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THE ACCIDENT AT GORLEBEN: A CASE STUDY OF RISK COMMUNICATION AND RISK AMPLIFICATION IN THE FEDERAL REPUBLIC OF GERMANY

by

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Clark University

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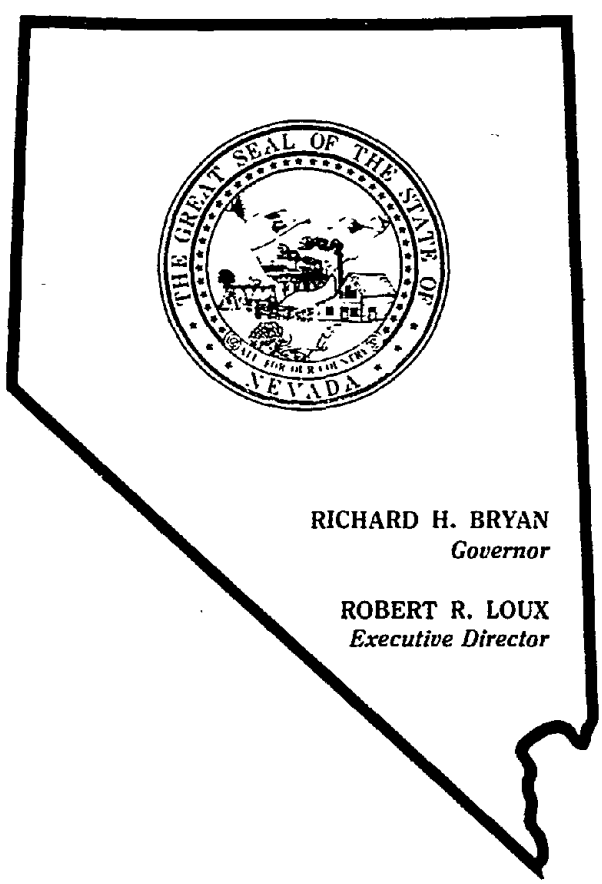

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The Nevada Agency for Nuclear Projects/Nuclear Waste Project Office was created by the Nevada Legislature to oversee federal high-level nuclear waste activities in the state. Since 1985, it has dealt largely with the U.S. Department of Energy's siting of a high-level nuclear waste repository at Yucca Mountain in southern Nevada. As part of its oversight role, NWPO has contracted for studies designed to assess the socioeconomic implications of a repository and of repository-related activities.

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Acknowledgments

First of all we have to thank the interviewees for their readiness to talk to us and for their frankness during the interviews. Without their participation this study could not have been finished. We hope that both sides of the Gorleben controversy find their views fairly represented. However, it is likely that not all of the interviewees (if any) will agree with our interpretations.

Furthermore we have to thank Mr. Martin Borgman, student of sociology at the Technical University of Aachen, and Mrs. Ursula Stetter, student of communication sciences at the Free University of Berlin, for their careful work in searching the newspapers and magazines for articles covering the planned Gorleben repository and coding these articles in the content analysis.

Last but not least we have to mention the assistance of Mrs. G.M. Glaze, who edited the manuscript and helped to formulate our thoughts in English. Without her help this paper would not be as readible as it (hopefully) is.

Contents

1. Introduction

On May 12th, 1987 an accident happened in the "pilot mine" at Gorleben in the Federal Republic of Germany where the feasibility of a repository for high-radioactive nuclear waste is currently being investigated. A miner was killed during that accident and two others were severely injured. Although this accident happened during conventional mining work and had nothing to do with radioactive waste, this event received much public attention and news coverage and had a strong impact on the political debate on the Gorleben project of a repository mine for radioactive waste and even on the nuclear power controversy in general.

This study does not aim to evaluate the accident that happened in the Gorleben pilot mine from a geological point of view nor does it aim to evaluate the West German waste disposal concept. All information given in chapter 2 on these aspects should be considered as background information, useful in understanding the subject of this case study: the risk communication concerning the Gorleben project in general and the accident in the shaft in particular.

As suggested by the term "risk amplification" in the title, this study focusses on the interdependencies between different regional levels of political communication (local, state and federal level) and different levels of argumentation (industrialization, nuclear power, Gorleben project, accident in the shaft). We will try to show by this case study of the Gorleben accident that the following are true.

1. The attention a specific event like the accident receives is strongly influenced by its relation to broader issues e.g. the Gorleben controversy and, hence, the perceived risk of a specific event may be amplified by its connection with a current issue.

2. A specific event like the accident can drive latent broader issues (Gorleben controversy, nuclear power controversy) up in the rank order of the national agenda, thus amplifying the social relevance of those broader issues.

3. A specific event like the accident can alter the boundary conditions of communication concerning the broader issues, for instance by influencing the credibility of social actors and, hence, reversing the burden of proof.

Chapter 2 gives an overview of the West German use of nuclear power, the nuclear waste disposal concept with the planned Gorleben repository and the circumstances of the accident in the shaft of the pilot mine at Gorleben. This overview also includes aspects of the social controversy pro and contra nuclear power. The approach of this case study is outlined in chapter 3 while chapter 4 describes the results of our explorative interviews and content analysis. Chapter 5 presents our interpretation of the Gorleben controversy and tries to illuminate the results in the light of "risk amplification".

2. The Gorleben Controversy

2.1. Nuclear Power in West Germany

About one third of the electric power generated in West Germany in 1987 came from nuclear power plants. This figure illustrates the importance of nuclear power within the West German energy supply system. Besides the 20 commercial light water reactors currently running and another one under construction, the prototype of a high temperature reactor in *Hamm-Uentrop* started operation in 1986 and the construction of a prototype fast breeder reactor at *Kalkar* is nearly finished.

The nuclear power program originally started with the consent of all political parties represented in the *Bundestag*, the West German Federal Parliament. Christian Democrats (CDU/CSU) and the Liberal Party (FDP), which presently work together in a coalition and form the Government, still support nuclear power, while the Social Democrats (SPD) have recently turned to a position of rejection of nuclear power. There had been a long controversy within the SPD concerning nuclear power, but the Chernobyl disaster triggered the formulation of an unambiguous anti-nuclear position: withdrawal from nuclear energy within ten years. Since 1983 the Green Party (GRÜNE), a new ecologically oriented party whose origins lie in the ecological movement, is represented within the *Bundestag* and - of course - advocates an uncompromising anti-nuclear position.

The public controversy between proponents and opponents of nuclear power is mainly concentrated on two "risk fields". First, health risks originating from the catastrophe potential of nuclear technology and the potential impacts of low-dose radiation and, secondly, the sociopolitical risk of a development towards an "*Atomstaat*" (atomic state), a society in which people are monitored and civil rights are suppressed to protect nuclear facilities against sabotage and terrorism. Although this level of the controversy about nuclear risks is the one frequently referred to by opponents and proponents of

nuclear power and which is covered by mass media, there are other levels of the controversy, e.g. differing concepts of the future society - "soft" versus "hard" way (cf. Renn, 1980) - that also play a - less visible - role in the social conflicts concerning nuclear power.

A strong ecological movement in West Germany opposes nuclear power outside and by means of the Green Party inside the parliaments. Forms of actions of this movement range from demonstrations at nuclear facilities to scientific disputes with "established" scientists. The antinuclear movement in West Germany has the power to mobilize thousands of people on the street as well as a well-organized and differentiated scientific infrastructure of ecological research institutes supported by networks of sympathizing colleagues at universities.

In West German public opinion a complex pattern of beliefs and attitudes toward nuclear power is found. About 80 percent of the population associate clear economic advantages with nuclear power, but 80 percent also perceive severe potential health risks (Peters, 1988). Thus most people do not have a simple but a complex picture of nuclear power. There are contradictions between emotion and reason and conflicts between perceived economic advantages and health risks. In opinion polls the proportion of opponents varies significantly depending on the wording of the question (even the substitution of "nuclear" by "atomic" makes a great difference) and the date of the survey. Before Chernobyl about 15 percent of the population supported a withdrawal from nuclear energy; after the Chernobyl disaster this proportion increased to 37 percent (Noelle-Neumann, 1987, p. 3). Other poll institutes even reported figures up to 65 percent (Emnid, cf. *Spiegel*, No. 9, 1988, pp. 36-47). These figures tend to give an impression of the sentiment of the public rather than about the distribution of political positions. In the elections in some federal states of West Germany a few month after the Chernobyl disaster and the national election for the *Bundestag* in January 1987 the parties with a clear

anti-nuclear position, SPD and GRÜNE, did not have the success that many observers had expected.

