Industrial Crisis Quarterly 2 (1988) 3–15
Elsevier Science Publishers B.V., Amsterdam — Printed in The Netherlands

Risk Communication in Europe after Chernobyl: A Media Analysis of Seven Countries

Harry Otway, Palle Haastrup, William Cannell*,
Giorgios Gianitsopoulos, Massimo Paruccini
Joint Research Centre, Commission of the European Communities, Ispra, Italy

Abstract

Otway, H., Haastrup, P., Cannell, W., Gianitsopoulos, G., Paruccini, M., 1988. Risk Communication in Europe after Chernobyl: A media analysis of seven countries. Industrial Crisis Quarterly, 2: 3–15.

We analysed media coverage of the Chernobyl emergency in seven European countries to identify common communications problems. We found the media were reasonably good at reporting information provided by official sources, although there were difficulties with technical topics such as radiation exposure and effects. There was some confusion, and it affected communications credibility, but the media seemed to be reflecting confusion in official circles and in the scientific community rather than creating it. Typical problems are discussed and suggestions made for improving communications and crisis management.

Introduction

Modern governments can communicate effectively with citizens only through the mass media, especially in emergencies where people must be informed rapidly of developments and advised on how to behave. According to an opinion poll reported by Schneider (1986), 80% of respondents got their information about health countermeasures after Chernobyl from the media while only 3% contacted public health authorities directly.

*Permanent address: UK Civil Aviation Authority, London, UK.

0921-8106/88/$03.50

We investigated how the media in seven European countries handled the communication of information that was technical, dealing with nuclear technology, sensitive, regarding the effects of radiation on public health, and also complicated by a strong East–West political dimension. Our intent was to identify common problems and to sugggest ways in which communications and crisis management might be improved. We have carefully avoided second-guessing specific decisions for two reasons: first, even under similar circumstances quite different choices can be equally reasonable and, second, it is impossible to judge decisions fairly without intimate knowledge of the political context and constraints surrounding them.

The countries studied (Austria, Denmark, the Federal Republic of Germany, France, Greece, Italy and the United Kingdom) are heterogeneous in industrial development and in the status of their domestic nuclear energy programmes. Our main sources were the more 'authoritative' national newspapers, supplemented by periodicals, television broadcasts, official statements, and interviews with journalists and public officials. A daily press summary was made for each country with emphasis on the timing and bases of countermeasures and the general public response. The summaries (Otway et al., 1987) are too long to be included here, but a list of print sources used is appended (see also Borelli et al., 1987; Chausse, 1987; Peters et al., 1987; Schoenhofer et al., 1986).

The print media may not be the most important source of information, but they are more specific and detailed than other media and are readily available for analysis. Checks between television and print media showed that coverage was similar, as were the communications problems. National media styles vary and reporting of public responses may itself influence public behaviour, however we doubt that this would affect our conclusions.

A brief chronology of events

The Chernobyl accident

The first indication of the accident in western Europe was the detection of airborne radioactivity in Sweden. Meteorologists forecast that the radioactive cloud would stay in northern Europe for some time and might even be harmless when it reached central and southern Europe. Little information was available about the accident and the extent of the release, necessitating back-calculation based on radioactivity measurements. In the event, weather conditions changed, bringing the cloud south, and the release of radioactivity continued. Many countries were not prepared for the speed with which the cloud arrived and the high levels of contamination it caused.

Authorities responsible for the management of radiation emergencies had generally not anticipated that a reactor accident could result in such high levels

of contamination so far from the plant. A reactor accident is commonly conceived as causing a sector of contamination downwind from the site, decreasing in intensity with distance, with significant downwind contamination limited to some tens of kilometres. But the Chernobyl release went much higher than usually assumed in accident calculations, the cloud encountered different wind conditions as it rose, and fallout patterns were affected by local rainfall. Consequently, contamination levels bore no simple relationship to distance from the reactor and early calculations made in the West overestimated the size of the release and the number of casualties close to the plant.

Contamination of an entire country, caused by an accident so far away, had not been expected so monitoring systems tended to be focussed on nearby nuclear facilities and were ill-suited to monitor widespread and uneven contamination. Politicians criticised the Soviet government for not providing more information, claiming that this was hampering crisis management.

