until 2015. According to data provided by Red Mud Project, today only seven of the world's 84 alumina plants dispose of red mud into the sea.[2]

Mainland storing technology depends on environmental conditions to some extent. Previously, only diluted red mud was pumped out and it was left to thicken and dry by itself, however, without proper protection towards the subsoil, it could easily result in the contamination of the environment, particularly of the ground water. That is why reservoirs with double, membrane polymer and clay isolation are widespread, as this way toxic materials cannot leak out to the environment.

During the thickening process, the alkaline fluid, which accumulates on the surface as a 'surplus', is normally driven back to the alumina plant. Dry red mud storing, which poses less environmental risk, is also becoming more and more common. For example, several Australian companies (Queensland Alumina Limited, Rio Tinto Alcan Gove Alumina Plant and Yarwun Plant) reduce alkalinity of red mud down to pH 9 by a relatively new process using seawater. In the three alumina plants of the United States (in Texas and Louisiana) they use more modern but expensive technology (Jávor and Hargitai, 2011: 127).

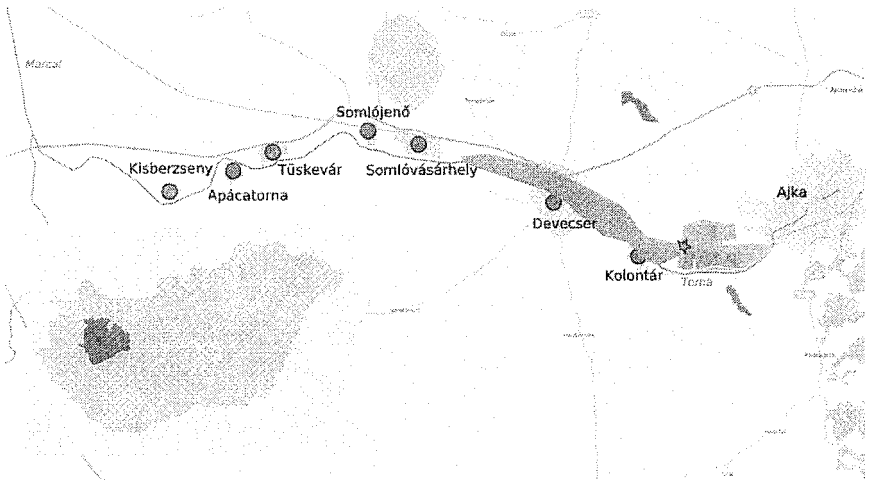

Figure 11.1 Maps about red sludge disaster

Source: © OpenStreetMap contributors, CC-BY-SA; Juhasz peter; G ambrus; http://en.wikipedia.org/wiki/File:Ajkai_vörösiszap-katasztrófa_vázlat_2010-10-04.svg

A widespread drying method in the US is to settle red mud and remove water from the surface continuously. According to experts, in the United States an industrial disaster similar to the one happened in Hungary cannot occur even in case of a breach in the dam, as the dry material could not flow out. Besides the USA, dry storing is also widespread in some Australian and Brazilian alumina plants. In China, about 10 per cent of the red mud is reused they produce bricks out of it. In Japan, bauxite is enriched before the Bayer process in order to reduce the quantity of red mud produced at the end (Jávor and Hargitai, 2011: 128).

There has never been a similar accident to the Kolontar catastrophe in the world. Wet red mud reservoirs usually damage the environment with a leakage towards the subsoil. The Kolontár Report collected a few similar major industrial accidents (the Buffalo Creek flood; dioxin poisoning in Seveso; the tragedy in Bhopal; an oil disaster in the Gulf of Mexico; the accident of the Prestige crude oil tanker; the accident at Baia Mare and the cyanide contamination of the river Tisza; Jávor and Hargitai, 2011: 132–9).