At the end of 1987 when the West German nuclear power industry was just beginning to hope that it could survive "Chernobyl" a scandal shocked it. In drums containing nuclear waste which came from the Belgian nuclear research center at Mol and which should only contain waste, delivered to that center for conditioning, small amounts of undeclared plutonium were found. In addition, employees in the nuclear power industry and the nuclear research center at Mol (Belgium) had been bribed by the company *Transnuklear*. One of the accused employees later committed suicide. During the debate on this scandal, details of the way in which the companies deal with nuclear material became public and lead to various suspicions. It was even suspected that the company *Nukem* might have broken the rules of the Non-Proliferation Treaty.[1] The corruption scandal has still not been completely explained; but it evidently destroyed more of the confidence in the nuclear power industry than did "Chernobyl".

In some respect the political effects of this scandal seem to be larger than those of the Chernobyl disaster. After Chernobyl one could charge the Russians for their "primitive technology" and their "poor safety culture" and one did not necessarily have to change ones view of the nuclear power industry at home. It obviously had no responsibility for the Chernobyl disaster. The corruption scandal, however, directly questions the reliability of people in the nuclear industry which is crucial for the safe operation of plants and careful treatment of the nuclear materials.

2.2. The West German Waste Management Concept

As in many other countries with a large nuclear power program the nuclear waste originating mainly from nuclear power

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[1] This suspicion could not be verified. Its origin lies in an interview between a reporter and a politician. A trial balloon was perceived as a hint by the politician and lead to an overreaction.

plants, reprocessing plants and nuclear research establishments (PTB, 1987) is considered as a major problem connected with the use of nuclear energy. The danger particularly of high-active wastes requires a careful conditioning, transportation, storage and final disposal of the material.

77 percent of the German population think that nuclear waste causes danger - this statement is even more often selected as a disadvantage of nuclear power than the risk of accidents in nuclear power plants, for example (Noelle-Neumann, 1987, p. 18). Thus, although experts tend to rate the risks of the "*Entsorgung*" (treatment and final disposal of nuclear wastes)[2] relatively low compared to the risk of operating the nuclear power plants (Wagner/Ziegler/Closs, 1982, p. 179), in public perception the risks associated with the treatment and disposal of nuclear waste are regarded as very important.

According to the West German Atomic Energy Act ("*Atomgesetz*") the Federal Government has the responsibility for the final disposal of nuclear waste. The *Physikalisch-Technische Bundesanstalt* (PTB), a research establishment attached to the Federal Ministry for Economy but supervised by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety in questions of nuclear waste, is authorized to take this responsibility. "The PTB is responsible for the construction and operation of federal facilities of radioactive wastes. The PTB initiates and coordinates research and development work related to these facilities. The PTB can make use of 'third parties' for the performance of its duties (§ 9a, section 3, Atomic Energy Act). It executes the reimbursement of the project-related costs which have arisen, from the waste producers." (PTB, 1986) The West German con-

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2 The German term "*Entsorgung*" - literally translated - means "de-concerning". It is a newly created term mainly used in connection with the disposal of nuclear waste. For some opponents of nuclear power it is an example for the manipulative use of language by the "atomic lobby".

cept of "*Entsorgung*" of nuclear power plants[3] gives responsibility to the operators of nuclear power facilities, the state governments and the federal government. It consists of four steps (cf. BMU, 1988, p. 6):

1. Interim storage of spent fuel elements.
2. Reprocessing of these fuel elements.
3. Development of techniques for "direct final disposal" of those fuel elements which cannot economically be reprocessed (e.g. elements which come from the prototype high temperature reactors and would require a different reprocessing technology).
4. Disposal of the radioactive wastes (conditioning, interim storage and final disposal).

To obtain the license for the operation of a nuclear power plant according to the Atomic Energy Act, § 9a, it is necessary to demonstrate that the disposal of the nuclear waste is guaranteed ("*Entsorgungsvorsorge*"). Besides other criteria this is dependent on "advances in the investigation and development of a final repository" (BMU, 1988, p. 25). If the concept for the disposal of nuclear waste could not be realized or only with a significant time delay, no new nuclear power stations could be licensed in West Germany and the existing ones would have to be closed (Thiel, 1987, p. 89).[4]

In 1974 the (Social Democratic) Chancellor Helmut Schmidt published plans to build a "*Nukleares Entsorgungszentrum*" (nuclear waste management center) in Lower Saxony. Interim storage, reprocessing, conditioning and final disposal according to this plan would have been done at one location in order to minimize transportation. After difficult negotia-

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[3] Although there are sources of nuclear waste other than nuclear power plants (e.g. medicine, research), most of the waste by far originates from the use of nuclear energy (cf. PTB, 1987).

[4] The legally required "*Entsorgungsvorsorge*" makes the waste treatment, storage and final disposal a weak spot for the nuclear power system in West Germany. This is one reason why the anti-nuclear movement attacks the efforts for the realization of the waste disposal concept so heavily.

tions with the (Christian Democratic) Prime Minister of Lower Saxony, Dr. Ernst Albrecht, Gorleben was named as the place for the planned waste management center. In 1979 the so-called Gorleben hearings took place. Under the chairmanship of Prof. Carl Friedrich von Weizäcker more than 60 international experts discussed the risks of the planned waste management center.[5] As a result of these hearings Prime Minister Albrecht stated that although a nuclear waste management center at Gorleben would be suitable from a technical point of view it would not be accepted by the population and hence could not be realized for political reasons.[6] Albrecht was particularly critical of the planned reprocessing facility[7]; however, he was willing to accept a repository for nuclear waste.[8]

As a consequence of Albrecht's decision the Federal Government gave up their plan for a "*Nukleares Entsorgungszentrum*" (nuclear waste management center) and instead formulated an "*Integriertes Entsorgungskonzept*" (integrated waste management concept) in which the functionally interdependent

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5 During these hearings the reactor accident at Three Mile Island took place and influenced the hearings. This event caused an anti-nuclear sentiment and hence assisted the critics of the planned waste management center (cf. Hatzfeldt/Hirsch/Kollert, 1979, p. 22).

6 A large demonstration during the Gorleben hearings, in which not only members of the ecological movement but also conservative farmers (traditional voters of the Christian Democratic Party) participated, may have influenced Albrecht's decision.

7 Since reprocessing implies the handling of pure plutonium, the anti-nuclear movement feels that a new "quality" is connected with reprocessing because of the health risks connected with plutonium, the proliferation problem with related sociopolitical risks (atomic state) and the logic of using fast breeder reactors together with reprocessing. Reprocessing only makes sense (economically) if nuclear power is used for a long time; it does not fit in with the "philosophy" of nuclear power as an interim technology. The anti-nuclear movement consequently favours the direct final disposal of spent fuel elements without reprocessing.

8 While a reprocessing facility can be built anywhere in the country, salt domes which are expected to be appropriate for the final disposal of nuclear waste are only found in the northern part of West Germany. Albrecht therefore decided against the most controversial technology of reprocessing (in his state) without completely obstructing the disposal concept of the Federal Government.

facilities for interim storage, reprocessing, conditioning and final disposal are to be built at different locations.

In 1982 the *Deutsche Gesellschaft für die Wiederaufarbeitung von Kernbrennstoffen* (DWK) applied for approval to build a reprocessing plant at two locations: Dragahn, a small village in the county of Lüchow-Dannenberg (Lower Saxony), and Wackersdorf, a small village in the state of Bavaria.[9] In 1985, however, the DWK decided to build the nuclear reprocessing plant in Wackersdorf.[10]

Presently the following facilities of the integrated waste management concept are in operation, under construction or planned (cf. BMU, 1988, pp. 9-18):

- **Interim storage of spent fuel elements:**
  Two interim storage facilities each of 1,500 tons capacity are being built in Gorleben and Ahaus. The one in Ahaus is still under construction but in Gorleben the facility is ready for operation. However, the start of operation has been delayed by a court decision and in Ahaus the construction work had to be interrupted for a long time following a court decision.[11]

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9 For the people opposed to nuclear power in the county of Lüchow-Dannenberg this application (which was certainly discussed with the Government of Lower Saxony) was perceived as a breach of promise of Prime Minister Albrecht, who after the Gorleben hearings had refused to accept a reprocessing plant in Gorleben, only a few kilometers away from Dragahn.