Actions required of government

Many governments had to evolve strategies to respond to the crisis as it was developing, e.g., for monitoring radioactivity, setting tolerance levels and recommending ways to reduce exposures. Atmospheric radioactivity had to be monitored as well as surface concentrations and levels in both imported and locally-produced foodstuffs.

Tolerance levels were sometimes available for other contingencies, but ad hoc arrangements had to be made to locate and deploy the necessary equipment and manpower for this particular application. In other cases, where tolerance levels had not already been decided for use in domestic nuclear emergencies, they had to be determined rapidly, often without time to consider the many theoretical and practical questions involved.

Ways devised to limit radiation exposures included banning certain foodstuffs from the market, setting consumption limits on others, and recommending personal behaviours that would minimise individual exposures, e.g., by not drinking rainwater, by not letting children play outdoors.

There were immediate demands for information on environmental radioactivity, levels in various foodstuffs, the corresponding health implications, expected future developments and on ways that people could act to limit their own exposures.

Some problems related to communications

Organisational confusion

Government responses required action by a number of departments and ministries. Because the goals and responsibilities of each organisation are dif-

ferent, the result was often friction and confusion. In particular, there seemed to be conflicts between economic interests and public safety in decisions to ban agricultural produce. Agriculture ministries, or local authorities in rural areas, tended to support higher intervention levels than public health officials.

There were also conflicts between members of government and senior civil servants. Webster (1986) reports that a senior spokesman of a health agency tried to give reassurance by saying that 'a few tens of people' would die because of the late effects of Chernobyl but, the responsible minister, either thinking only of immediate health effects or ignorant of longterm effects, announced that there were no health risks.

The source term

A strong theme running through reports of the accident was Western officials' criticism of the Soviet Union for not providing more information on the accident sequence, the extent of damage and the amount and type of radioactivity released. This was a problem for Denmark, Finland, Poland and Sweden, who learnt about the accident through their own routine atmospheric monitoring prorammes. However, many early problems encountered by crisis managers were not really due to uncertainty about the source term but, rather, because they did not have good information about what was happening in their own countries, i.e., the cloud trajectory and local radiation measurements. Local information could hardly have been provided by the Soviet Union and, in view of their organisational problems and the technical uncertainties, it is unlikely that Soviet authorities even had reliable detailed information.

Anticipating the need for countermeasures

Besides inadequacies in local monitoring, there was a weakness in using whatever local information was available in conjunction with models of atmospheric transport, radioactivity deposition and uptake by humans and animals to foresee crisis management needs. For example, the first countermeasures focussed on the threat posed by iodine-131, which was initially the greatest contributor to radiation exposures. In several countries, shortly after restrictions based on iodine contamination were lifted, it was necessary to reimplement them because of caesium contamination. This created confusion about which countermeasures were actually in force and hurt public confidence in the management of the crisis.

Radiation units

In all countries there was a serious problem in reporting quantitative information, especially with regard to radiation measurement units. Contamination levels were reported in Roentgen, Curies or Bequerel per kilogram, litre, square

metre, etc. Radiation exposures or doses were given in rads per unit time or in Grays, while dose equivalents were given in rads or Sieverts. Milli-, micro-, pico- and nano-units of the above were also used, sometimes as if the basic units with different prefixes were completely unrelated. The time rates used also varied widely, e.g., per second, hour, day or even over a lifetime.

Confusion was caused firstly by different units being used, sometimes in the same report, without providing information on how to convert between them and, secondly, because units were used incorrectly, making the information meaningless even to technically qualified people, e.g., by not indicating the time unit of a rate measurement. This was not only a media problem; often ministries within a country used different units and the press simply reported the information given to them. In some cases, the media were careless because they did not understand the importance of prefixes or the time dimension.

Relating exposures to health effects

Raw numbers on radiation exposures mean little to lay people because they are difficult to relate to health effects. Attempts were made to put these numbers into context by expressing them as fractions of allowable limits, but the limits were rarely explained, i.e., to what situations they apply or how they relate to health effects. Also, various limit values were used, often inappropriately or without proper identification, e.g., the ICRP recommended yearly occupational whole body dose equivalent, the public dose limit, the dose required for the onset of acute effects, or the dose at which half of those exposed would die of acute radiation sickness (the LD-50).

