

Muddling through a nuclear-political emergency: multilevel crisis management in West Germany after radioactive fallout from Chernobyl

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Abstract

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Nuclear fallout from the Chernobyl reactor blaze took the West German authorities completely by surprise. Attempts to control the situation encountered various obstacles: (1) insufficient preparedness; (2) rapidly evolving social conflicts and public demands; (3) complex, interwoven structures of competence; and (4) geographically fluctuating problem loads. Regression analysis indicates that the responses of lower-level administrations depended on the resources available to them, such as scientific expertise, measurement devices and administrative experience. The existence of local hazards and general risk perceptions also influenced crisis management. In particular, this article scrutinizes the organizational crisis evolving from conflicts between federal, state and local governments. A multilevel research design is applied to demonstrate how divergent radiological assessments and ill-defined responsibilities amplified the crisis, and how a degree of normalcy was recovered by interlocking the different levels of government.

Introduction

In the early morning of 26 April 1986, 120 km north of the Ukrainian capital Kiev, the fourth block of the Chernobyl nuclear power plant went out of con-

trol. The operators had embarked on a test sequence at low power, which involved deliberately overriding various safety systems. In the hours that followed, core temperatures rose steeply, fuel in the core disintegrated and steam pressures increased rapidly. Hydrogen built up as a result of a chemical reaction set off by the fuel rod's cladding material. The first explosion blew the top off the reactor, and a second one ejected glowing parts of its central unit. In the evening, the moderator, a huge graphite block of 11 x 3 m weighing 1,700 tons, started burning. During the following days, about 10% of the radioactive core inventory was ejected. A heat vortex carried it high up into the atmosphere, and winds dispersed radioactive particles over Poland and Scandinavia. The wind was later to scatter radioactive particles over western and southern parts of Europe. The territorial impacts varied considerably due to different meteorological conditions and local rainfall (see Table 1 and Fig. 1; also Kroger and Chakraborty, 1989).

This article deals with the political and administrative responses to the nuclear fallout in West Germany. In parts of Bavaria and Baden-Württemberg, cesium 137 activity (half-life: 30 years) was over 320 times the values measured in 1983 (BMI, 1983; Vester, 1986, p. 48). In the area around Munich, for instance, 19 different sorts of radionuclides were deposited, amounting to an overall activity of 343,000 Bq/m² (SSK, 1987, p. 43) —ten times higher than the German Federal Decree on Radiological Protection allows inside nuclear power plants and laboratories.

Table 1

Medium and maximum contaminations in Western Europe (Bq/m²) (*sources: Kroger and Chakraborty. 1989, p. 146; Morrey, 1987; SSK, 1987*)

Country	Distance from Chernobyl (km)	Total cesium		Iodide 131	
		Ø	Max.	Ø	Max.
Austria	1,000-1,500	23,000	60,000	120,000	700,000
Belgium	2,000	1,300	3,000	3,900	10,000
Finland	1,000-2,000	9,000	30,000	51,000	190,000
France	1,500-2,500	1,900	7,600	7,000	n.a.
FR Germany	1,000-1,500	6,000	65,000	16,000	160,000
South		15,000	65,000		
North		3,000			
Italy	1,500-2,500	6,500	100,000	32,000	500,000
Netherlands	1,500-2,000	2,700	9,000	21,000	26,000
Sweden	1,000-2,000	8,200	190,000	41,000	950,000
Switzerland	1,500-2,000	8,000	41,000	37,000	180,000
Spain	2,500-3,500	4	41	10	90
UK	2,000-2,500	1,400	20,000	4,000	40,000

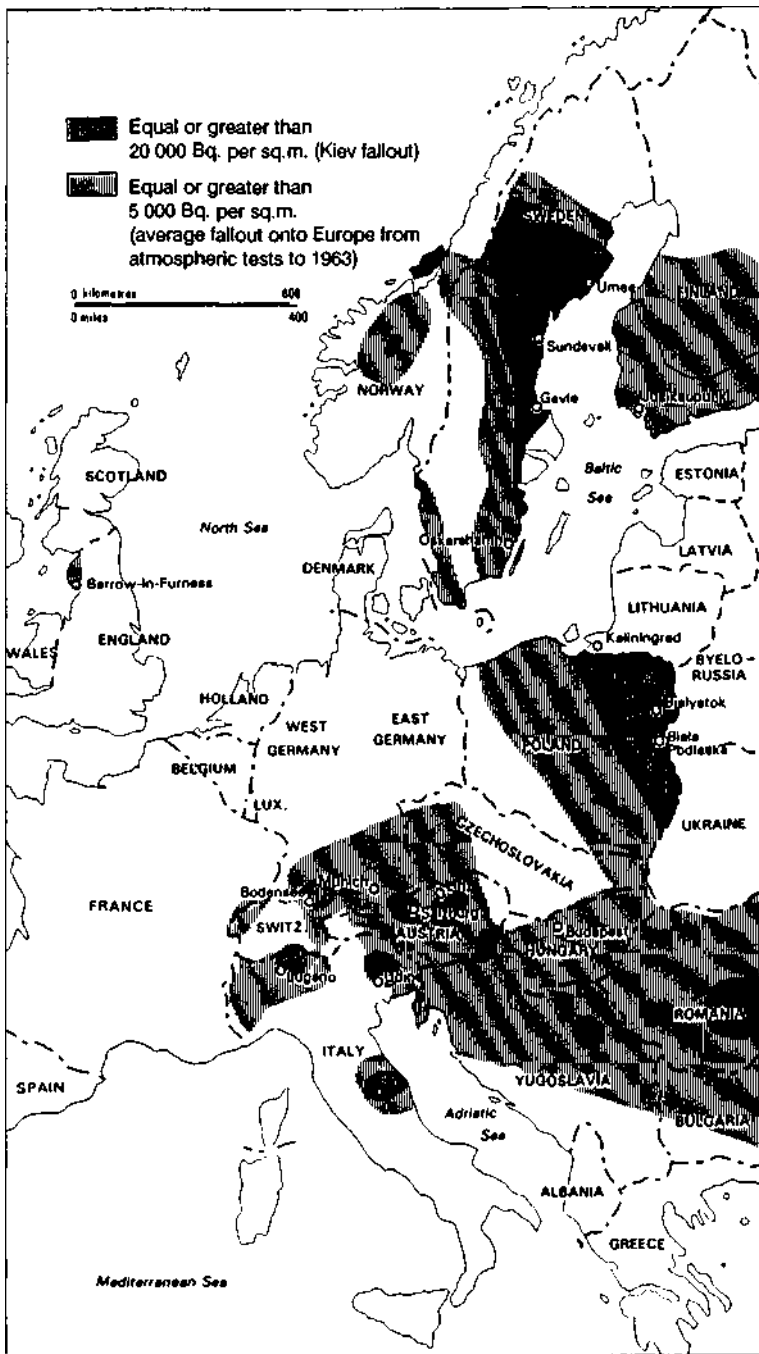


Fig. 1. Heavy cesium 137 fallout between 30 April and 5 May 1986 outside the USSR (from Haynes and Bojcun [1988 , p. 45]: reproduced with permission).

The problem: public bureaucracies and nuclear fallout

To apply the existing Federal Decree on Radiological Protection during the Chernobyl crisis would have meant professionally decontaminating cowsheds to avoid polluted milk. One of the political problems was to *prevent* lower-level administrations from obeying this decree. Declaring that the thresholds laid down in the decree were only applicable during the ordinary operation of nuclear plants would have caused confusion among the public. For political, judicial and administrative reasons, the state and federal governments found themselves in a tricky situation.

(1) The experts — nuclear physicists and radiological biologists — had divergent notions on the nature and general impact of the fallout from Chernobyl. Therefore it did not seem advisable to officially declare a disaster. Additionally, this would have intensified the ongoing nuclear/environmental conflict in West Germany.

(2) No federal or state laws provided for the case of nuclear contamination originating in a foreign nuclear power plant and spreading over large parts of the country. The only legal provisions available were to be found in special plans for the regions around domestic nuclear industries (Greifelt, 1986). Hence, the lack of clearly drawn competences and responsibilities hampered administrative action.