10 One of the arguments for this decision was probably the expectation that the acceptance of the reprocessing plant would be higher in Bavaria than in Lower Saxony and the Bavarian Government would more consequently back the efforts to construct the reprocessing plant than the Government in Lower Saxony. The latter expectation has been confirmed but the first has not. Even among the rural and conservative population of that economically poor region there is much resistance to the project. Since the plans to build a reprocessing plant at Wackersdorf have been published, many (often violent) demonstrations with participants from all over the country have taken place at the site.

11 Presently spent fuel elements are mainly stored within the nuclear power plants or are transported abroad for interim storage or reprocessing. The capacity of the storage facilities within the nuclear power plants seems to be nearly exhausted. Thus there is an urgent need for external interim storage facilities.

- **Reprocessing:**
  The reprocessing plant in Wackersdorf is under construction (capacity: 350 tons/year) and is expected to start operation in 1996.

- **Conditioning:**
  A pilot conditioning facility for spent fuel elements that cannot be reprocessed and other kinds of waste is planned in Gorleben. The operation is planned to begin in 1994.

- **Final disposal:**
  Two locations for the final disposal of radioactive wastes are being investigated. It is planned to dispose low- and medium-active waste in the former iron ore mine "Konrad" near Salzgitter. The Federal Government expects the licencing procedure to be completed in 1989 and operation to start in 1992. However, high-active waste with significant heat production is planned to be disposed of in a salt dome. As mentioned above, the suitability of the Gorleben salt dome is presently being investigated. A repository at Gorleben could be opened in the year 2010 at the earliest.

2.3. The Planned Gorleben Repository

On February 22nd, 1977, the State Government of Lower Saxony agreed to investigate the salt dome at Gorleben for its suitability as a repository for high-radioactive waste. The salt dome is approximately 14 km long and 4 km broad. It begins about 250 meter below the surface and reaches a depth of more than 3,000 meter. (DBE, p. 7) It is located very close to the *Elbe*, which is the borderline between the Federal Republic of Germany and the German Democratic Republic.

The rural county of Lüchow-Dannenberg is one of the poorest regions in Lower Saxony. Unemployment of about 20 percent (far above the average of the country), a drift away of young people, a crisis-prone agriculture and a lack of industries

are major problems of this region. Hence, one of the motives for suggesting Gorleben as the location for the planned waste management center was probably to improve the economic structure of that deprived region. After the plans of a nuclear waste management center had been given up, Gorleben still remained the proposed location for some of the required facilities of the West German nuclear waste management concept.

Presently in Gorleben four facilities are either in operation, under construction or planned:

1. Most important is the planned repository for the final disposal of high-active waste; the suitability of the Gorleben salt dome for this purpose is currently being investigated.

2. An interim storage facility for spent fuel elements is ready for operation, but is currently blocked by a court decision.[12]

3. An interim storage facility for radioactive waste of low or medium activity originating from nuclear power plants and already conditioned for final disposal is operating.

4. A pilot conditioning facility[13] is planned to develop and test technologies required for the direct disposal (disposal without reprocessing) of nuclear waste.

Although all of these facilities are the subject of a controversy between the Federal Government, the State Government, the nuclear industry and the Christian Democratic Party (CDU) on one hand and the national anti-nuclear movement, the local citizens' action group, the Social Democratic Party (SPD) and the Green Party (GRÜNE) on the other hand, the controversy - and, hence, this study - focusses on the planned repository for the final disposal of nuclear waste.

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12 The German Government expects operation to start in the near future (BMU, 1988, S. 10).

13 "Conditioning" means the treatment and packing of radioactive wastes in a way that it is possible to dispose of it in a final repository.

The following institutions are responsible for the construction of a repository for nuclear waste at Gorleben (cf. PTB, 1986):

- The Federal Government, particularly the Ministries for Research and Technology (BMFT), for Environment, Nature Conservation and Nuclear Safety (BMU) and of Economics (BMWi), have set the objectives.

- The *Physikalisch-Technische Bundesanstalt* (PTB) with the assistance of the *Bundesanstalt für Geowissenschaften und Rohstoffe* (BGR) has developed the Gorleben project and monitors the work done at Gorleben and evaluates the results of the investigation program.

- The *Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfallstoffe* (DBE), an industrial company, performs the projects and does most of the research work at Gorleben on behalf of the PTB.

In a first exploratory phase, from 1979 to 1983, the salt dome of Gorleben was investigated from above ground by drillings, hydrogeological and seismic methods. After this phase it was decided to continue the investigation. The PTB concluded that no facts had been discovered during the investigation which raise doubts of the "*Eignungshöffigkeit*" (expected suitability) of the Gorleben salt dome although at least one of the external experts, Prof. K. Duphorn, questioned the suitability of the salt dome.

The next phase of the investigation plan was the underground investigation of the salt dome by a pilot mine "in order to determine the geological structure and the usable volume, and to draw up a detailed concept for the future repository mine" (PTB, 1985). The idea was to design the pilot mine in such a way that it could later be used as the basis for the underground repository.[14]

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[14] The construction of a repository mine has to follow the procedure according to the German Mining Law and the plan-approval procedure ("*Planfeststellungsverfahren*") of the Atomic Energy Act (with potentially time consuming public participation and several possibilities

2.4. The Accident in the Pilot Mine at Gorleben[15]

The sinking of two shafts began at Gorleben in March (shaft 1) and November 1986 (shaft 2). Their planned depths were 940 meters (shaft 1) and 840 meters (shaft 2). The technology used to sink the shafts is the so-called freezing method. Using large freezing plants, which started their operation about half a year before the sinking of the shafts began, the complete column in which the shafts are to be sunk are frozen in order to have hard rock-like soils that form firm shaft walls.[16] This method is well-known in West German mining technology and the two companies who as subcontracters did the actual work, are specialized and experienced in shaft-sinking.

In March 1987, however, when shaft 1 had reached a depth of 228 meters, problems arose. Stones loosened from the wall and a miner was injured by a stone that fell from the shaft wall. On April 4th an increase of the temperature was measured in one of the drillings used to monitor the temperature of the frozen column, and some days later dislocations were detected. The bottom of the shaft had reached a critical geological position, the boundary between a clay soil and a soil consisting of gypsum immediately above the salt dome. To stop the dislocations, iron rings were mounted in addition to the normal shaft lagging which consisted of concrete blocks[17]. The rings have a weight of about 1.5 tons each.

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of legal measures taken by the affected public). With the declaration of the mine as a "pilot mine" and not as a "repository mine" it was possible to start the work without having to wait for the completion of the plan-approval procedure (cf. Thiel, 1987, p. 139-152).

15 The description of the accident is mainly based on a report of the Federal Government (BMU, 1988, pp. 35-40) and several press releases of the DBE and the *Bergamt Celle* of May 1987.

16 Freezing is only necessary in the supercap, the area between the earth surface and the top of the salt dome. The salt itself is stable enough to sink a shaft without additional measures.

17 This is just the provisional shaft lagging. The final shaft lagging is built from the bottom when the shaft is already deep in the salt dome. Within the salt dome the shaft does not require a lagging.

On May 12th one of the iron rings was damaged by the pressure of the rock and fell from a height of 5 meters to the ground of the shaft where seven miners were working. Three miners were seriously injured and three others were slightly hurt. Two days later one of the seriously injured miners died.

The damaged iron ring was replaced and all iron rings were fixed using steel cables. Some days later it was decided to fill the bottom of the shaft with concrete up to a height of 14 meters in order to prevent the shaft from being destroyed by the rock pressure. It was felt that time was needed to investigate the reasons for the accident and to develop alternative methods to sink the shaft.[18] Up to now, the work at both shafts of the Gorleben pilot mine has not been started again.