Exposures to Chernobyl radiation were also compared to familiar activities which involve exposure to natural radiation; e.g., hollidaying in the mountains, travelling by air or moving to a part of the country with higher background radiation. These comparisons were generally regarded suspiciously by the press: one reason may be that comparisons of industrial accident risks to leisure time activities seem obviously inappropriate; another explanation is that they have so frequently been used by nuclear experts to put *prospective* accident risks 'in perspective' that they are now simply discounted as being part of self-serving promotional campaigns.

Alternatively, the cancer deaths expected from Chernobyl were compared to the large number of 'natural' cancer deaths. The intent was to demonstrate the relative insignificance of radiation hazards, but its success as a communications strategy requires that the public accept this as a legitimate comparison. This seemed not to be the case, probably because up to ten thousand additional cancer deaths were predicted for Europe.

Explaining countermeasures

Many different intervention levels exist for particular foodstuffs, used by different countries and international organisations, and it was often not clear

which levels were actually being used. Further, well-intentioned people sometimes behaved inappropriately when following government advice without understanding the reasons for it, e.g., by consuming long-life milk packaged after it had already been contaminated, or by bringing a contaminated sandbox into the house after instructions had been given not to let children play outdoors.

There was confusion about the extent to which the implementation of countermeasures was the responsibility of the government or of the individual, informed by government advice. For example, sometimes people were advised not to consume more than a certain amount of some foods while others were withdrawn from the market altogether. Thus consumers were unsure if food available in shops was free of radioactivity or not.

Sometimes countermeasures failed to distinguish between produce grown in the open and similar, but uncontaminated produce grown in greenhouses (e.g., lettuce, strawberries). The consumers' inability to personally check for radioactivity, coupled with suspicions of the shopkeepers' knowledge of where products originated and an awareness of conflicting government objectives, then caused unwillingness to buy any fresh produce at all. Another complication was that it was relatively easy to tell when countermeasures were instituted, but difficult to know when they were removed, perhaps because the imposition of countermeasures is more newsworthy (see Peltu, 1985, for a discussion of how the media determine what is 'news').

Differences across national borders

A number of different intervention levels were used in the countries studied for the same foodstuffs; in Germany, there were also differences amongst the State (Laender) governments. Countermeasures based on political judgement were also not consistent — especially noticeable in the official responses to similar levels of contamination across political boundaries. For example, in the German city of Wiesbaden the mayor closed public parks and swimming pools while in Mainz, just over the Rhine, they remained open. Similarly, Germany placed restrictions on vegetables and milk, while across the Rhine in France there were none. In Austria, parents were advised to keep children indoors, while in Italy they were not.

On the Swiss–Italian border, differences in the averaging and aggregation of data caused apparent inconsistencies in the reporting of radioactivity levels. Italy, a peninsula with north–south cultural differences, reported aggregated levels for north, central and southern regions. However, the Swiss, with cultural differences across language groups, aggregated in terms of linguistic region. Thus, in the Italian-speaking Ticino region of Switzerland, which experienced heavy rains, reported radiation levels were about 10 times higher than those given in the Italian media for northern Italy. The part of Italy bordering on Ticino, which experienced roughly the same contamination levels, was averaged with drier parts of the north. Both sets of data were correct within

their own terms of reference, but the apparent differences were confusing to those who followed the media of both countries.

Unusual public reactions

The entire range of public responses cannot be documented from media reports because unexceptional behaviour is not newsworthy; Schneider (1986) estimated that 60% of the public complied with government recommendations, making radical changes in their lifestyles to minimise risk. Nevertheless, some extreme responses were reported: a sudden increase in the number of abortions sought (in Austria and Italy); panic buying of long-life foods in most countries, but reaching near-riot proportions in Greece; buying radiation measuring equipment for personal use (United Kingdom and Germany); an increase in antinuclear demonstrations, including demonstrations at nuclear sites in bordering countries (e.g., Austrian groups demonstrated at Wackersdorf in Bavaria, and in Prague and Budapest, for which they were arrested); deaths and hospitalisations due to self-administered overdoses of potassium iodide in Germany (this stable iodine compound blocks the thyroid gland so it cannot take up radioactive iodine — pharmacies in Denmark reportedly sold out of it shortly after the accident); suicides attributed to anxiety or economic losses caused by Chernobyl.