(3) The division of competences among administrative units and ministries at the federal and state levels favored arbitrary action on the part of local and regional authorities (*cf* König, 1991). When the state and federal administrations finally agreed on guidelines for disaster management, many local actors had already developed autonomous strategies. This paper will show how difficult it was for state and federal governments to stop or even change local crisis management.

(4) Lower-level administrations and disaster control units were not practically trained to handle such extensive nuclear problems in a unified and cooperative manner. Hence, the nuclear disaster — once declared — was bound to be followed by an administrative one.

Considering these obstacles, federal and state governments assumed a wait-and-see attitude during the initial phases of the crisis. In particular, they did not issue any coherent guidelines for administrative action during the first week, even though local governments had to cope with protest, unruliness and strong demands for political and technical measures. The local authorities were facing an administrative crisis, partly caused by inconsistent political leadership, inadequate scientific expertise and the rise of various citizen initiatives. Their dilemma was made all the more acute by the erosion of their capacity for action and by increasing public demands for administrative measures.

Hence, to take a proper look at the impact of Chernobyl in West Germany one has to start looking at the local level.

German local governments are politically autonomous. In some areas, however, they act on behalf of the states. Regarding state-federal relations, further overlaps can be observed: state administrations, though also autonomous, act in part as implementation agencies of the federal government. In the case of radiological disasters, competences between the three levels of

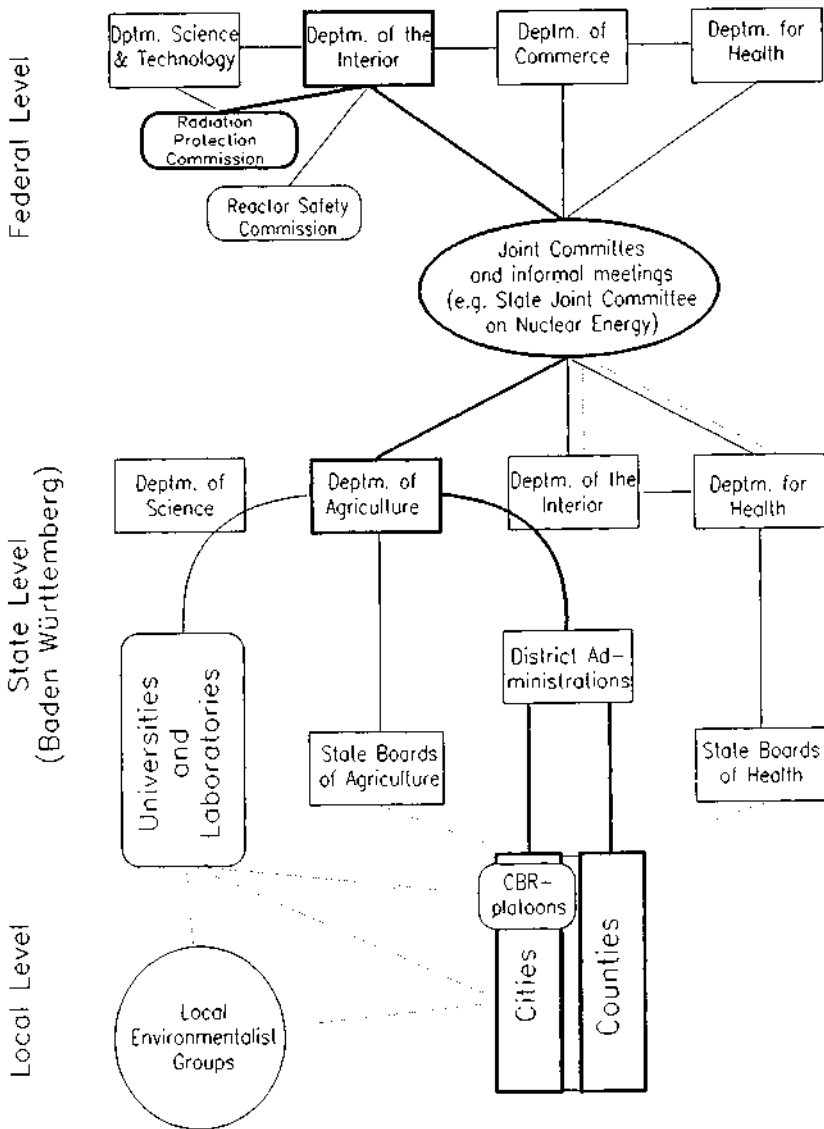


Fig. 2. Network of organizations involved in crisis management.

government are not clearly defined. State, city and county administrations have all been in charge of general disaster protection. Only in wartime or as part of precautionary civil defense measures was disaster protection subject to federal command structures (Drexler and Czada, 1987). Major technical devices which can be used for nuclear emergencies are located in the CBR platoons of municipal fire brigades.¹ Additionally, laboratories for chemical and radiological analysis have actually been in the hands of the states, private firms and local governments, as well as autonomous university institutes. The federal government is solely responsible for nuclear regulation, radiation protection, and public payments for nuclear damage according to the *Atomic Law*. The tasks of radiation protection and disaster protection have in fact been completely separated.

What has just been described for the management of nuclear disasters also holds for German federalism in general; it lacks clear-cut divisions of political authority (Scharpf et al., 1976; Lehmbruch, 1989). It is characterized by political interlocking — *Politikverflechtung* — instead. The term *Verflechtung* ("interlocking") is taken from the realm of intercorporate relationships. As in firms, "*Politikverflechtung*" is understood as the establishment of intermediating structures linking decision making processes, policies, and substantive responsibilities of initially autonomous organizations" (Lehmbruch, 1989, pp. 222).

Because its decision making capacity is based on consensus-building between autonomous actors, the system depends on procedural and distributional rules. As a result, one finds numerous procedures, committees and other bodies for interstate or federal-state coordination in specific sectors. Fig. 2 shows the network of the main actors involved in crisis management after Chernobyl as it will be discussed in the following sections.

The occurrence and perception of crisis

As early as 28 April, the Federal Department of the Interior called for periodic information and measurement of nuclear air contamination by federal and state monitoring institutions. One day later, the Federal Committee on Radiation Protection (*Fachausschuss für Strahlenschutz*) informed state officials within the States' Joint Committee on Nuclear Energy (*Länderausschuss für Atomkernenergie*). Official experts claimed there would be no serious impact from Chernobyl on the Western European population. Nevertheless, possible measures and scenarios were discussed by the state secretaries of the ministries concerned and leading officials of the Federal Chancellor's Office. The Federal Reactor Safety Commission (*Reaktorsicherheitskommission*) was instructed to prepare a report on the events in Chernobyl. Additionally, the Federal Weather Bureau was ordered not to publish data on nuclear radiation.

On 29 April, in the state of Baden-Württemberg, Gerhad Weiser, the Minister for Agriculture, Nutrition, Forests and Environmental Matters, ordered four control points to take radiometric measurements around the clock and to keep

¹ CBR platoons are concerned with atomic, biological and chemical hazards.

the state government regularly informed. In addition, the Minister for Social and Health Matters ordered that milk and food should be checked for contamination.

The news reports of Wednesday 30 April 1988 were comforting. Nobert Schafer, a deputy speaker of the federal government, reported to the press: "The federal government states that there is not, and will not be any danger. According to all the information at hand, health hazards for the inhabitants of the Federal Republic of Germany can be ruled out" (Husemann, 1986, p. 83). Nevertheless, permanent working staffs were established at the Federal Ministry of the Interior and the Department of Foreign Affairs. Their task was the gathering and passing on of information. Travellers to the USSR were advised not to travel to the area affected by the accident. The Joint Committee of the State Environmental Departments was informed of the federal measures.

In the afternoon, Prime Minister Lothar Spath of the southwestern state of Baden-Württemberg met ministers and officials of the departments of Agriculture, Nutrition, Forests and Environmental Matters, Health and Social Matters, and the Interior. After discussing federal policy, they decided to establish a permanent observation group at the Department of Agriculture. Spath, who henceforth stayed backstage, appointed Minister Weiser of the Department of Agriculture as head of the group. The permanent observation group was ordered not to apply the disaster laws. As a consequence, it was denied access to the emergency communication network of the Department of the Interior, which was operated by the police services. On the other hand, the Department of Health also insisted on its competence in medical matters, by unexpectedly issuing a warning against the use of iodide pills. The only task left for Weiser was to inform the public of slightly elevated radioactivity.