The Office of the District Attorney in *Lüneburg* began with inquiries concerning the *Bergamt Celle*, the *Physikalisch-Technische Bundesanstalt* (PTB) and the *Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfallstoffe* (DBE). These inquiries are not yet finished.

In April and May 1988 the accident in the shaft was subject of expert hearings in the parliamentary committees for environment of the State Government in Hanover and the Federal Government in Bonn. In these hearings the responsibility for the accident and its relevance for the concept of a repository mine have been discussed controversially. Particularly interesting is an expertise of the *Bundesanstalt für Geowissenschaften und Rohstoffe* (BGR, 1988) on the causes of the accident. This expertise is critical to the DBE, who was responsible for the sinking of the shaft. The DBE is implicitely accused of having been not careful enough. According to the BGR expertise the accident happened because the rock was not completely frozen.

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[18] The plan now is to have a lagging built of pre-manufactured steel cylinder segments. This method is currently being tested.

3. Design of the Study

3.1. Concept

To analyze the communication concerning the accident at the Gorleben pilot mine within the context of the general discussion on nuclear waste disposal we selected a double approach: first we investigated the points of view of the key groups and institutions by direct interviews with representatives of them and the analysis of papers and statements issued by them and, secondly, analyzed their role in public communication by a content analysis of the mass media, the most important channel for political communication.

Explorative interviews were conducted with representatives of the *Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfallstoffe* (DBE), the *Physikalisch-Technische Bundesanstalt* (PTB), the Government information center at Gorleben, the political parties CDU and SPD, the local citizens' action group "*Bürgerinitiative Umweltschutz Lüchow-Dannenberg*" (BI) and the ecological institute "*Institut für ökologische Forschung und Bildung*", Hanover.

These interviews did not only aim at describing the position of the different groups towards nuclear waste disposal in general and the accident in the shaft in particular but also to get their perception and evaluation of the other social actors and the way in which the different sides communicate with each other.

The content analysis of the coverage of nuclear waste disposal included the four German national newspapers *Frankfurter Allgemeine Zeitung* (FAZ), *Die Welt* (WELT), *Frankfurter Rundschau* (FR) und *Süddeutsche Zeitung* (SZ), the regional newspaper *Hannoversche Allgemeine Zeitung* (HAZ) and the local newspaper *Elbe-Jeetzel-Zeitung* (EJZ). In addition the coverage in the very influential weekly magazines *Der Spiegel* and *Stern* was analyzed.

Besides these empirical investigations the relevant reports and publications on the West German nuclear waste disposal concept, the controversy about the planned Gorleben repository and the accident in the shaft, issued for instance by the Federal Government, the *Physikalisch-Technische Bundesanstalt* (PTB), the *Deutsche Gesellschaft für den Bau und Betrieb von Endlagern für Abfallstoffe* (DBE) and the local citizens' action group at Gorleben were evaluated.

3.2. Interviews with Participants and Observers

During the study ten interviews with participants and observers of the Gorleben nuclear waste disposal site controversy were conducted. All but one institution asked for an interview agreed. Only the Green Party in the *Landtag* (state parliament) of Lower Saxony, which was also asked for an interview, refused any participation in this study. They suspected that it was some sort of "acceptance research", the results of which could be used to undermine their resistance to the project at Gorleben. But the views of the Green Party seem to be very close to those of the local citizens' action group, which is represented with two interviews.

The following people were interviewed during this study:

1. Mr. Kurt Schmidt, editor of the local newspaper *Elbe-Jeetzel-Zeitung* at Gorleben

2. Mr. Alfred Jansen, officer in the Government information center for nuclear waste disposal at Gorleben

3. Dr. Rolf Meyer, public relations manager of the *Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfallstoffe* (DBE) at Gorleben

4. Mrs. Marianne Fritzen, one of the founders of the citizens' action group at Gorleben and long-standing chairwoman

5. Mrs. Marianne Tritz, employee in the office of the local citizens' action group at Gorleben

6. Mr. Jörg Janning, chemist and farmer, member of the *Kreistag* (county parliament) of Lüchow-Dannenberg (SPD), critic of the planned site for final disposal for nuclear waste at Gorleben, former speaker of the citizens' action group

7. Mr. Jürgen Kreuch, geologist of the ecological research institute "*Institut für ökologische Forschung und Bildung*", Hanover

8. Dr. Eckart Viehl, public relations manager of the *Physikalisch-Technische Bundesanstalt* (PTB), Brunswick

9. Mr. Kurt-Dieter Grill, member of the state government of Lower Saxony for the county of Lüchow-Dannenberg (CDU) and chairman of the Gorleben commission

10. Dr. Christel Möller, member of the scientific staff of the SPD in the *Landtag* (state parliament) of Lower Saxony, Hanover

Basis of the interviews was not a standardized questionnaire but a structured list of subjects to be discussed. The interviews covered the following subjects (depending on the interviewee):

- Own position towards the planned disposal site at Gorleben
- Evaluation of the accident in the shaft of the pilot mine and perceived implication of the accident for the planned disposal site at Gorleben
- Political events with respect to the planned disposal site at Gorleben and the accident in the shaft
- Perception of the public debate on the Gorleben disposal site and perceived motives and strategies of the other social actors
- Evaluation of media coverage on the planned Gorleben disposal site

All interviews were conducted in May or June 1988 by the authors of this study. They lasted between half an hour and two hours. In general the interviewees were very frank in describing not only their own positions but also their perception of others involved in the Gorleben controversy.

3.3. Content Analysis of Newspaper Coverage

Based on a more recent content analysis of nuclear power coverage in the German newspapers *Frankfurter Allgemeine Zeitung* (FAZ) und *Frankfurter Rundschau* (FR), where about 100 articles in 1984 and 150 articles in 1985 were found in each newspaper dealing with aspects of "*Entsorgung*" (nuclear waste management), we estimated the number of articles in 1987 referring to the planned Gorleben repository to be about half of these figures. It was planned to include again the FAZ and the FR in our analysis since these two newspapers represent - on a high journalistic standard - the left and the right wing of the West German press and are read by many decision makers.

After searching the 1987 issues of the FAZ for articles referring to the planned Gorleben repository in any way, we were surprised to see that only five articles could be identified in approximately 300 newspaper issues.[19] Although nuclear power was an important issue in 1987 in West Germany obviously other aspects, such as the Chernobyl disaster, the reprocessing plant in Wackersdorf, the nearly completed fast breeder reactor in Kalkar and - last but not least - political troubles with the nuclear companies *Nukem*, *Alkem* and *Transnuklear*, attracted most coverage of the media.

Since searching newspapers for specific articles is a very time-consuming business we decided to rely on press reviews

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[19] Our first reaction was to suspect the student, who actually did the search, of not being careful enough. Comparisons with two different press reviews, however, convinced us that he had done his job very carefully.

for the selection of articles.[20] This approach gave us the possibility of including more newspapers in our content analysis than was planned in the beginning. On the other hand the selection criteria for the press review were not controllable by us and, hence, we cannot be completely sure that all relevant articles found their way into it. Thus, we have to consider a possible bias in our material for the content analysis. The selection of articles is mainly guided by their "importance" for the purpose of the DWK press review which is to inform the management of the DWK about media coverage on issues and subjects related to activities of the company or the company itself. Fortunately, "*Entsorgung*" is the central activity of the DWK. Hence, all aspects will be found relevant by the people who produce the press review. But within the articles covering "*Entsorgung*" we expect the following biases:

1. Articles in national papers and newspapers of particular interest (eg. regional or local newspapers at "important" locations) may be overrepresented.

2. Small articles and articles covering nuclear power issues only as secondary topics may be underrepresented.

3. Redundancies are avoided. If more than one newspaper publishes more or less the same article (as is often the case caused by the dependency of West German newspapers on the news agency "*Deutsche Presseagentur*"), only one of the articles and probably that in the most important newspaper is taken.