Changes in public opinion about nuclear energy

Post-Chernobyl public opinion polls pose problems for governments committed to nuclear energy. Each poll was phrased differently, but opposition to nuclear power was invariably seen to have increased. In 1982, 52% of German respondents supported nuclear energy, with 46% opposed; after Chernobyl the corresponding figures were 29% and 69%. A UK Gallup Poll in March showed 34% supported increasing nuclear power generation and 53% against; results in May were 18% and 75% respectively. Polls also suggested dissatisfaction with government information. In a Harris Poll in France 13% agreed that 'they are telling the truth about Chernobyl' while 74% believed 'they are not telling everything'.

Special information telephones

Many countries set up special telephone numbers where people could get additional information or check rumours. Often demands for information were so heavy that the lines were overloaded and callers could not get through. (In one country, incorrect numbers were mistakenly published.) Even worse, when they did reach someone, people found that those manning the telephones were overworked and abrupt, or able only to give general reassurance and repeat information already available in the media. People with very specific and (to

them) important questions, such as farmers who needed to know if grass could be fed to livestock, were unable to get specific information. Overloaded special telephone lines sometimes caused people to call authorities at their normal telephone numbers, jamming switchboards and making crisis management even more difficult.

Discussion and conclusions

Organisational aspects

The widespread impression was that governments were not well prepared for the crisis management problems presented by Chernobyl, partly because of its international dimension — a fairly recent phenomenon in industrial accidents. It was often apparent that strategies were being improvised, evidenced by frequent reversals of decisions and by the different policies chosen by different countries to solve the same problems. This was complicated by conflicting information provided by different government departments or even by various hierarchical levels within the same department. Also, the desire for information responsive to the needs of specific groups was underestimated, causing delay in the provision of information, inadequacy of the information eventually provided, and a consequent loss of credibility in crisis management.

Paradoxically, even if crisis management organisations and procedures are set up in advance there are inherent problems of maintaining readiness. Every crisis is different, and plans made in advance may still need to be improvised upon as the nature of the particular crisis becomes apparent. In addition, plans existing on paper need frequent updating and must also be rehearsed frequently. Experience has shown that the problems of information updating and maintenance of proficiency are serious ones; day-to-day responsibilities inevitably take precedence over special assignments to emergency teams. It is also expensive to assign people only to emergency tasks, and boredom caused by long periods of inactivity also causes problems in maintaining proficiency.

Personal goals may conflict with intentions to limit official sources of information. Elected politicians may still want to be seen by the media and the public to be actively involved in crisis management. Government changes occur rather more frequently than major crises, thus politicians may not have first hand experience of previous crises, increasing the possibility of repeating past mistakes.

Risk communication

Public confidence was not helped by overly technocratic efforts to put Chernobyl risks 'in perspective' by comparisons with natural death rates or the risks of dissimilar activities. This was viewed as an attempt to minimise or to cover

up the accident's consequences. Attempts to provide reassurance using comparisons often backfired; 50 additional cancer deaths may not seem like much to experts used to thinking of hundreds of thousands of 'natural' cancer deaths per year, but 50 deaths, visualised by lay people as bodies to be put in coffins and buried, is a large number — especially when caused by a reactor no one had ever heard of, in a distant and unfamiliar land.

People were concerned to hear their own public health authorities essentially say that it didn't matter because so many people die of cancer anyway. Carrying this logic to the extreme implies that an equal number of deaths could be caused by every industrial facility in the world and still not matter — a position that most people would intuitively reject.

Often the spokespeople who said that the additional cancer deaths were insignificant also said that their technologists could learn nothing from the Chernobyl accident because western technology is so much more advanced. This made the nuclear experts seem arrogant and damaged the credibility of public health information because it was suspected of being influenced by a desire to protect domestic nuclear industry, especially where governments officially support nuclear energy.