With the prospect of a long weekend ahead of them (1 May is a national holiday, and as it fell on a Thursday most people took the Friday off too), the state ministers left their offices — just three hours before torrential rains occurred in southern Germany, Austria and Switzerland. The area around Lake Constance was particularly hard-hit by nuclear fallout from Chernobyl (see Fig. 1). Gerhard Lindner, Associate Professor at the Department of Physics of the University of Constance, was among the first to go out and measure the nuclear ground contamination during the "great rains". Lindner's Geiger counter indicated high nuclear decomposition rates outdoors, but stopped bleeping as he passed underneath the roof of a bicycle shed in the courtyard of the institute. Overall nuclear ground-exposure varied within a factor of 30 between indoors and outdoors, whereas air radiation remained comparatively low (Lindner and Recknagel, 1988, p. 13). During the night, Lindner prepared a gamma spectrometer to measure the radiation in food. In the early morning of Thursday, 1 May, Lindner was rather shocked to discover, among several short-lived nuclides such as iodide 131, some heavier isotopes in his food probes. He detected cesium 137, with a half-life of 30.2 years, and strontium 90, with a half-life of 28.5 years.

May Day was a sunny day. Shortly after 10 AM Lindner detected a tiny single nuclear particle from Chernobyl on a withered leaf giving off several thousand Bq of radiation.² Yet most people were completely unaware of the fallout. Many families had gone for a walk. Others were tending their gardens, which were covered with a thin sediment of decomposing nuclear isotopes. Children were playing in slightly radioactive meadows and romping through puddles of highly contaminated rain from the day before. The deputy director of the university library helped his wife to dye bundles of home-spun wool in a rain barrel. Later he threw the wool away, and — full of anger — went to prepare an exhibition on the Chernobyl disaster at the library.

Uncertainty over thresholds

Robert Maus, a Christian Democratic member of parliament in Baden-Württemberg, County President of Constance, and consequently the head of the local County Agency for Disaster Protection, knew about increased radioactivity from an incident at a private isotope laboratory. On Wednesday, 30 April, the alarm systems there had been activated when an employee wanted to *enter* (!) the laboratory. To be on the safe side, a manager reported the incident to the local fire brigade. The commander of the brigade, Santo, also a part-time member of the County Agency for Disaster Protection, ordered the CBR platoon to take radiological measurements. Maus was not informed in advance because he was on an official journey at the time.

On Thursday, 1 May, Maus was pleased to be contacted by the young physicist Gerhard Lindner. Lindner was an expert in nuclear science. He had access to the technical devices required for radiological measurements and — presumably even more important for a conservative politician — Lindner was a well-known ecologist, engaged in citizens' environmental initiatives, and a member of the Social Democratic Party. Maus knew that he would have to legitimate his decisions and non-decisions, facing heterogeneous political demands from environmental and economic groups, the county council, and, not least, from the state government. Additionally, he was worried about competence conflicts within his own administrative apparatus. Maus was determined to establish a local expert committee in order to take control of a muddled situation. He invited Lindner to take part in a meeting of officials from several administrative departments, police stations, fire brigades and the press the next day.

Friday, 2 May, was a day of confusion. Public concern was growing. About 10% of the city and county administrations in southern Germany had by now

² Similar fuel fragments have been found around Chernobyl, in the Ukraine and Byelorussia, in the northeastern parts of Poland and at other places in southern Germany. If the fuel gets into animal feed, consumers of the milk and meat will be exposed to a particularly strong radiation emanating from them (Haynes and Bojcun, 1988, p. 43).

set up special crisis-handling committees. In the early afternoon, County President Maus met with the heads of major administrative departments, the editor-in-chief of the local newspaper, and physicists from the University of Constance. The physicists, Professor Ekkehardt Recknagel and Dr Gerhard Lindner, gave an account of the radiological situation. Subsequently, the commander of the local fire brigade reported somewhat lower levels of nuclear contamination than the physicists had. Most of the officials warned against overestimating the threat of radioactivity. Their advice was to keep people calm by not taking precipitate action. Uncertainty over appropriate thresholds complicated administrative action. The physicists suggested taking the figures laid down in the Federal Decree on Radiological Protection as a basis. Considering different living and eating habits, it would be impossible to apply these figures directly, but, "as a rule of thumb", the physicists claimed 100 Bq/l to be the appropriate threshold for milk. Finally, it was agreed to inspect the milk at the nearby dairy and to insist on quite low levels of radiation for marketed milk products: County President Maus promised to persuade the dairy not to process supplies of milk with contamination exceeding 100 Bq/l. And, indeed, the dairy did store a few tanks of contaminated milk for curds and cottage cheese during the following days.

On Friday afternoon, the state government, via the Department of the Interior, ordered the withdrawal of CBR platoons and the collection of their radiometers for calibration. The teletype "Chernobyl/1" said: "The lower-level disaster protection offices are to be instructed not to use units and equipment from the public disaster protection service, and to withdraw units already operating... Additionally, measures by disaster protection offices (including any orders from a special emergency staff) are only to be taken on the Department's instruction." County and city officials questioned the sense and purpose of these instructions, and only a few mayors and county presidents obeyed them.

Competence conflicts characterized the events in Bonn, the federal capital, on 2 May. There was a special session of the Radiation Protection Commission (*Strahlenschutzkommission*), an advisory body consisting of well-known nuclear scientists, in the morning. After a general estimation of the radiological situation, the Commission recommended a threshold of 500 Bq/l of iodide 131 for milk. Subsequently, the Secretaries of State discussed the consequences of such a recommendation at their meeting in the Department of the Interior. Issuing official thresholds was bound to cause severe problems, for technical, political and administrative reasons: (1) given the lack of reliable measurement facilities, thresholds could not be effectively controlled; (2) the states could not be legally forced to implement such a measure; (3) where measurement facilities were available, contaminated milk exceeding the threshold would have to be destroyed — and somebody would have to pay for it. On the other hand, waiting would have meant that single states — especially Hesse, with a Minister of the Environment from the Green Party — or even counties and

cities could take the lead with their own thresholds. The Secretaries of State agreed to follow the Radiation Protection Commission. They viewed the threshold for milk of 500 Bq/l as a signal to the states and other territorial authorities not to undercut the federal strategy.

The issuing of a nationwide threshold for milk predetermined further actions of states and federal authorities. While referring to the Atomic Law, which assigned the liability for damages from domestic nuclear accidents to the federal state, judicial experts considered the following: by issuing a threshold, the federal government had accepted a definition of what was "acceptable damage". States undercutting federal figures could then be held responsible for "producing more damage" and would have to pay the indemnities themselves. Thus, fiscal reasons served as leverage to make individual states and municipal governments comply with federal regulations.

The public was not at all reassured by the federal measures taken so far. In Constance, 2,500 people flocked to the university's *Auditorium Maximum* in the late evening of 2 May. The physics department had announced a lecture to shed some light on the situation after the fallout. Professor Hohenemser, a well-known American nuclear scientist visiting Constance as a guest professor, gave a lesson on the biological impacts of low levels of nuclear radiation. He warned against panic, but nevertheless told the audience that the domestic rate of cancer would increase as a result of Chernobyl and that children were especially vulnerable to radioactive fallout. The mood in the Auditorium Maximus ranged from depression to enraged activism. The group "Parents Against Nuclear Power" and several other action committees were founded on that same night.

Newspapers were full of the Chernobyl story on Saturday, 3 May. Critical comments predominated now. Generally, one could observe that the political leaders in governments and parties avoided the press and public audiences when possible. This was the day of the middle ranks in politics. Many officials were entangled in the adversities of an apparatus which had never been prepared to cope with large-scale hazards during long holiday weekends.

The bureaucratic apparatus heats up

Over the weekend, increased soil contamination was reported not only in the south, but throughout the country. Discussions in Bonn centered on the question of whether the marketing of green vegetables should be restricted. The government of Berlin was the first to strongly demand such a measure. On Sunday, the Radiation Protection Commission suggested that a threshold of 250 Bq/kg should be applied to green vegetables. Subsequently, federal authorities requested the states to limit the marketing of green vegetables from Monday, 5 May, onwards.