While the first "bias" can be dealt with by a limitation of the analysis to newspapers more or less equally important to the DWK and the second "bias" will probably not lead to

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[20] We considered two press reviews, that of the Nuclear Research Centre Jülich and that of the *Deutsche Gesellschaft für die Wiederaufarbeitung von Kernbrennstoffen* (DWK). We found the latter to be more specific for "*Entsorgung*" since the DWK as partner of the DBE and operating company of the reprocessing plant under construction is indirectly involved in the Gorleben project. We owe thanks to the DWK for their readiness to let us use their press review.

severe systematic errors about content, the third "bias" implies an evening out of differences in intensity of coverage. Thus, differences found in our content analysis underestimate rather than overestimate differences in the total mass media coverage.

In our content analysis we differentiated between three types of newspapers:

- National newspapers including *Frankfurter Allgemeine Zeitung* (FAZ), *Frankfurter Rundschau* (FR), *Die Welt* and *Süddeutsche Zeitung* (SZ) with a total circulation of about 1,270,000 copies,

- the regional newspaper *Hannoversche Allgemeine Zeitung* (HAZ) which is particularly important in the state of Lower Saxony (circulation 230,000 copies) and

- the local newspaper *Elbe-Jeetzel Zeitung* (EJZ) which is only circulated in the county of Lüchow-Dannenberg and has a monopoly for local reporting (circulation 14,000 copies).

Our analysis is based partly on the "statement" and partly on the "article" as coding unit. The material on which our analysis is based consists of 129 articles with 456 identified statements published in the time interval from January to December 1987. Table 1 shows the source of these articles.

	Number of articles	Number of statements
National press	21	77
HAZ	21	94
EJZ	87	285
	129	456

Table 1: Source of the articles and statements used for the content analysis

Most of the articles were identified in the press review of the DWK; only all issues of the FAZ and those of the EJZ in the three-month period following the date of the accident (May 12th) were searched by us. In the case of the FAZ our search result corresponded to the articles found in the press review. Hence, we conclude that articles from the national papers (and probably from the HAZ) are fairly well covered by the press review. This is not true for the EJZ. A comparison of the articles found by direct search in the three-month period following the accident with those included in the press review suggests that only the most important articles of the EJZ (roughly one third of all relevant articles) were selected for the press review. It is therefore necessary to be careful in interpreting the frequency of EJZ articles. But we do not see any reason why the content structure of the selected EJZ articles in the analyzed features should vary significantly from that of the articles not selected. Probably the person working on the press review and facing a relatively high number of articles in the EJZ found it not worth including very small articles or articles covering minor events.

For the content analysis we developed code sheets with several systems of categories, designed to cover six types of statement. It was possible to code up to four statements of each type in an article if necessary. Table 2 gives an overview of the statement types and their frequency in the different newspapers.

In addition to the standardized content analysis of newspaper coverage of the Gorleben controversy the political weekly magazines *Stern* and *Der Spiegel* were qualitatively analyzed. Again we were surprised how little attention these magazines spent on the Gorleben controversy. While in 1987 there were four articles in the *Spiegel* at least mentioning the planned repository at Gorleben we did not find any reference to "Gorleben" in the *Stern*.

Type of statement	Number of statements			
	National press	HAZ	EJZ	All newspapers
Critic and defense of the Gorleben site	18	13	68	99
Evaluation of actors involved in the discussion on the Gorleben site	10	16	65	91
Description of the accident	18	27	37	82
Information on the causes of the accident	9	8	27	44
Statements about responsibility of actors for the accident	4	13	22	39
Implication of the accident for the future of the Gorleben site	18	17	66	101
	77	94	285	456

Table 2: Analyzed statements in the articles covering the planned repository at Gorleben and the accident in the shaft of the pilot mine

4. Results

4.1. Relevant Social Actors and Their Positions

There are are many actors at different regional levels involved in the controversy about the planned Gorleben repository. For example:

- Government authorities at the Federal and state level
- local administrations[21]
- Federal, state and local parliaments
- the so called "Gorleben commission"
- the political parties CDU, SPD, GRÜNE and - on the local level - the *Unabhängige Wählergemeinschaft* (UWG) (independent voters' group) while the FDP only plays a minor role
- the local citizens' action group "*Bürgerinitiative Umweltschutz Lüchow-Dannenberg*" (BI)
- industry, particularly the DBE
- the *Bergamt Celle* as mining authority responsible for the pilot mine
- the *Physikalisch-Technische Bundesanstalt* (PTB), a mixture of Government agency and research center, acting on behalf of the Federal Government responsible for the disposal of radioactive waste
- the *Bundesforschungsanstalt für Geowissenschaften und Rohstoffe* (BGR), a Government research facility which advises the PTB
- the national ecological movement
- the ecological institute "*Institut für ökologische Forschung und Bildung*"
- expert critics of the Gorleben repository.

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21 The "local" level covers the county (*Kreis*) of Lüchow-Dannenberg, the communities (*Gemeinden*) of this county and "supra-communities" (*Samtgemeinden*), administrative groups of several small communities, which are only found in Lower Saxony.

According to the perception of the interviewees the most important actors involved in the public debate on the Gorleben repository are:

Pro "Gorleben":

- the DBE,
- the Federal Government (particularly the Ministers for Research and Technology and for the Environment, Nature Protection and Reactor Safety),
- the State Government of Lower Saxony,
- the Christian Democratic Party (CDU), particularly Kurt-Dieter Grill, member of the state parliament of Lower Saxony, and
- the PTB.

Contra "Gorleben":

- the Social Democratic Party (SPD),
- the Green Party (GRÜNE),
- the expert critics (particularly Prof. Duphorn and Prof. Grimmel) and
- the local citizens' action group.

In the news coverage on the Gorleben controversy a rather similar picture of the involvement of the actors in the public debate can be found either as source or as object of statements (Table 3). Also the pattern of actors pro and contra "Gorleben" is mirrored in the coverage (Table 4).

The Gorleben controversy is a polarized conflict. The relevant actors can easily be classified into two distinct groups "pro" and "contra" the Gorleben project. The conflict constellation is rather similar to that of the more general nuclear power controversy - thus indicating that both are closely interconnected.

The actors pro "Gorleben" more or less support the waste disposal concept of the Federal Government and do not see major problems in its realization. The main motive for the local CDU applying for the planned nuclear waste mangement center

("*Nukleares Entsorgungszentrum*") had little to do with energy policy but with the hope of economic advantages for the county of Lüchow-Dannenberg. But this decision was and is in line with the energy-political position of the CDU on the Federal and state level. Hence, although the economic expectations have not been realized, and although after "Chernobyl", the accident in the shaft and the corruption scandal there is growing skepticism with respect to nuclear power even among the members of the CDU, it is not to be expected that the CDU will change its political position towards the Gorleben project in the near future.

Mentioned actor	Number of references: National press	HAZ	EJZ	All newspapers
DBE	3	5	20	28
Other industry	1	1	4	6
Federal Government	2	3	23	28
State Government of Lower Saxony	4	3	8	15
District attorney	0	1	4	5
CDU/CSU	0	2	13	15
SPD	4	6	20	30
FDP	1	1	3	5
GRÜNE	1	6	17	24
Local citizens' action group	0	2	11	13
National ecological movement	0	0	1	1
Bergamt Celle (mining authority)	0	4	15	19
PTB	2	3	15	20
"Established" research organizat.	0	0	2	2
"Pro" experts	0	0	3	3
"Contra" experts	4	1	10	15
	23	38	171	232

Table 3: Actors mentioned in media coverage of the accident in the shaft of the pilot mine at Gorleben

Federal Government, PTB and DBE expect that the salt dome at Gorleben will be suitable for the construction of a repository mine. They argue that even if the results of the under-

ground investigation show that it is not, there would be enough time to look for another location.

Source of statement	Number of statements	
	Pro	Contra
DBE	2	0
Other industry	3	0
Federal Government	9	0
State Government of Lower Saxony	6	0
CDU/CSU	5	0
SPD	0	19
GRÜNE	0	22
Local citizens' action group	0	11
National movement contra nuclear power	0	2
Physikalisch-Technische Bundesanstalt (PTB)	3	0
"Established" research organizations	3	0
"Pro" experts	1	0
"Contra" experts	0	8
Newspaper	0	5
	32	67

Table 4: Sources of statements pro and contra the planned repository at Gorleben

The actors contra "Gorleben" fear that a repository for high-active waste in the salt dome at Gorleben would not be safe. They demand that the investigation program is stopped. They are only willing to consider alternative methods for the final disposal of nuclear material after a decision on a principle withdrawal from nuclear energy has been made.