Short description of the disaster by MAL

The Hungarian Aluminum Production and Trade Company (MAL Co. Ltd) is a significant player in Hungarian economy. It is one of the largest employers in the region, and together with its suppliers it provides jobs to 6,000 people. MAL is 100 per cent in Hungarian ownership. Its registered capital is €10 million (HUF3 billion).

The present ownership structure was established in a relatively complicated process under a socialist government (between 1995 and 1997). The Ajka alumina factory, which was originally founded in 1943, was taken over by MAL, a company set up in 1995 following the widespread privatisation of the industry in the 1990s. According to the Hungarian ecological party (LMP), 'guided privatization' occurred (Jávor and Hargitai, 2011: 21). Stefan Steinberg noted that:

> A key figure in the privatisation process was the former prime minister and leader of the social democratic MSZP party, Ferenc Gyurcsany. Gyurcsany, one of Hungary's richest citizens, is known to have gained part of his own huge personal fortune from the privatisation of the aluminium industry.
>
> (Steinberg, 2010)

MAL (similarly to other firms) produces alum earth by the Bayer technology. The MAL stored this mixed material (red mud and alkaloids) in various containment ponds. In the MAL factory 700,000 tonnes of red mud is formed every year, and in total 14.5 million tonnes of this material is stored from previous production. The disposal and neutralizing of this quantity would cost an enormous amount of money, and the company did not even put any effort towards trying it. This hazardous waste is a constant and growing threat on the surroundings.

On 4 October 2010, at 12:05pm, one of the reservoir walls ruptured and a lot of toxic sludge was released. About 1.8 million m^3 of strongly alkaline (pH 13) liquid red sludge flooded out to cover nearby settlements and 4,000 hectares (40 km^2, or 15 square miles) in area. This section of reservoir (measuring 300m × 500m) belongs to MAL Co. Ltd. In this section the amount of alkaline above the red mud with the depth of 6–7 metres was 1 million tonnes. The waste reservoir is at a height of 50–60 metres above the village. The toxic wave reached the first village, Kolontar in five minutes where 8 people drowned in the 2 metre high liquid. In the meantime the death of 2 people and other injuries was caused by the caustic effect of the alkali. If the rupture of the dam had happened at night, the catastrophe would have been more serious.[3]

Ten people lost their lives in the disaster and 406 needed medical care, of which 120 were seriously injured. More than 300 families (731 people) lost their homes. The settlements of Kolontár, Devecser and Somlóvásárhely were the worst affected by the disaster. The flood swept away everything – cars, tractors, fences. The damage to agriculture and the environment was also significant because red sludge flooded the Torna brook; thus it covered nearby settlements and 4000 hectares, including 1,036 hectares of agricultural land.[4] Hungarian authorities report that a total of 7,000 people have been affected. It was Hungary's largest ever industrial and environmental catastrophe.

Key players of industrial catastrophe

All industrial accidents have common actors, which are briefly summarized as follows: the *polluter* (or company causing damage, in this case MAL); *victims*, which are usually neighbouring inhabitants and other companies, maybe future generations and non-human beings); *environmental protection agencies* (governmental organizations, which may be local, regional, national or global); and also disaster management agencies, courts, environmental organizations (non-governmental organizations), media, insurance companies and banks. First, I am examining the behaviour of the top three players before and after the disaster. Then I will try to outline some morals of it. From the facts investigated, a strong hypothesis can be formulated considering MAL, while only a weak one can be formulated considering the other companies.

Behaviour of MAL before the pollution

Seven empirical facts in relation to the behaviour of MAL before the pollution:

1. As for waste disposal, MAL's technology operation was not sustainable. It constantly produced extreme alkaline red mud sludge. At least the alkali recycling should have been resolved. During the handling of the waste, the MAL did not use the best available technology (the so called dry technology; Report, 2011: 20).
2. Concerning the highly alkaline sludge disposal, MAL did not comply with its own rules. Approximately 6 metres of liquid alkali base was on the solid red mud, while a maximum thickness of 1 metre was allowed. Less fluid would cause less damage (Jávor and Hargitai, 2011: 53).
3. The MAL previously reached an agreement with the authorities, which stated that the red mud pond should *not be considered hazardous* waste reservoir.
4. The subsequent analysis of the available satellite images showed that the north-western wall of the reservoir was moving steadily: a centimetre per year. Such examinations could have been performed even before the tragedy. However, before the disaster neither the management nor the inspection of authorities examined these images (Jávor and Hargitai, 2011: 30–1).
5. MAL had not prepared a reserve safety barrier which would have stopped the movement of alkaline sludge.
6. There were warning signs that the company ignored. The day before the red sludge broke out the MAL safety instruments showed abnormal readings. These instruments gave the alarm warning half an hour before the accident occurred.
7. MAL liability insurance did not cover the victims that are the insurer was not paying anyone.

There are strong hypotheses in relation to the behaviour of MAL before the pollution. Steinberg averred that 'The cause of the catastrophe was the drive for profit' (Steinberg, 2010). MAL wanted to solve environmental safety at the lowest possible cost:

> Dumping the red sludge costs virtually nothing: the toxic slurry is stored in a reservoir whose walls are made out of slag, ashes, or soil, and is occasionally covered with sewage-sludge or other, also harmful waste under the pretext of recultivation.
>
> (ibid.)

Because of lower costs, MAL's profits increase; on the other hand, it enhances the firm's competitiveness. The behaviour of MAL is not characterized by corporate social responsibility (CSR). MAL follows up the practice of the 'private profit and social risk (and cost)'.

There are weak hypotheses in relation to polluters, such as that all (mining) companies caused some kind of environmental pollution wanted to solve environmental safety at the lowest possible cost. We know this behaviour has characterized several companies (e.g. BP wanted to solve environmental safety at the lowest possible cost, and this arguably resulted in the Deepwater Horizon oil spill). So this weak (or working) hypothesis can be verified (or not) by the further research. Environmentalists remind us that it is often cheaper for these companies to take risks than to invest into environment protection, this being a form of socialization of risks and privatization of benefits.

No doubt firms in a competitive market should continue to reduce their costs and thus the environmental security-related costs will be reduced. Under the capitalist system many experts consider the issue of environmental protection hopeless. So, some radical environmentalist movements (e.g. deep ecology, social ecology, bioregionalism) refuse the capitalist system itself. I consider this problem more sophisticated. I think the market competition has a dual effect on the environment. The reduction in costs in general increases the environmental efficiency, and this is *good and useful.* On the other hand, reduction in'environmental costs' (that is in environmental security-related costs) is *harmful and bad.* For example, MAL should have built an emergency dike (barrier), which increases the (environmental) cost of production, but it would be necessary from an environmental point of view.

Environmental protection should *support* market competition in general, but it should *prevent* market competition in certain domains (related to 'environmental costs'). So we must accept that there are environmental costs where the logic of free market should not be used. (Modern capitalism has recognized that the *labour cost* as a special cost, where the market considerations have limitations.)

From the point of view of the economy, the pollution caused by MAL was

a *negative externality*. The concept of an externality is central issue for environmental economics. We can speak about externality if the economic activity in question involves participants (third parties or stakeholders) who do not take part in the market transaction. In this case we are faced with the danger that advantages arising from (direct) market activities are enjoyed exclusively by market actors (e.g. owners, managements, workers, consumers), while the disadvantages are suffered by indirect or non-market actors (particularly local residents).

Economic experts think that direct advantages (i.e. profit of the owners) or indirect advantages (i.e. creation of jobs or satisfaction of consumers' needs) always exceed the negative effects of an enterprise in which local residents are involved mainly. The issue of externality is regarded implicitly as of secondary importance in the current economic practice. Liberal economists often assume that the positive and negative externalities are balancing each other on social level, and that externalities in the private economy are insignificant. Laissez-fare economists such as Friedrich Hayek and Milton Friedman refer to externalities as the 'neighbourhood effect'. In the past this opinion might have been be true. Externalities may, however, be neither small nor localized.