On Monday, 5 May, the federal parliament's Committee of the Interior was informed by the government. This was the first time that the national parlia-

ment had become officially involved. Before, crisis management had been a purely executive matter, except for the manifold local initiatives. At noon, an ad hoc Secretaries of State conference decided to establish a commission of judicial experts to clarify particular questions on structures of competence, legal forces and indemnifications.

In Baden-Württemberg, the Minister of Agriculture and the Minister of Health set up eight joint working groups to attempt to solve the multiple problems caused by anxious people, the activities of local administrations, internal and external communication structures, political and judicial consequences, etc. Moreover, the state administrations now felt obliged to issue a number of orders to lower-level administrative units concerning the surveillance and confiscation of food.

In Baden-Württemberg, controls were organized as follows. Mobile measurements were to be directed by local sections of the State Board for Health (marketed goods) and State Board for Agriculture (field crops). Detailed measurements of suspicious goods were delegated to officially appointed laboratories. Rough measurements, confiscation of products for testing and coercive measures had to be executed by the Economic Control Service (*Wirtschaftskontrolldienst*) of the police, on the basis of the food laws and several decrees on business and industry regulation. The transport of samples was the task of police couriers, including a helicopter squadron and officers of the Economic Control Service.

In Constance, the state government's written order of Monday, 5 May, caused angry reactions. The district administrations' corresponding teletype (No. 224) arrived at 11:12 AM. It indicated that the "radiometers 'minicont' are to be transferred to the police's Economic Control Service" and other devices "are to be kept ready — special orders will be issued with regard to their assignment". County President Maus replied immediately: "...the above-mentioned teletype has caused absolute confusion. After six days of autonomous measurements here, should the Department of the Interior now control these measurements and confiscate and redistribute the radiometers to special testing teams? With the best of will, I cannot imagine that this instruction is to be executed ...I require prompt communication." Minister Weiser called Maus the following day. He argued that protection from nuclear radiation had never been a communal task. Hence, county services had to act as local branches of the state administration in this case. Nevertheless, Maus continued to disobey the state government's instructions.

In the afternoon of 6 May, about 15 parents appeared with their children at County President Maus' office, asking for more information and special protective measures for children. They belonged to the recently founded "Parents Against Nuclear Energy". In particular, they demanded categorically that the county administration should provide permanent facilities to analyze and measure food for everyone. At first Maus tried to sooth them. But then Walter Dittrich, a political scientist from the university and the group's speaker,

shouted at him that it was irresponsible not to take special measures for the nutrition of babies and small children. He claimed that the county administration was taking the easy way, by only concentrating on outdoor contamination, changing the sand in sandboxes and such things. Instead it should have been distributing uncontaminated food for children. Subsequently, County President Maus got worked up and said his visitors were hysterical. Then he turned them out and left his office.

On the other side of Lake Constance, in Ravensburg, about 100 environmentalists took over the town hall during a session of the municipal council. The protesters asked for an immediate debate on nuclear contamination and administrative measures to combat it. As the session was interrupted by constant angry heckling and rhythmic sounds from the listener's benches, Mayor Waschle called the riot police, who came from nearby Biberach and had the hall cleared within a few minutes. The six councillors from the Green and Independent parties left the hall with the protesters. One of them, H. Jobmann, returned later with a Geiger counter and several contaminated samples of soil and water. Finding the constant bleeping of the Geiger counter irritating, Mayor Waschle urged him to leave the council again. The Social Democrats then called for immediate talks between the mayor, the party leaders and three representatives of the protesters. The majority of Christian Democrats rejected this move. They decided to schedule a special meeting for the following week.

The events in Ravensburg reminded County President Maus of the next meeting of his county council. He asked Dr Lindner to contact the protesters who had visited him in his office. The next day Lindner invited the group to the University Institute. He presented the institute's measurement devices and everyone got a three-hour lecture on radiological and environmental questions. The "Parents Against Nuclear Energy" were happy afterwards, the more so as they had been invited to bring their dubious food to the institute for radiological measurements.

Party politics and departmental conflict

Early on 7 May, the EC Commission's decision to restrict the marketing of milk and milk products, fruit and vegetables, and to stop imports of meat from East European countries until 30 May 1986 was implemented. The customs offices and business control units of the state police were ordered to take radiological measurements of all food passing the border. But on the same afternoon, some restrictions concerning the treatment and marketing of food were cancelled after a special meeting of the Radiation Protection Commission. The Commission warned against "unreasonable restrictions" in daily life. The Joint Committee on Atomic Energy discussed the Radiation Protection Commission's recommendations. Discussions on compensation for damage caused by administra-

tive measures — destruction of food, restrictions of tourist traffic to the East, decline of food sales — came to the fore.

The results of this day's meetings at the federal level were based on a minimal consensus. Conflicts dominated the Federal Cabinet, which at that time was only a rump cabinet, since Chancellor Kohl and two of the most important ministers were attending the World Economic Summit in Tokyo.

Party politics influenced the course of events in Bonn. Two state elections in Lower Saxony and Schleswig Holstein were coming up, which could change political forces fundamentally. These states consist of many rural districts, and farmers had been the most wooed voters of the CDU (the Christian democrats). Therefore it was not surprising that the Federal Minister of Agriculture, Alfons Kiechle (CDU), and his advisors saw a chance to compensate farmers for damage from radioactive fallout without breaking EC rules concerning extra subsidies for farming. In this situation, inter-departmental conflicts were bound to escalate, but electoral politics — together with the fact that the governing coalition had to act quickly — also attenuated them. The Minister of Finance, Gerhard Stoltenberg, did accept additional expenditures to pay indemnities — although his department had initially rejected the idea — because, being the CDU party leader in Schleswig Holstein, he was particularly afraid of electoral losses. Eventually, the federal government distributed 310 million DM to farmers and gardeners in a remarkably unbureaucratic fashion — even before a reliable figure could be put on the real damage.

A major political problem which pervaded the crisis was posed by deviant political actions in Hesse. This constituent state of the Federal Republic was ruled by a Green-Red coalition at the time. Its Environmental Minister, Joschka Fischer, a prominent member of the anti-nuclear Green Party, surpassed the federal recommendations as he pleased. The threshold for milk was 20 Bq/l in Hesse, in contrast to the 500 Bq/l issued by the Radiation Protection Commission. The marketing of meat was restricted to contamination below 100 Bq/kg in Hesse, whereas the federal figure was 250 Bq/kg. One should bear in mind at the same time that nuclear contamination was much lower in Hesse than in Baden-Württemberg.³

After 8 May, strong efforts to routinize and concert the administrative actions of federal, state and local governments came to the fore. On this day, expert talks took place in Bonn to prepare statements for the meetings of the European Commission and Council, the OECD Committee for the Security of Nuclear Establishments, the International Atomic Energy Agency, and other

³ It is interesting to note that all these thresholds are well below the limits of the International Commission on Radiological Protection (ICPR), which recommends that the banning of milk should be initiated at 2,000 Bq/l and should be imposed at 20,000 Bq/l. The Soviet banning level was 3,700 Bq/l, whereas Poland applied 1,000 Bq/l. Other countries with stringent radiological standards — Austria, 370 Bq/l; Finland, 185 Bq/l — used considerably lower thresholds than the German federal government (500 Bq/l), but again much higher ones than local crisis management teams in Hesse, Baden-Württemberg and Bavaria.

international organizations and conferences. On Saturday, 9 May, a special cabinet meeting discussed the preparation of a new "Law for Provisional Protection from Radiation", which would apply in situations of widespread nuclear contamination "below the disaster level". The cabinet also suggested that a special working group on such hazards should be set up at the Department of Domestic Affairs. Furthermore, it decided to support higher safety standards in nuclear industries worldwide. The Secretaries of State met in the Department of Justice to talk about the administrative and judicial problems of indemnification.