The SPD takes a more differentiated view compared to the other actors of this group. As mentioned above the SPD has recently changed its position from support of nuclear power in general and the Gorleben project in particular to a position critical of nuclear power and critical of the planned repository at Gorleben. But there are still many (at the moment silent) members and MPs of the SPD who think that a

withdrawal from nuclear power is not realistic. Furthermore even clearly anti-nuclear but responsible members of the SPD feel that they have a duty to help solve the nuclear waste problem, since they were involved in creating it.

Although in the small villages of the county of Lüchow-Dannenberg there are many face-to-face contacts between the people living there, there is much uncertainty concerning the position of the population. There is a tendency of actors to perceive the "silent majority" of the population backing their position. The CDU uses the results of the elections in the county of Lüchow-Dannenberg which give them a small majority to back their position. Critics of the Gorleben project on the other hand contradict this statement. They explain the results of the elections by the conservative orientation of the population. According to their view it would not be justified to interpret the results of the elections as support for the Gorleben project.[22]

Within the population there are many discussions on the project. The "opinion camps" divide families and local communities. Although we were told about friendships broken by the Gorleben controversy such effects seem to be the exception rather than the rule. The integrative force of the local communities with the importance of face-to-face contacts covers opponents and proponents of the project. Both sides of the controversy agree that the Gorleben project is a relevant, but not the dominant issue for most people living in the county of Lüchow-Dannenberg and that a significant majority of the population is neither to be found on the pro nor on the contra side.

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22 The analogy to the national elections seems to support the interpretation of the critics. Although there was a lot of opposition to nuclear power found in public opinion polls after Chernobyl, the event had surprisingly little influence on the outcome of the elections to the Federal parliament.

4.2. Structure of the Political Controversy

The Gorleben controversy is solely a conflict about the risks of nuclear waste disposal only at the first glance. This is just one facette of the conflict; others are the nuclear power controversy in general and even different views of the desired future for the county of Lüchow-Dannenberg. Furthermore the conflict about the planned repository in Gorleben can be split into several aspects:

1. The risks related to the disposal of nuclear waste in the Gorleben salt dome and the necessary processing and transportation are discussed. The conflict here is about the extent of risks as well as about the criteria of acceptability of these risks.

2. Doubt is raised about the fairness of the procedure of investigating the suitability of the Gorleben salt dome conducted by the PTB and the Governments in Hanover and Bonn.

3. Economic interests of land owners at the Gorleben site and the local communities are involved. The local communities have financial interests in the Gorleben repository as a result of the so-called "*Gorleben-Gelder*" (Gorleben money).

Fig. 1 shows the structure of the Gorleben controversy as found during the interviews.

Risks of a Gorleben repository

Two kinds of risk play a role in the discussion on the planned Gorleben repository: the short-term risks caused by the handling of the nuclear waste (transportation, storage and conditioning) and the long-term risks caused by the potential release of radioactive material from the repository in the salt dome by means of ground water transportation, other geological effects or damage to the repository mine during operation. While most of the short-term risks are not specific

for the Gorleben controversy (and therefore not discussed here) the long-term risks are.

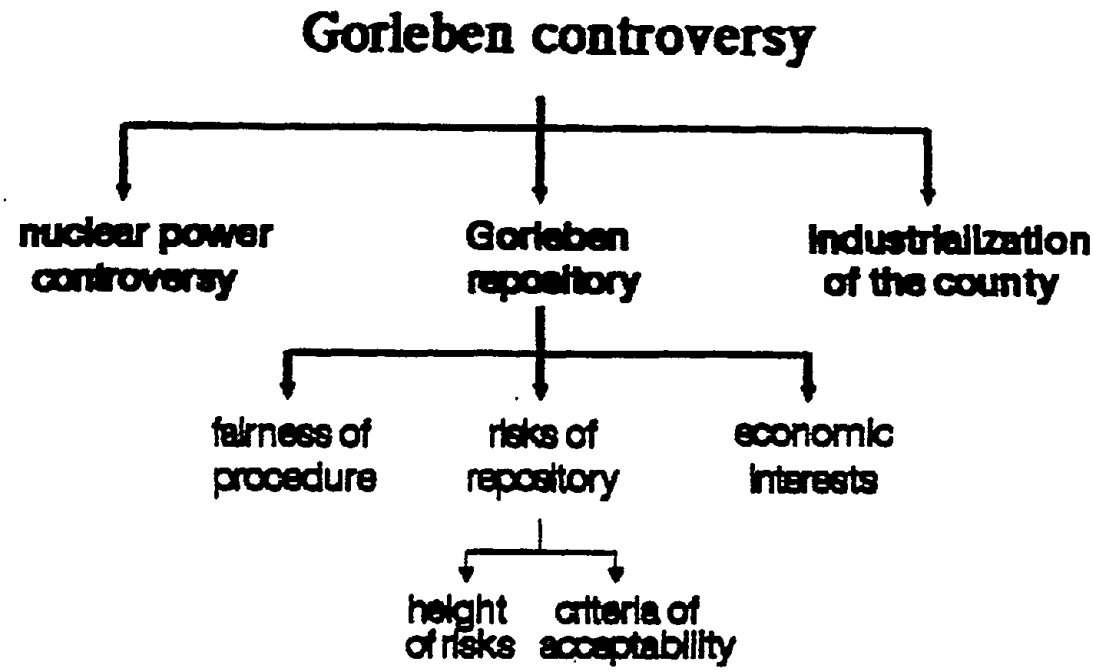

Figure 1: Different aspects of the Gorleben controversy

Critics of the Gorleben project disagree with the PTB in several aspects. For instance, they argue that

- the geological structure of the Gorleben salt dome is not optimal for a repository for high-active waste,
- technical as opposed to geological barriers play a role that is too important in the safety concept of the PTB,
- the computer models used by the PTB to analyze transportation of radioactive nuclids from the salt dome to the surface are not valid,
- during the time of operation the repository is very sensitive to water invasion through the shafts and

- there is a possibility of radiolytic decomposition of the salt.

The arguments concerning the safety of the repository mine are particularly relevant if one has a long-term horizon. And due to a more moralizing argumentation of the critics compared to the more pragmatic one of the proponents, the time horizon relevant for the evaluation of repository concepts seems to be longer for the critics than for the proponents.

While the opponents of the Gorleben site implicitly request a repository in which even for geological time spans (10,000 years) all the radioactive material would be completely incorporated, the PTB argues with models according to which the radioactive material is transported so slowly that when it enters the biosphere again there would be no danger because of the exponential radioactive decay. Analogous to safety concepts based on probability analyses in the discussion of the safety of nuclear power plants, which are not accepted by many critics of nuclear power, for the Gorleben repository "absolute" rather than "relative" safety is required. A safety concept that has to argue with the velocity of transportation is therefore not accepted by many critics of the Gorleben repository.

Fairness of procedure

A very important aspect of the Gorleben controversy is the perception of the critics that the investigation program is not being conducted in a fair way. They criticize the fact that the pilot mine is being built solely according to the German mining law with hardly any possibility for public participation. Furthermore they think that the result of the scientific investigation is not really open. Since the PTB is a research facility closely attached to the Federal Government the selection of the site and the investigation of its suitability according to the critics' view is guided by political rather than scientific reasoning.

The critics of the Gorleben program see several boundary conditions for the atomic lobby and the politicians promoting the Gorleben repository which in their eyes are producing a biased evaluation of the suitability of the Gorleben salt dome:

- First of all, they perceive that the Federal Government and the operators of nuclear power plants for the construction of a repository for final disposal of nuclear waste are under pressure of time. If no significant advances are made in the nuclear waste disposal concept, sooner or later courts could stop the West German nuclear power program because of the lack of "*Entsorgungsvorsorge*".[23]

- Secondly, the critics fear that because of the high costs of the investigation program[24] the nuclear power industry and electric power-supply companies will use their influence to let the PTB declare the suitability of the salt dome. If the results of the underground investigation are so bad that this seems impossible, it is felt that the pilot mine would probably be used as repository for other kinds of waste rather than high-active nuclear waste.