A new situation has developed with the modern technology, as several authors emphasized (Ellul, 1964; Jonas, 1984; Daly, 1999). The effective potential of technology is increasing remarkably and is affecting people who live far away in space (in the other countries) and in time (the next generations). Because of this, society has to pay more and more attention to these negative effects which exist through non-market mediation. Society, of course, has numerous ways to force these firms to obey environment protection laws: the proper formulation of rules, the harsh punishment of rule-breakers, and so on.

The behaviour of MAL after the pollution

Three empirical facts in relation to the behaviour of MAL after the pollution:

1. After the pollution, MAL claimed that the red mud is not hazardous. Because of the redness, everyone thought that the main composition of the sewage material is red mud. It is true that the red mud is not dangerous in itself, but the effluent sludge (pH 13) was dangerous (Report, 2011: 4).
2. MAL claimed that only a minimal amount of pollutants was leaked. According to MAL, 300,000 m^3 of red mud spilled from the reservoir. The expert that was cited by the ad hoc parliamentary committee stated that the amount of spilled material was 1,644,000 m^3 (ibid.: 4). It is worth mentioning that this amount is much more than the 780,000 m^3 of crude oil released in the Deepwater Horizon oil spill in 2010. Furthermore, at the cyanide pollution of Baia Mare in Romania in year 2000, about

100,000 m^3 of material burst out from the containment pond. So in the case of Kolontár there was a substantially bigger amount of pollution.

3. MAL claimed that the company's pollution did not occur due to their fault, but the accident was caused by unforeseen consequences of natural processes and due to faulty government decisions made in the past (i.e. the negative effects on soil stability of the western clay wall ordered to be built earlier, during the communist regime).

Three overall hypotheses about the polluters:

1. The polluting companies try to deny that they caused the pollution.
2. The polluter is always trying to reduce the amount of damage and denies his own responsibility.
3. In general, after environmental disasters you cannot count on the fact that the companies take on their responsibilities. Because of the '*polluter pays principle*', one of the key questions is to determine who is considered a polluter.

Behaviour of potential victims

The mostly poor population living near the reservoir was confident that the company and the agencies ensure environmental safety. The recession and restrictions before the disaster also ruined a number of non-governmental organizations (NGOs), and also governmental organizations (GOs). This weakened the NGOs, which are independent from authorities.

The victims first want rapid compensation from the polluter or the government. The victims are indifferent who will compensate them as long as somebody does. The reason of the catastrophe will turn out at court after a long time because of conflict of interest. During this time there will be no remediation, reconstruction and compensation, or if there is it will happen from public funds.

The polluter company will pay compensation only after a court ruling, and this may take several years. Victims often do not have much money reserve to wait for years for a court decision. Thus, they tend to settle with the polluter company out of court for the amount of compensation which is usually much *smaller* than the actual amount of damages. (It usually happens like this.) This solution is the best for the polluters and *worst for the victims.*

The government (state) can immediately *compensate* victims partially or completely. Therefore, it is best for the victims if the state compensates them immediately and later the state litigates with the polluter. (This happened after MAL's pollution.) This solution is the worst for the polluters, because in this case they are confronted with the state which is much stronger than them; and they are not confronted with the victims which are much weaker. The problem of this solution is that the government could give compensation to the victims from taxpayers' money.

One good solution to these problems would be if the hazardous plants would take out compulsory insurance for these types of risks. On one hand this ensures that victims are compensated immediately, on the other hand, the insurance company will monitor the hazardous company which in turn will increase the environmental safety. Introducing compulsory insurance could raise environmental security itself.