On Sunday, 10 May, the Federal Department of Youth, Family and Health organized a meeting of leading officials of the states' health administrations. Scientists from the Radiation Protection Commission gave a lecture on the radiological consequences of Chernobyl, concentrating on the contamination of meat and milk. This meeting was obviously in answer to the persisting deviationist course in Hesse, where the Red-Green coalition government continued to apply much lower thresholds than other states.

The effects of Chernobyl occupied governments and administrations for a long time. Apart from legislative measures, they have mainly been concerned with issues of reactor safety and improved communication structures between various levels of government and administrative units. Generally speaking, it seems that the main emphasis has been placed on improving technical devices, such as computer networks (Mühlen, 1987).

Expertise, risk structures and experience as determinants of administrative action

Local coordination was astonishingly effective in some areas. By 6 May, when the first situation report reached those lower-level administrative units, crisis-handling committees were installed in 23% of the counties and cities of southern Germany. Intensive networks had emerged linking county offices, universities, fire brigades, local newspapers, and sometimes even environmental or agricultural interest groups. Most of these committees worked on an informal basis and concentrated on the gathering and passing on of information. Nearly all the bigger cities and county administrations established permanent telephone services. Some administrations worked out special lists with recommendations. In Constance, for instance, they made the following recommendations:

- do not clean air-filters;
- do not allow children to play in sand-boxes;
- milk should no longer be provided at school;
- do not drink rain water;
- wash vegetables thoroughly before consumption;
- shower children after they have been outdoors;
- plough up fields of vegetables (to destroy them so they are not sold).

Despite the lack of coordination and the political confusion, local administrations did not act in a chaotic manner. In fact, they adhered to specific routines and rules of appropriateness. Lower-level administrations followed their usual standards, setting written agendas, keeping records of talks and meetings, and filing documents. The county archive of Constance collected four thick folders containing the letters, protocols and memos of civil servants engaged in crisis management. In several cities, crisis staffs were installed according to regulations originally designed for floods, earthquakes or even fun-fairs.

Besides procedural regularities, one can also distinguish policy patterns chosen by local administrations, such as installing hot-lines, and issuing radiation thresholds and recommendations for nutrition. Most of them could not respond adequately because they lacked the necessary knowledge and technical resources. Considering their possibilities, they chose solutions which seemed appropriate to them. For instance, the crisis committee in Constance issued a recommendation to plough up fields of vegetable crops, to avoid any contaminated vegetables being sold. It turned out later that due to this measure the transfer of nuclides into plants increased for at least the next few years. The applied "rules of appropriateness" (Olsen, 1991, p. 90) were determined by a few distinctive factors. Having reported the special features, we will analyze the regularities in the next section.

53 administrations of counties and county-independent cities participated in our investigation in May and June 1987. From this data corpus, 38 cases, from the states of Bavaria, Baden-Württemberg and Hesse, were analyzed in the first instance and an additional 13 cases (administrations in North Rhine-Westphalia and Lower Saxony, which were surveyed later) were included in a second step. After focusing on the details of the relationship between local rates of contamination and administrative reactions, further explanatory variables will be employed: available expertise, risk structures and the previous experiences of administrations in particular.

The territorial distribution of local ground contamination covers a vast range. Substantial variations were measured between and even within counties and cities. Our scores were obtained by using the highest measurement occurring in each administrative district.⁴ A similar variation can be discerned in the multitude of administrative reactions discussed above. In our sample, the internal organizational reactions employed immediately were as follows (multiple entries were possible): 13 administrations established groups for information exchange; 23 installed committees to coordinate the responses of different departments; 16 appointed specific competences to single departments; and 16

⁴ The measurements are based on the rule of the so-called "leading isotope", which exhibited the greatest amount of radiation at that time: iodide 131 and cesium 131. Being essentially confronted with "packages of isotopes of the same composition" after Chernobyl and considering that administrative reactions should be oriented to the highest amount of contamination found, the application of the highest measured rate of contamination in a designated area seems to be the appropriate indicator of the problem.

established a formal crisis staff, involving the assignment of competence for decision making. Six of the administrations surveyed did not react organizationally.

In the framework of a systematic analysis, one can begin by distinguishing between those administrative reactions that related to internal organizational measures (e.g. building a crisis management team) and those that dealt with the public (e.g. closing parks and playgrounds). An important indicator was the "opening" of administrative action across administrative units or towards the general public and local interest groups. This was measured by the "number of administrative units" participating in crisis management, and for external reactions by the "number of participating institutions not belonging to the administration" — associations, firms (private laboratories), universities and the mass media in particular. The establishment by the administration of citizen's information services, such as an information telephone (a hot-line), is also viewed as an externally aimed administrative reaction. Variations in this variable can be discerned above all in their duration; for example, a citizen's information service existed in 23% of the surveyed counties for more than 12 months. Additional variables are the "rapidity of reaction", measured by the first date on which specific measures were implemented, and the "depth of reaction", measured by the duration and lasting political consequences of the measures.

The scale of radioactive soil contamination of the cities and counties had no effect on any of the administrative reactions, either on the internal or external measures taken by the administrations, or on the rapidity and depth of reactions.

Detailed analysis of the data indicates that administrative districts suffering high contamination often did less than those with low contamination, and vice versa. No claims can be made on the appropriateness of the reactions. One fact though is indisputable: the determinants of administrative reactions after Chernobyl and the resulting political problems should be closely scrutinized within the administrations themselves, with special attention being paid to their societal, economic and political embeddedness. Due to the invisibility of radioactivity — resulting in deep fears and insecurity on the part of the population — relationships and reactive patterns emerged which deviate somewhat from those that might apply to visible disasters such as broken dams, earthquakes or airplane crashes.

One important determinant of administrative action seems to be the degree of accessibility to scientific expertise and consultation. Even when measurements of contamination were available, the danger could hardly be assessed without appropriate expertise. One should additionally assume that the action taken (i.e. the actual management of crisis, including the acquired expertise) is also dependent on the risk structures already existing in a specific area, such as special garbage dumps for dangerous materials, chemical plants, military

depots of chemical, nuclear or biological weapons (which, being under foreign military control, one has found in Germany more than elsewhere), nuclear industry, etc. As a rule, such resources are usually already considered in existing disaster protection plans and are assumed to lead to a preparedness from which specific reaction patterns (e.g. trained reactions or routinization) could be expected in the case of the Chernobyl crisis.

An additional explanatory factor is former experience with disasters or disaster-like situations (e.g. the snow catastrophe of 1978/79 and tidal waves and flooding in northern Germany, the earthquake in the southwest, the decomposition of fertilizers in two cities in Hesse and North Rhine-Westphalia, as well as floods and large fires in several cities).

Last but not least, one can assume that when, in a specific area, city or county, a critical attitude towards nuclear energy is frequently encountered (indicated by the strength of the Green Party in city and county parliaments), a higher degree of pressure to legitimate their measures will be exerted on the administration. This should hold especially for the case of nuclear hazards.

Statistical analysis of the data

According to our prior considerations, the simplest and most elegant hypothetical causal structure to explain administrative actions after Chernobyl consists of the following independent variables: access to expertise, existing risk structures, prior experience with disasters, and the local virulency of the energy-ecology conflict; and the following dependent variables: the rapidity, intensity and duration of administrative measures.

The measurement of access to expertise is based on the possibility of utilizing measurement equipment and expertise from local universities and polytechnics. In order to allot the risk structures, an additive index was constructed, based on the existence of local garbage dumps for especially dangerous material, nuclear power plants, ABC ammunition depots and a high proportion of employment in the chemical industry (exceeding 20%). The administrations were asked directly if they had had prior experience with catastrophes. The variable "virulency of the local energy-ecology conflict" was assessed through the proportion of seats in city and county parliaments occupied by Green ecologists.