The majority of the public in most countries regarded government information provisions as inadequate, but public authorities faced a most difficult communications problem: How can people be impressed with the urgent need to change their daily routines to reduce risks without causing undue anxiety and potentially dangerous over-reactions? This problem was seen universally following Chernobyl; people seemed to feel that the public health threat was worse than government sources said.

Media accuracy

We found, in agreement with a study of the UK media (Herbert, 1987), that the more 'responsible' print media did a fairly good job of covering the accident, especially in conveying information provided by authorities. There was some sensationalist reporting, but even part of this was a faithful repetition of information from apparently credible sources. For example, in the first days of the accident the media widely reported thousands of deaths in the vicinity of the reactor, riots in Kiev and an out-of-control fire in a second unit. Most of these stories originated in the US media and were attributed to US 'intelligence' sources. Official Soviet information later proved to have been correct.

The media did have problems with highly technical topics, especially with units of radiation, contamination and exposure; however many scientists not working in the area of radiation protection on a daily basis (including the present authors) were surprised by the 'new' SI units and were forced to consult reference books. The scientific-technical community tends to judge media accuracy by scientific standards. The typical scientific paper takes months to draft and may not appear in print for a year or two. Journalists, in contrast, often

work to deadlines measured in hours, perhaps even in minutes, and the material may appear the next day; some inaccuracy in technical matters is inevitable, and should not come as a surprise. This will always be a problem in the coverage of emergencies; it is unrealistic to expect journalists to be informed of the technical details of all hazardous facilities.

The media will always check government information with unofficial sources, such as university laboratories and 'independent' scientists, and whatever scientific disagreements exist will be mirrored in this supplementary information. Where consequences are uncertain, and thus open to genuine differences of opinion, these divergent viewpoints will be reported — with implications for the credibility of official information, especially if government credibility is already in question.

The only way that authorities can be perceived as credible in emergencies is if they have already earned credibility in their daily dealings with the public. The cosmetics of packaging and presenting information cannot cause a previously untrustworthy source suddenly to be perceived as credible. The problem of credibly communicating the double message of 'take immediate action, but don't worry' is inherently difficult.

Recommendations

Our analysis suggests several recommendations to improve emergency management and communications, two of which are specific to nuclear accidents.

Standardisation of radiation units

The effects of radiation have been more extensively studied than those of any other toxic agent, and there is a substantial measure of agreement (at least in official circles) on dose-response relationships, thus it is ironic that so much confusion was caused by misunderstanding of the basic units. This could be improved by ensuring consistency in official circles and by using only SI units. Non-governmental laboratories should also be encouraged to use standard units since it does not affect their independence. Some confusion is inevitable since measurements made under different conditions cannot readily be compared, e.g., per kilogram of wet and dry grass.

Aggregation rules

Aggregation of contamination data is necessary and is likely to cause disagreements even in the best of circumstances. Aggregating data from areas which have experienced quite different weather conditions, and thus have widely different levels of contamination, must be avoided. Aggregation decisions should

also consider factors such as population density and land use, recognising that the public are sensitive to maxima as well as average values.

Communications credibility

Communication with the public is central to effective crisis management. Governments have a responsibility to intervene in the marketing of foodstuffs and to provide services required to reduce risks, but the effectiveness of countermeasures in practice depends upon individual decisions. Sensible public behaviour can result only from adequate, understandable and credible information. This has obvious implications for goverment's day-to-day dealings with the public.

Organisational aspects

Crisis management procedures were generally perceived by the public as inadequate and confused. This was typified by disagreements, for example between ministries, about where responsibility and authority lay. The need for centralised information dissemination became apparent as the accident progressed when journalists had trouble identifying official sources, the public weren't sure where to turn for information, there was uncertainty about the impartiality of the information that was available, and there were discrepancies amongst various official sources. It is important to have, and to present to the public and press, pre-established methods for dealing with crises of this sort. Obviously every crisis is different, but organisational relationships should be defined in advance to avoid overlapping responsibilities and conflicts of interest in the heat of a developing crisis.

Trans-boundary harmonisation

The harmonisation of intervention levels has a strong political dimension because quite different policies can result from equally reasonable trade-offs amongst political, economic and safety considerations. However, the fact that intervention levels very across national or state borders undermines the credibility of government choices, because the public expects health and safety issues to be the primary consideration.