> Interesting security mechanisms are the Swedish and Finnish Environmental Damages Insurances (EDI)....Essential is that the EDI only provides compensation to third parties remaining uncompensated in the event of insolvency of the insured. It is not liability insurance. It can be analyzed as a direct (casualty) insurance take-out by the operator for the benefit of unnamed third parties. EDI does not protect the insured party against liability.
>
> (Intergovernmental Working Group on Civil Liability, 2002: 4)

Behavior of governmental agencies

Before the pollution

The local government agencies that were controlled by the previous socialist government (2002–2008) *were too lenient towards MAL.* The environmental protection central government agency *abolished the hazardous classification* of the MAL's red mud waste storage on 4 December 2003. Thus MAL's red mud storage facility was (officially) no longer considered hazardous waste reservoir.[5] This caused the inspecting powers of local environmental agency to be significantly reduced (Jávor and Hargitai, 2011: 105).

In addition, Hungarian authorities have never introduced the type of tax known as landfill tax, which is commonplace throughout Europe (Steinberg, 2010). A brief examination of the recent history of the Hungarian aluminium industry makes clear it was only a matter of time before such a disaster took place (ibid.).

The practical relationship of the three main players was that the Hungarian government agency being unjust and unfair prefers the MAL's interests to the local residents (potential victims). The government agency has many reasons to *be lenient towards large companies:*

1. A big company is a major tax payer and also a large employer. These things earn high respect for the company. It is therefore understandable that the agency also favours the company; as the popular slogan from the early 1950s had it, 'What's good for General Motors is good for the USA.' Similarly, certain banks and companies are 'too big to fail' (i.e. so large that their failure will be disastrous to the economy, and which therefore must be supported by government when they face difficulty).

2. Additionally, the companies can *support the political parties* and in return these parties will return favours later. Therefore the large companies could expect favourable treatment from authorities in general (political corruption).
3. Furthermore, several *multinational companies are often more significant economically than the government* wanting to control them, and in these cases it is particularly difficult for the agency to have control over the companies.

Therefore agencies often seek to relieve the companies from responsibility and obligation. One practical consequence of this practice is that big companies try to pass on the damage they have caused to another actors ('private profit and social cost'). So the above conclusion is generally true, because the government agencies prefer big companies to potential victims *in general.*

After the pollution

First, the Parliament set up an ad hoc parliamentary committee of inquiry with the aim of determining responsibility for this environmental disaster in 12 October 2010. According to the parliamentary committee, the directors of MAL and the regional environmental protection authorities were responsible for the tragedy (Report, 2011). The new *conservative government* (elected in 2010) *acted severely* against the MAL Ltd. These hard actions (arrests, nationalized operation, a huge penalties, etc.) shocked the leaders of MAL.

The company has received a record fine for infringement of waste management regulations of around €470 million (HUF135.14 billion). This fine is much higher than the damage (€118 million), and more than the fair value of the company (€10 million). MAL attacked the penalty in legal way.[6] Thus, the magnitude of the penalty and the payment date will be decided by the court. This penalty puts on a strong deterrent effect to all potential polluters.

Eight days after the tragedy (on 13 October) the new government put the activities of the privately-owned company under state supervision (nationalized operation) coordinated by a government commissioner. The plant started production again on 15 October 2010. State supervision was terminated on 30 June 2011.[7] This state supervision creates a strong deterrent effect to all potential polluters.

As a result of the 'pressure' of state supervision the plant introduced *dry technology* in February 2011. The by-product of aluminium production is not strong alkaline liquid red sludge; it is non-caustic material of a solid consistency. This is the best available technology (BAT). However, it produced a new problem: too much red dust in the air. The solution is covering the reservoir.