This causal model was tested through the application of a multiple regression analysis,⁵ but the results for our sample consisting of cases coming from all the states surveyed did not confirm our expectations:

⁵ Dependent variables are based on an additive index built from the indicators: number of participating organizations, intensity, initial date and duration of actions. Since the quality of interval scales can be assigned to dependent variables, the method of multiple regression with a few independent variables (partially dichotomized) was employed (dummy regression, see Nie et al., 1977, pp. 373-394).

$$\text{Reaction} = 0.08 \text{ Greens} + 0.45 \text{ Expertise} + 0.25 \text{ Risk structures} + 0.12 \text{ Experience}$$

The multiple linear regression explains just 30% of the variance in administrative reactions ($F=4,71$; $n = 51$). This result is apparently due to the existence of different constellations in North Rhine-Westphalia and Lower Saxony as compared to the three southern states. This difference diminishes the regression results through statistical interaction effects. A closer look at the correlation matrix of both subgroups (north and south) reveals that, with regard to some relationships, the northern states reacted in exactly the opposite way from the southern ones. Further analysis has shown that prior experience of catastrophes enhanced activities concerning the exposure of administrative measures in the south, while it decreased such activities in the north. Similarly, the existence of high risks achieved in the south a much higher activity level than in the north. In contrast, the available (external) expertise could predict administrative reactions in both subgroups quite well and without ambiguity. I can merely form a hypothesis on the causes of these differences: (a) the later arrival of the radioactive cloud in the north, giving the administration more preparation time; (b) the fast and tense instructions of lower-level administrations through the state government of North Rhine-Westphalia, which is due to (c) the strict separation of the local executive branch from political institutions of communal self-government found in the north German municipal constitutions. As such, the possibilities of hierarchical state control are greater in the north. These features — compared to the unidirectional impact of externally controlled expertise vs. different impacts of internal administrative experiences and risk perceptions in both subgroups — indicate the relevance of institutional settings for autonomous local crisis management.

Due to these considerations, the data of the southern states ($n = 38$) were analyzed separately. The explanatory model drafted above was acknowledged fairly well in this analysis (see Fig. 3). It explained 48% of the variance in internal administrative reactions and 32% of the external administrative openings (number of external societal organizations participating). This is a noteworthy result, when one considers that other contingent influences, such as personal initiative and political motivations, were not evaluated.

The results of a two-sided t-test show that the variables "access to expertise" ($t=2.9$; $p=0.005$), "existing risk structures" ($t=3.0$; $p=0.000$), and "prior experience of catastrophe" ($t= -1.7$; $p=0.091$) have a significant influence on reactions, while the "local conflict potential" ($t= -0.1$; $p=0.94$) has no effect. The significance of the whole regression ($F=6.56$; $n = 38$; $df=4$; $p=0.001$) shows that these results can be applied to the total population of cities and counties in Baden-Württemberg, Hesse and Bavaria.

Viewing the influence of the party-political make-up of local and county councils on administrative reactions, an interesting effect can be detected,

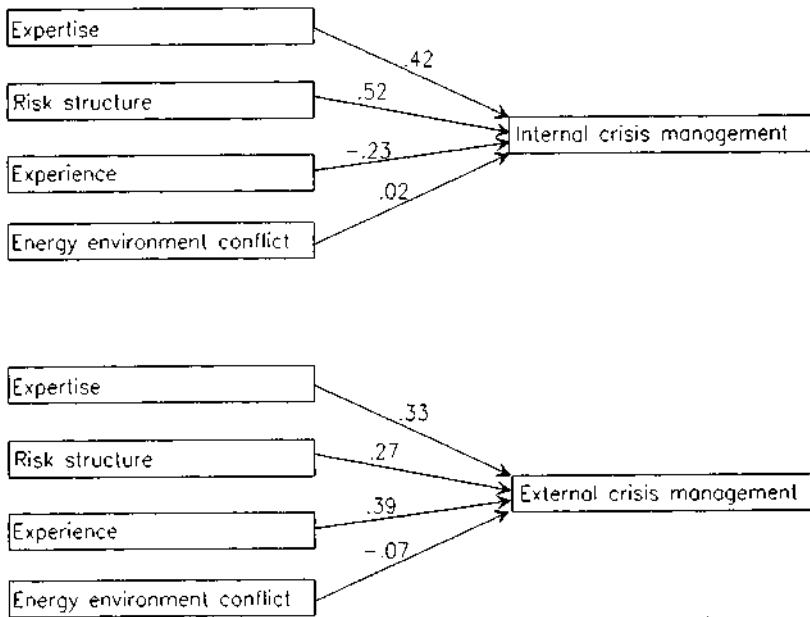


Fig. 3. Determinants of administrative responses to nuclear fallout.

namely the interaction of the variable "strength of parties" with "access to expertise" and "existing risk structures". The correlation matrix (Table 2) shows a relation between the proportion of votes for the Greens and internal reactions. This, however is revealed as a spurious relation in the regression analysis: due to the Greens having strongholds in university cities, the presence of local universities turned out to be a variable explaining both the Greens' voting

Table 2

Correlation matrix

	Response		Risks	Expertise	Experience	CDU	SPD	Greens
	Internal	External						
Internal response	1.000							
External response	0.273	1.000						
Risk structure	0.400	0.272	1.000					
Expertise	0.481	0.216	-0.096	1.000				
Experience	-0.199	0.381	0.000	0.019	1.000			
CDU seats	-0.353	-0.338	-0.060	-0.178	-0.294	1.000		
SPD seats	0.233	0.363	0.326	0.207	0.515	-0.618	1.000	
Green seats	0.351	-0.068	0.046	0.299	-0.250	-0.251	-0.113	1.00

success *and* administrative responses after Chernobyl. The same holds for the relationship of Social Democratic (SPD) and Christian Democratic (CDU) seats to "prior experiences of technical disasters": the more technical disasters occurred, the higher the proportion of SPD votes ($r^2 = 0.52$) and the lower the proportion of CDU votes ($r^2 = -0.29$). This phenomenon is clearly related to the industrial structure and the degree of urbanization. The Social Democrats are still strong in areas with heavy and basic industries, whereas the Christian Democrats dominate in rural districts, and the Greens are strong in "post-industrial" regions with a high share of universities and modern service industries.

Except for these interaction effects, it has not been sufficiently explained why the strength of the local Green Party, and as such the intensity of the energy-ecology conflict, has shown so little influence on administrative responses. This even holds for municipalities in which the Greens held 15% or more of the seats in city and county parliaments. The sensitization of the population after Chernobyl was apparently so extensive and independent of established political cleavages that party politics lost their meaning for this issue. An example of this has already been given, in the collaboration between the conservative County President Maus and the Social Democratic ecologist Lindner in Constance.

The lack of a direct link between party politics and lower-level administrative responses could also be interpreted in another way; it could be that local administrations acted autonomously in a two-fold sense — detached from state governments *and* from city and county councils. However, this seems improbable, given the observed openness of administrations towards the public. An additional, though rather unsystematic, observation supports this conclusion: later organizational measures taken by lower-level administrations which were explicitly based on local parliamentary decisions, such as budget increases, new recruitment and other provisions liable to self-government, did not show any relation with the distribution of party seats in city and county parliaments. In contrast to the local level, federal inter-party conflicts played a major role during the Chernobyl crisis, as our multilevel case study has already shown.

The differential influence of prior experience on reaction is most striking (see Fig. 3), comparing the regressions on external and internal measures of administrations. When prior disasters had been experienced, the number of administrative departments involved was below average, whereas the participation of (harmed or otherwise interested) external groups increased: usually prior experience had yielded an organizational pattern that could be revived, requiring fewer internal activities. Additionally, experience had taught that the participation of many departments usually impeded decision making. On the other hand, administrations with experience of disaster viewed the participation of external specialists and harmed and interested groups or persons as being beneficial for crisis management. Experience with previous application of the Disaster Protection Laws probably also played a role in this issue. Where prior experience was available, administrations could fall back on local competence,

accomplishment and routines developed in this formal context. This enabled them to act informally in accordance with the Disaster Protection Law, without officially referring to it — instead they referred to their experience.

Origins and ways out of the Chernobyl crisis

The results of the case study and comparative survey allow some conclusions to be drawn on the role of lower-level administrative units in the prevention and management of disasters and technical-industrial hazards.

It has been shown that lower-level administrations have a potential for improvising. An elementary component of their flexibility is the participation of external groups and experts. Group-specific influences — in the sense of particular "pressure politics" — have not been found. Lower-level administrations could nevertheless hardly safeguard consumers against producer interests (agriculture, market gardeners and agricultural salesmen). Confiscations were only carried out after decrees from state governments had been issued. Local solutions were achieved through negotiations and the formulation of recommendations.