- Thirdly, in the eyes of the critics it would be politically impossible to start another investigation program similar to the one in Gorleben. After the experiences made in Gorleben, the political opposition and public resistance to a nuclear repository at other possible sites would be strong enough to prevent such plans. Because of acceptance problems at other potential sites,

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23 The proponents of the Gorleben repository contradict this view. They argue that there is no time pressure at all. Even if the Gorleben salt is not suitable as a repository for high-active waste one would have enough time to look for another salt dome.

24 Conservative estimations of the required budget for the investigation program were more than 1.1 billion DM (DBE, p. 20). The accident in the shaft will probably increase these costs.

Gorleben - according to the perception of the critics - is the last chance for the nuclear industry.

In the eyes of the critics, these boundary conditions mean that the promoting politicians, the PTB and the DBE cannot accept a failure of the Gorleben project. This means that the PTB has to interpret the investigation results in a way that fits into their safety concept or they must alter the safety concept in order to be compatible with the observed geological facts. The critics of the Gorleben project blame the PTB for

- reducing their own standards with respect to the geological barriers each time new information was available on the salt dome,
- not publishing a set of criteria that the salt dome should meet before the investigation program began,
- ignoring critical remarks of independent geologists,
- not investigating alternative methods for the repository of high-active waste and
- not investigating alternative salt domes.

To summarize the arguments of the critics concerning the investigation procedure: the critics think that the suitability of the Gorleben salt dome has already been decided politically and, hence, the main function of the scientific inquiry is to legitimize this decision.

The local citizens' action group regards the fact that they sometimes get information from anonymous scientists engaged in the investigation program as supportive to this view. The citizens' action group thinks that there are researchers who realize this legitimizing function of their work and do not agree with it, but who cannot publicly oppose the political pressure without having to fear sanctions.

Economic interests

The land-owners whose land is needed for the construction of the aboveground parts of the mine, the storage facilities etc. and the owners of so-called "*Salzrechte*" (salt claims)[25] which are needed to construct the underground parts of the mine both have economic interests in the Gorleben repository. Although many of the land-owners are critical of the project one of our interviewees said that their critical attitude would not dominate their economic motivations and that the PTB would get the land and the claims it needs.

From a purely economic point of view it seems rational for the land and claim owners to moderately oppose the Gorleben repository. To overcome this opposition and prevent a time delay by expropriation proceedings the PTB would probably try to make financially-attractive offers thus increasing the profit of selling land and claims. However, it is important not to wait too long with selling since the profit would be much lower if the land and the claims are expropriated.

The local communities also have financial advantages in the form of the so-called "*Gorleben-Gelder*", direct extra funds assigned to them by the Government of Lower Saxony to compensate for possible disadvantages caused by the Gorleben project. Some critics of the Gorleben project perceive this money as a bribe; others think that it is a fair compensation for immaterial and material disadvantages.[26] After the expectations of economic development as a result of the nuclear facilities have not been fulfilled the Gorleben money for the local communities is the major economic benefit of the Gorleben project. This might be a convincing argument for one or other local politician.

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25 "Salt claims" are the right to exploit the salt under the surface of ones land.

26 E.g. it is feared that a nuclear waste disposal site at Gorleben might have negative effects on tourism in the county of Lüchow-Dannenberg.

Nuclear power controversy

The proponents of the Gorleben project think that opposition to the planned repository is mainly guided by a general anti-nuclear attitude. Hence, the proponents hence consider the discussion of risks a tactical manoeuver by the opponents to disturb the national nuclear power program. The primary objective of the opponents is perceived to be the withdrawal from nuclear power and the opposition to the Gorleben site as a means to reach that goal. Thus, even for the opponents, the discussion on the risks of final disposal does not represent the actual controversy.

The critics of the Gorleben repository agree to this view to some extent. Of course, they say that they perceive the risks of a repository as real, but they also concede that their opposition is strongly motivated by their opposition to nuclear power in general. Since the existing nuclear waste which is now stored in interim storage facilities has to be disposed somewhere, even the critics see the necessity for a repository. But they argue that constructive cooperation in the search for a safe repository would indirectly mean supporting the nuclear power program. Hence, they demand a political decision to withdraw from nuclear power; after such a decision has been made they are willing to accept a repository for nuclear waste.

Industrialization of the county Lüchow-Dannenberg

In the county of Lüchow-Dannenberg even the very conservative and rural population is represented in the citizens' action group. This is most extraordinary for West Germany.[27] The existence of a conservative anti-nuclear "*Unabhängige Wählergemeinschaft*" (independent voters' group) in the county of Lüchow-Dannenberg also leads to the conclusion that in the county of Lüchow-Dannenberg there is a conservative culture opposing the "modernization process" from a purely rural to a

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[27] Representatives of the citizens' action group proudly told us that even members of the local landed gentry work within the citizens' action group.

more industrialized region. Many people seem to fear a destruction of their living space by an industrialization of the county for which the Gorleben repository might be considered a symbol.

Furthermore the county of Lüchow-Dannenberg has a pleasant countryside without mass tourism. There are many people from the large German cities who have bought houses there which they use at weekends and holiday periods and where they want to live after retiring from work. Of course this group of people has a strong interest in the county of Lüchow-Dannenberg keeping its rural character.

Finally, since the mid seventies many ecologically-oriented young people, mainly from big cities, moved into the county to live a simple life close to nature. These people form an "alternative scene" in the county of Lüchow-Dannenberg. Their attitudes toward large-scale technologies in general and nuclear power in particular are very critical. After the decision to build nuclear disposal facilities in Gorleben they found themselves confronted with the kind of technology and industry which they wanted to escape. Of course they too are opposed to the Gorleben repository and are very active in the opposition movement regarding this project.

In 1980 these people (supported by others from the county) built a camp consisting of wooden huts at one of the drilling sites in Gorleben and declared the "Republic of Free Wendland"[28]. This republic existed for just one month before it was evacuated by the police. For the ecologically-oriented opponents of the Gorleben project this action has become a very important symbol of their "resistance" which they frequently refer to.[29] The term "Free Republic" is obviously related to an intensive feeling of at least some people that the "atomic lobby" is going to occupy the county of Lüchow-

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[28] "Wendland" is an old traditional name for the region of Lüchow-Dannenberg.

[29] For example, passports of the "Free Republic of Wendland" are issued in the office of the local citizens' action group in Lüchow.

Dannenberg and oppress its population. Opposition to the Gorleben project is hence perceived as a struggle for freedom and independence.

4.3. Mass Media Coverage of the Controversy

Mass media only cover the "manifest" level of the Gorleben controversy: the discussion of risks and the behavior of the relevant social actors. Latent levels of the conflict are hardly mentioned. This observation is not surprising, since the coverage of the Gorleben repository, as true of the coverage of most issues, mainly depends on the public relations of the social actors themselves. The mass media primarily publish negative evaluations of social actors (Table 5), usually in the way that they report evaluative statements of the other actors involved.

	Number of statements	
Evaluated actor	Negative	Positive
DBE	11	0
Other industry	3	0
Federal Government	14	2
State Government of Lower Saxony	9	0
District attorney	0	1
CDU/CSU	6	2
SPD	8	0
FDP	1	0
GRÜNE	1	0
Local citizens' action group	3	0
Bergamt Celle (mining authority)	7	0
PTB	13	0
"Established" research organizations	1	1
"Pro" experts	2	0
"Contra" experts	2	3
	81	9

Table 5: Evaluation of actors who are involved in the public debate on the planned repository at Gorleben by other actors

It is quite interesting to note that in all but one case the social actors opposed to the Gorleben project evaluate the proponents negatively and vice versa. The exception is the SPD which is evaluated negatively by the citizens' action group, the Green Party as well as by the CDU and the Governments. A similar pattern was found during the explorative interviews. The SPD is blamed by the proponents for being opposed to the Gorleben project and by the other opponents for not fighting the project consequently enough.