Since the catastrophe, more than 145,000 people have been working together for remediation and restoration. A more extensive environmental disaster – contamination of the Danube – was averted (by building a damn on the river Marcal, and by using a variety of techniques to neutralize the alkaline content in the water). Reinforcement of dam walls at Kolontár was done using state sources. These dam walls were built soon after the catastrophe, and relatively cheaply. So MAL could have built these earlier, thus avoiding the catastrophe. Later on, two safety barrier dam systems have been built for the reservoirs by the aluminium plant with multi-billion HUF investments. An integrated monitoring system measuring the airborne dust in the region is in operation.[8]

A total of more than 1 million m^3 of pollutant material has been removed from central and outer areas, and placed in the designated storage reservoir. The government has allocated almost €118 million (US$157 million or HUF35 billion) to completely rebuild the stricken area. 112 houses were built with state support. Thus, a year after the catastrophe, life in the region was returning to its normal routine.[9]

The tragedy has called attention to a lack of regulatory precision. For example, the fact that the local agencies did not have complete freedom of action because the division of responsibilities was not clear. Therefore the Hungarian Parliament modified its law, and from December 2010 only mining authorities have been able to issue operating licenses for the operation of reservoirs similar to the one at Ajka. This will ensure firm authority, supervision and inspection.

In September 2011 the Hungarian Parliament adopted a new Disaster Management Act. Among other things this make the supervision of plants dealing with materials covered by the Disaster Management Act more effectively. It introduces fines for less serious offences extending the power of agencies to deal with such plants.[10] The Hungarian Parliament passed a law compelling industrial plants to have insurance in case in the course of their operations hazardous material may be released into the environment. The sum paid forms a fund for the insurance companies, and from this they can pay the reinstatement costs of an eventual disaster. The compulsory insurance extends to damage caused by the environment and private individuals.

The latest developments is that this case finally went to court in Veszprem in western Hungary on 24 September 2012. The first hearing was held in the criminal trial. On the first day, the indictment was presented and charges pressed against fifteen suspects in all, one of whom is Zoltan Bakonyi, managing director of the MAL. These individuals have gone on trial having been accused of negligence, waste management violations and damages to the environment due to the 2010 red mud spillage. All defendants were MAL employees at the time of the accident.[11] Many experts think that not only the staff of MAL, but the local authority was also at fault, and they should therefore be charged as well.[12]

MAL has serious difficulties with liquidity since the environmental disaster. Therefore, on 27 February 2013, one of the Hungarian courts ordered that the company be liquidated. A former Hungarian law provides that MAL should get gradually under *state ownership* during continuous production. A new state company is created, which takes over the factory together with the assets and workers.

Notes

1. See http://ozonenetwork.hu/ozonenetwork/20101005-maro-oxidkoktel-55-millio-tonna-vorosiszap-van-a-magyar-tarozokban.html (accessed 4 October 2012)
2. See www.redmud.org/Disposal.html (accessed 4 October 2012).
3. See www.kormany.hu/en/ministry-of-public-administration-and-justice/news/one-year-on-hungary-remembers-the-red-sludge-disaster (accessed 4 October 2012).
4. See www.kormany.hu/en/ministry-of-public-administration-and-justice/news/one-year-on-hungary-remembers-the-red-sludge-disaster (accessed 4 October 2012).
5. See www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+WQ+E-2010-011083+0+DOC+XML+V0//HU (accessed 4 October 2012).
6. See http://nol.hu/belfold/fellebbez_a_rekordbirsag_ellen_a_mal_zrt_ (accessed 4 October 2012).
7. See www.kormany.hu/en/ministry-of-public-administration-and-justice/news/one-year-on-hungary-remembers-the-red-sludge-disaster (accessed 4 October 2012).
8. See www.kormany.hu/en/ministry-of-public-administration-and-justice/news/one-year-on-hungary-remembers-the-red-sludge-disaster (accessed 4 October 2012).
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10. See http://hvg.hu/itthon/20120328_katasztrofavedelem_bakondi# (accessed 4 October 2012).
11. See www.mnn.com/earth-matters/wilderness-resources/stories/plant-managers-on-trial-for-toxic-mud-spill-in-hungary (accessed 4 October 2012).
12. See http://magyarinfo.blog.hu/2012/09/28/vorosiszap_per_hol_az_allami_felelosseg?utm_source=ketrec&utm_medium=link&utm_content=2012_09_28&utm_campaign=index (accessed 4 October 2012).

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