The identified response patterns of lower-level administrations can partly be explained by their social environments, organizational features and individual initiatives. Regression analysis reveals that up to 50% of the variance of internal responses and at least 35% of external responses can be explained by the most influential independent variables. Adding other conceivable independent variables, such as actual contamination rates, the number of people employed in agriculture and tourism, population density, etc., does not significantly improve the variance explained. This means that a considerable part of local activities cannot be explained on this level of aggregation, but must be grounded in individual initiatives and case-specific constellations.

In Constance, for instance, some of these features can be illustrated by viewing the activities of County President Maus. Despite a demanding public, he could well have inhibited official activities. Several specific factors, however, can explain why he did not do this:

(1) When Maus came back from an official journey, the local fire brigade had already taken measurements. Maus saw himself in an exceptional situation. Crisis management had already begun without him. The thoroughbred politician sensed that hesitation would undermine his authority during later stages of the crisis. If the fallout proved to be harmless, he could still refer to a precautionary strategy.

(2) Maus had been elected by the county council for eight years as a County President. As a member of the state parliament, however, he had to consider possible electoral losses since the next state election was forthcoming (ironically he did not anticipate that his chief advisor, Lindner, would become his Social Democratic opponent in this campaign).

(3) Maus had suggested amending the state's disaster law before the Chernobyl crisis, but his parliamentary proposal had been voted down. He argued that provisions for a pre-alarm situation should become part of the law in order to cope with hazards below the disaster level. It now appears that during the Chernobyl crisis he acted according to the recommendations and guidelines contained in his proposal. Indeed, afterwards he reintroduced his bill, and eventually the parliament of Baden-Württemberg amended the disaster laws according to Maus' original suggestions.

The crisis was not actually handled by technically trained disaster managers but rather by politicians. Decision making was based on compromising more than on well-founded judgements. Did any possibility exist to transpose these politics of "muddling through" into a more calculated and coordinated process of decision making? Probably not, because the gap between varying local threats and the federal and state government's urge to achieve a low-level unitary response was far too big. In addition, specific obstacles of crisis management inhibited a more coherent management of the Chernobyl crisis:

(1) The spheres of responsibility were unclearly defined between horizontal administrative departments and vertical state, regional and federal levels of administration. Competences were often assigned to units, where the appropriate resources were not available. In particular, trained personnel and technical devices could not be employed efficiently.

(2) Communication networks collapsed not only for technical reasons, but also due to the general confusion caused by inadequate laws, the lack of administrative experience and training, and absences due to the long weekend after May Day.

(3) There were not only local variations in party politics, scientific expertise, previous experience and risk structures, but also in the amount of nuclear fallout. In the case of Baden-Württemberg, the state capital, Stuttgart, was much less afflicted than the periphery. Hence, state officials did not believe the reports from the south of the state. For instance, in some cities they attempted to collect the local fire brigade's radiometers for calibration.

(4) A further problem was posed by federal competences in regard to indemnification. The Atomic Law, which was designed to regulate the nuclear industry, outlines federal obligations in cases of claims for damages. After Chernobyl, such claims resulted from recommendations or orders to destroy food.

(5) The situation after Chernobyl was highly politicized due to persisting debates on the risks of nuclear energy. The energy-environment conflict and electoral politics influenced actual crisis management at various administrative levels. Lower-level units in particular had to deal with the demands of environmental activists.

Despite the novelty and uniqueness of the problem, crisis decision making was not chaotic. Political compromising developed in a disturbed, reactive social environment (*cf* Jarman and Kouzmin, 1991, p. 129 *ff*). The situation was

neither really turbulent nor did crisis managers depend on mere inspiration. The political actors apparently knew the rules of the intriguing German game of *Politikverflechtung*. They had already played it with educational and cultural policies, industrial policies and highway planning. The federal government was used to urging unitary responses, whereas some states and many local actors usually stuck to their own interests and approaches to problem solving. Indeed, *Politikverflechtung* has proved itself effective in fields like industrial policy making, where competitive pluralism enhances the outcomes of policy making. For instance, in the case of economic adjustment policies, *Politikverflechtung* turned out to be a flexible political institution, serving a difficult socio-economic environment that was dominated by big firms, influential banks and powerful labor unions (Czada, 1988). However, when immediate decisions are required in highly conflictual situations, our analysis reveals that this type of bargaining carries certain risks. *Politikverflechtung* then tends to accumulate political and administrative problems. They result from fluid responsibilities, which usually increase during non-routinized situations of crisis management; the system suffers from emerging internal centrifugal complexities.

In Germany, the Chernobyl crisis revealed centrifugal tendencies that were based on inherited institutional and cultural features and on conflicts over the future of nuclear energy. Attempts by local and state administrators to protect their freedom of action were confronted with attempts at the national level to centralize and coordinate crisis decision making. This type of problem does not respond to the mechanistic/organic, programmed/non-programmed, or routine/non-routine distinctions elaborated in organization theory by Burns and Stalker (1961), March and Simon (1967) and Perrow (1967). While explaining patterns of crisis management, we have to consider politico-institutional and sociocultural deviations as well as technological and bureaucratic failures. Therefore, exclusively functionalist approaches fail to explain and resolve crisis situations. Conflicts and tensions usually play a crucial role in crisis management (Rosenthal et al., 1989, p. 459). Research has shown that many organizations generally participate in crisis decision making. The complexity of communication structures and lack of reliable information make central control very unlikely (Quarantelli, 1988), and if achieved also ineffective. Even if information flows are controlled and the authority to decide is centralized — as disaster managers commonly attempt to do (Rosenthal and van Duin, 1986, p. 10) — local actors "need to take initial steps in coping with the crisis more or less autonomously, as a matter of direct response" (Rosenthal et al., 1989, p. 457).

During the Chernobyl crisis, some local administrations were confronted with the fallout earlier than others — and most often earlier than the state and federal administrations. Thus a time lag occurred that was exacerbated by the different reaction patterns of the administrations involved. Local governments were not only the first to be confronted with the fallout, but, as front-line organizations, many of them also responded quickly and decisively. State govern-

ments usually reacted in a more restrictive fashion. Their delays were not only caused by a more "mechanistic" response pattern resulting in bureaucratic slowness and rigidity: in contrast to the specific local situation, they had difficulties in obtaining a general picture for whole states. To properly employ their resources and to formulate policies, a state overview was held to be necessary. Additionally, the states did not want to encourage local initiatives by employing early measures on their part. All these factors — bureaucratic rigidities, difficulties in generalizing the state situation, and a strategy of restraining local initiatives — increased the reaction time-lag between state and local governments.

Higher-level governments — though they were alerted by international sources at an earlier stage than local administrations — had a longer starting phase. Later, however, they produced a surplus of directions, information and rules. The federal government's activity started first, but remained on a low level for four days and rose steeply afterwards. Then it declined continuously over a period of several years. Thus, one can find a time-related pattern of responses at different administrative levels which interfered with each other (see Fig. 4).