Information hotlines

Special telephone numbers to give quick and authoritative answers to particular questions can help to show that those responsible are 'on top' of the situation and reduce the spread of rumours. These numbers must be published correctly, function properly, not be overloaded, and be staffed by well informed people, skilled in dealing with lay people who may be somewhat over-

anxious. Arrangements for an adequate supply of telephone lines, and special training for enough people to staff them, should be made in advance so that the emergency information system can be rapidly activated when needed.

'Education' and communication

In view of the wide variety of conceivable emergencies, it is unrealistic to ask that journalists be 'educated' in the scientific and technical details of all hazardous technologies, but they could be familiarised with crisis management procedures as background for dealing with particular emergencies. Governments should prepare information in advance for specific cases, e.g., on radiation units and their meaning. Scientists and public officials responsible for communications about risks need to learn more about how the media work and what their constraints are. Scientific standards of accuracy should not be expected of journalists, who work under severe deadline presures amidst confusion that is not of their making.

Scientists and public oficials are generally not good at clearly communicating complex information, itself clouded by uncertainty, to journalists and members of the lay public. This requires improved communications skills, an understanding of how risks are perceived, and knowledge of how to express technical information so that it is meaningful to lay people. Research suggestions have been made in this respect (e.g., Keeney and von Winterfeldt, 1986; Slovic, 1986), but we must be sensitive to the fact that this research has an inherent political dimension and a potential for manipulative use which depends less on the content of the research than on the intent with which it is ultimately applied (Cannell and Otway, forthcoming).

Appendix: Print media sources used

Austria: Neue Kronen Zeitung, Kurier, Die Presse, profil, Wochenpresse, Wiener, Wiener Zeitung.
Denmark: Information, Weekendavisen, press releases and summary reports from Miljoestyrelsen.
Federal Republic of Germany: Sueddeutsche Zeitung, Die Zeit, Frankfurter Allgemeine Zeitung, Der Spiegel.
France: Le Figaro, Le Monde.
Greece: Kathimerini, Makedonia.
Italy: Ill Corriere della Sera, Il Giornale, La Repubblica.
United Kingdom: Times, Financial Times, Guardian, several weeklies.

References

Borelli, G., et al. 1987. Stampa quotidiana e incidente nucleare di Chernobyl: Primi risultati di una indagine in corso, ENEA, Roma, RTI/STUDI-VASA(87)5, Marzo.

Cannell, Wm. and Otway, Harry, forthcoming. Audience perspectives in the communication of technological risks, Futures.

Chausse, J., 1987. L'accident de Tchernobyl: Quelques consequences economiques et sociales, IPSN, DPS/SEGP (Paris) Note LSEES 87/17, Sept.

Herbert, Roy, 1987. Chernobyl: How the cover was blown, New Scientist, April 23: 34–46.

Keeney, Ralph and von Winterfeldt, Detlof, 1986. Improving risk communication, Risk Analysis, 6: 417–424.

Peltu, M., 1985. The communications media, in: H. Otway and M. Peltu, eds., Regulating industrial risks: Science, hazards and public protection. Butterworths, London: 128–148.

Peters, H.P., et al., 1987. Reactions of the German population to the Chernobyl accident: Results of a survey, Kernforschanlage Juelich, Juel-Spez-400/Trans, May.

Schneider, Ernst, 1986. Tschernobyl: Psychische Folgen schwerwiegender als Strahlenschaeden, Medical Tribune: Oesterreichische Ausgabe, no. 44, Oct. 31, 20.

Schoenhofer, et al., 1986. Tschernobyl und die Folgen fuer Oesterreich: Vorlaeufiger Bericht, Bundesministerium fuer Gesundheit und Umwelschutz, Umweltbundesamt, Vienna, Nov.

Slovic, Paul, 1986. Informing and educating the public about risk, Risk Analysis 6, 403–416.

Webster, David, 1986. How ministers misled Britain about Chernobyl, New Scientists, Oct. 9: 43–46.

Acknowledgements

We particularly thank the journalists and public officials who helped us during the preparation of this paper. We are also grateful to Pierre Bonnaure, Giuseppe Volta and Brian Wynne for their comments on an earlier draft.