Within a relatively small time-span, the crisis culminated in paths of disintegration, when local thresholds had already been issued, state governments were ordering the withdrawal of local CBR platoons, and the federal administration was determined to insist on its responsibilities as laid down in the Atomic Law. The way back to at least some degree of normalcy was quickly achieved — just after the federal government had issued its threshold for milk — when the established rules of *Politikverflechtung* came into play: federal-state coordination took place in an informal fashion or within joint committees

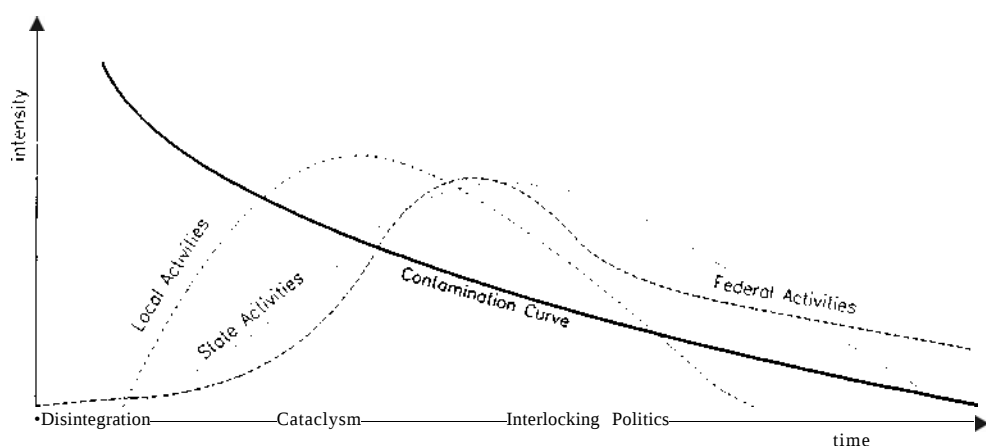


Fig. 4. The course of nuclear contamination and multilevel administrative action.

of the administrative departments concerned. Despite escalating inter-party conflicts in Bonn, and even though the states of Hesse and Berlin as well as many local administrations did not follow the federal recommendations, this situation can be viewed as being in accordance with normalcy; in German federalism, politicians are used to managing these multilevel tensions. Bargaining on how the federal guidelines were to be implemented by state and local administrations did not solve basic conflicts, but it was accompanied by at least some efforts towards gaining mutual understanding.

Among the lessons one could draw from the Chernobyl crisis, three are worth emphasizing:

(1) The loose coupling of multilevel participants causes centrifugal complexities. This holds especially when quick decision making is required in organizations with poorly defined responsibilities. To master crises which extend over vast areas and therefore involve a number of organizational levels requires a careful assessment of the vertical links between these levels. It is wrong, however, to assume that regional, national or international extensions of a disaster merely require an appropriate degree of centralization. Such crises have some specific dimensions which can only be faced at a local level.

(2) Two major variables which determine crisis management on the local level are easily accessible to political intervention. *Experience* can at least partially be replaced by training. *Measurement devices and professional expertise* can be made available in advance. Considering that about one-third of the variance in local crisis management is explained by these factors, politicians should not hesitate to improve facilities for training, measurement and professional advice. Additionally, technical communication is important, as the course of events after Chernobyl has shown. Improvements in communication, however, often result in simply a greater quantity of information and more complex technical operations. Thus the emphasis should be on providing greater professional expertise and more technical training. Otherwise an overload of information or communication failures can occur.

(3) Experience, a further determinant of crisis management, should be evaluated in order to improve training and policy making. This requires a multi-level research design in which two sets of variables must be integrated: process events and institutional structures. In the next section, I will discuss this problem, the most crucial from a theoretical point of view.

Theoretical problems and implications for further research

Disaster research often follows a process-type approach. Sets of variables are brought together in a functionalist manner to explain distinctive flows of events. Thus, administrative responses appear to be determined by a certain problem dynamic given by the disaster itself. In contrast, an organizational approach is based on the assumption that the structures, interests and resources of admi-

nistrations determine their perception of a crisis. Additionally, their institutional choices for certain activities, which are grounded on these perceptions, also influence the further course of a crisis and its consequences.

Many different types of disasters result in secondary crises; volcanic eruptions or earthquakes, for instance, have intensified social and political conflicts in the Philippines and in Armenia. This holds all the more for technological failures such as the *Challenger* shuttle disaster or nuclear accidents. Even a toxic cloud passing over a suburb can result in wicked political and organizational problems.

During the initial phases of a crisis, structural influences usually prevail. Administrative responses are often less determined by the special characteristics of a crisis, which are mostly unknown at that early time, than by the institutional settings involved. When and where an alarm is given, who acts first and the manner in which they act strongly depend on the organizational capacities available. Moreover, in the initial phase, which involves the highest degree of uncertainty, the legitimacy of political and administrative decisions can hardly be based on the characteristics of real events, but merely on vague crisis perceptions and prognostic expertise. The longer this phase lasts, the more social and political implications can be expected.

The Chernobyl case shows how early responses can shape the course of administrative action during the later stages of the crisis. Initial responses favored by certain institutional structures became decisive for further action. For instance, if there had been no possibility of taking early autonomous measurements at the local level, the course of events would have been completely different. In contrast, in centralistic France — where the Prefect is appointed by and responsible to the state government — no local initiatives emerged; and in Switzerland, despite a federalistic structure, local administrations were restricted due to early issuing of federal thresholds (500 Bq/l for milk). In West Germany, however, the structure of local self-government — including the predominant forms of *Politikverflechtung* — enabled decentralized action. Decentralization was also supported by the lack of federal thresholds, which were not issued before Saturday, 3 May. Because of the long holiday weekend, administrative measures to control and confiscate contaminated food did not start until Monday, 5 May.

The issuing of federal thresholds finally changed the course of decentralized crisis management. This was partially due to the problems pertaining to confiscation and indemnification; local governments could neither legally enforce nor pay for such measures. In counties like Constance, however, where voluntary agreements had been achieved with the local dairy, such attempts to centralize failed.

The Chernobyl crisis demonstrated that — at least in Germany — with regard to environmental crises, public sensitization is intensified and encompassing to such a degree that municipalities and counties are likely to seize their own opportunities of crisis management. Of course, the matter is compli-

cated by the fact that lower-level administrations usually lack the scientific expertise and technical competence required to handle problems such as nuclear contamination. For legal and economic reasons, higher-level administrations have better access to these resources. During events that are fairly limited in time and space, this may cause minor problems, because central agencies could easily aid local organizations in their crisis management. In contrast, events spreading over a large territory involve more tensions between different levels of crisis management. One big problem is that there are such different views involved. State and federal administrations have to obtain comprehensive surveys, which are applicable to their respective territories. Their assessment and action are based on generalizations of the problem, which erase certain individual local crisis features. Additionally, higher-level governments tend to administer their resources in a more bureaucratic fashion, whereas local governments follow rather informal rules of adequateness.

Problems which follow from the interdependency of governmental levels can be solved in three different ways:

- (1) In a given multilevel institutional setting with overlapping competences, the scale of coordination can be *increased*; for example, more efficient styles of decision making could be achieved through early interaction training and technical information and communication devices.
- (2) Implying an institutional change, the requirements for coordination can be *reduced* by strictly delineating the competences of each level. With this strategy, however, it must be decided whether centralized or decentralized structures of government are appropriate.
- (3) Finally, administrative responsibilities and the scale of coordination can be *left open* to such a degree that informal "Adhocracies" (Mintzberg and McHugh, 1985) and adaptive processes of "muddling through" (Lindblom, 1959) can emerge during a crisis.

These typical responses to the coordination problem predetermine the conditions of generating conflicts and conflict management in a multilevel political structure (Benz, 1991). Which approach is preferable for crisis management? The handling of the Chernobyl crisis in Germany certainly reflects the third type. This resulted from both the lack of coordination mechanisms and ill-defined responsibilities. The experience reported here indicates that high requirements for coordination are apt to paralyze or confuse administrations, when immediate responses are held to be necessary. Therefore a solution of the first type has to be treated with caution. Since ill-defined and, thus, overlapping responsibilities amplified social conflicts and blocked decision making for quite a long time, a solution of the third type is also not advisable. Disentangling mixed competences and the proper realignment of responsibilities seem to be most efficient — though not a panacea — to prevent mutual blockades of crisis management and processes of conflict accumulation on different governmental levels.

Of course, a central coordinating agency, supporting the various participants

in crisis management with general guidelines, specific expertise and recommendations, would be advantageous. Emerging tensions between levels of government could also be reduced by employing intelligent information systems and modern telecommunications equipment. This would probably improve the overall response efficiency to an actual crisis. As far as social, political and organizational conflicts are concerned, however, the effectiveness of mere technical solutions appears to be questionable. Legitimation problems and political conflicts suddenly evolving with crisis situations like nuclear fallout have first to be dealt with on a community level. State and federal governments should welcome a decentralized approach to social conflicts, because this relieves them of the "social perplexities" and political cross-pressures that originate in local situations; they could then focus their attention on tasks of advisory and technical assistance. In contrast, an immediate centralization of the political dimensions of crisis management tends to increase conflicts at all governmental levels, and particularly restricts the capacities of state and federal governments to assist local crisis management teams in an effective manner.

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