The newspapers themselves, particularly the local newspaper "Elbe-Jeetzel Zeitung", are evaluated as fair by nearly all interviewees.[30] Both sides said that they have access to the public by the newspapers. The proponents tended to evaluate the coverage as playing up the controversy. The newspapers, especially the EJZ, hardly gave any direct commentary to the Gorleben controversy. The few evaluative statements for which the newspaper itself was identified as the source were more or less critical of the Gorleben project.[31]

4.4. Evaluation of the Accident by the Actors

The accident in the shaft of the pilot mine at Gorleben and its consequences are of course viewed differently by proponents and opponents of the project. For the proponents the accident was more or less a tragic but rather "normal" accident at work which hardly would have received any public

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[30] Only the member of the State Parliament, Kurt-Dieter Grill (CDU), blamed the EJZ of being biased against the Gorleben project. This statement is understandable because in the issue of the EJZ of that day when the interview was conducted Grill was blamed for having obtained illegal gifts from a company that had profited from the Gorleben project but nevertheless went bankrupt. This scandal is now being investigated by the District Attorney.

[31] After 'Chernobyl' and the Nukem/Transnuklear scandal the position of the newspapers has become more critical towards nuclear power. What is considered a 'neutral' point of view has moved in the direction of the 'critical' end of the scale. This is also true for the local EJZ. The editor of the EJZ for example told us that after the Nukem/Transnuklear scandal he is no longer eliminating words like '*Atommafia*' (Atomic Mafia) out of letters to the editor prepared for publishing as he did before.

attention if, for example, it had happened in the shaft of a coal mine. According to their view the accident has no relevance at all for the evaluation of the suitability of the Gorleben salt dome as a repository for nuclear waste. The opponents of the Gorleben project were playing up the accident in order to have a new peg for questioning the Gorleben project.

For the critics of the planned repository, however, the accident in the shaft demonstrates the following:

1. The geological situation in the supercap of the salt dome is much more complicated than was expected. This could cause problems for a safe operation of the repository mine as well as for the long-term safety of the repository itself. Hence, the accident indicates that the salt dome is not suitable as a repository for nuclear waste.

2. The companies and authorities involved, particularly the DBE, do not work carefully and responsibly enough.[32] If they are not able to sink a shaft without problems they will probably not be able to handle high-active nuclear waste in a safe way.

3. There had been warnings by independent experts not to sink the shafts at the selected locations. These warnings were ignored by the PTB. But the expert critics were right evidently. They may also be right in their critical evaluation of the suitability of the salt dome.

4.5. Coverage of the Accident by the Media

The accident in the shaft of the pilot mine at Gorleben not only received broad coverage in the EJZ but the regional and national newspapers also reported on the event. The intensity of coverage primarily is dependent on the spatial distance of

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[32] The above mentioned expertise of the BGR (1988) at least partially supports this view.

the newspaper to Gorleben. The local EJZ published 43 articles focussing on the accident in the three-month period following it; the regional HAZ published 7 articles and the national newspapers just published 1-2 each. The news magazine *Spiegel*, however, published two detailed articles on the accident.

	Number of statements			
	National press	HAZ	EJZ	All newspapers
No implications of the accident	9	6	21	36
Proof that the planned Gorleben site cannot be realized	5	3	17	25
Proof that Gorleben is a bad location for the planned final deposit	2	3	5	10
Motivation to look for alternatives for final disposal of nuclear waste	0	1	6	7
Loss of time in the construction of a deposit for radioactive waste	2	4	7	13
Questioning the use of nuclear energy in general	0	0	10	10
	18	17	66	101

Table 6: Reported consequences of the accident in the shaft of the pilot mine at Gorleben for the use of nuclear energy in West Germany

The pattern of arguments found in the interviews is mirrored in the newspaper content (Table 6). Statements that there are no implications of the accident for the waste management concept were made by the Federal and State Government, the CDU,

the PTB and the DBE. The only consequence for the realization of the Gorleben project as perceived by this group of involved social actors is a time delay. The other consequences were almost exclusively stated by the Green Party, the SPD and the local citizens' action group.

	Number of statements			
	National press	HAZ	EJZ	All newspapers
Unexpected geological factors	7	2	12	21
Errors in the concept or during work	0	5	14	19
Other causes	2	1	1	4
	9	8	27	44

Table 7: Reported causes of the accident in the shaft of the pilot mine at Gorleben

The reason for the accident is almost equally divided between "unexpected geological factors" and "errors in the concept or during work" (Table 7). The expertise given by the BGR (BGR, 1988) explains the accident with a combination of both reasons: unexpected geological factors that led to a reduced stability of the frozen column were not discovered because the geological investigation during the sinking of the shaft was not conducted carefully enough. Hence, the newspaper coverage in 1987 had anticipated the result that both factors were relevant for the accident.

There were only a few statements in the newspaper coverage of the accident in which social actors were directly accused of being responsible for the accident. Actors who were mentioned

as being responsible were the DBE, the PTB, the mining authority, the Federal Government and the "Pro" experts.

In two articles dealing exclusively with the accident (issues of May 25th and August 8th) the *Spiegel* reported on the causes of the accident, the geological conditions and the concept used to sink the shafts. Both times this information included a citation of the (critical) geologist Professor Duphorn, University of Kiel, who had already said in 1982 that the selected locations for the shafts were not suitable from a geological point of view. The responsible institutions (BMFT, PTB) are accused by the *Spiegel* of having disregarded this warning. Another article (issue of August 3rd) mentioned the Gorleben project and the accident in a broader context.

The *Spiegel* provides its readers with information in order to prove that the accident was predictable. Part of this information came from an anonymous former engineer of the DBE who was dismissed - according to the *Spiegel* - because of a critical attitude to the shaft sinking concept. In his opinion the DBE ignored hints that something was going wrong, namely

- falling ground-water level since December 1986,
- penetration of brine into the shaft in March 1987,
- rock slide in March 1987 and
- rising temperature at the frozen rock of the shaft at the beginning of April 1987.

DBE and PTB are blamed for having ignored these hints. Furthermore it is stressed that the geological conditions had not been sufficiently investigated. Although there had been a drilling at the location of the shaft before it was actually sunk only samples of the rock out of the drill hole were analyzed. A specimen from the problematic clay stratum where the accident later happened had not been taken. The *Spiegel* took the point of view of the opponents to the Gorleben project and wrote in its issue from August 3rd (p. 78):

> "Since the site for the final disposal of the nuclear industry's radiant heritage was selected from a political point of view, the responsible institutions ignored warnings of their experts and engineers for years, and risked the lives of their miners."

In this context the political pressure arising from the fact that licenses to run nuclear power plants depend on the demonstration of a safe disposal of the nuclear waste is also mentioned. The Federal Minister of the Environment, Nature Protection and Reactor Safety is criticized for playing down the consequences of the accident for the planned Gorleben repository.

According to the *Spiegel* the accident questions the whole disposal project. The *Spiegel* is known to be anti-nuclear, hence, this assessment is not surprising. The accident did not change the magazine's opinion of the Gorleben project but it provided the occasion for a critical discussion.

4.6. Perceived Influence of the Accident

The influence of the accident on the local discussion of the Gorleben project in the county of Lüchow-Dannenberg cannot be evaluated in isolation. The shaft accident is just one factor in a series of events consisting mainly of the Chernobyl disaster, the accident in the shaft, the *Nukem/Transnuklear* scandal and finally the scandal in which the very important and influential member of the State Parliament Kurt-Dieter Grill is involved. All these events have had similar implications: the public attitude towards nuclear power became more sceptical and the confidence in the institutions responsible for the operation and monitoring of nuclear facilities decreased drastically. Our interviewees of both sides agreed that the *Nukem/Transnuklear* scandal has had a relatively larger impact on local public opinion than had the accident.

The changes in public opinion and the decreasing trust in institutions promoting nuclear power have consequences for communications on the Gorleben project. The opponents of the project in the county of Lüchow-Dannenberg have improved

their position in the local controversy. Their arguments are now believed more by the undecided public than before. This was mentioned by the proponents as well as by the opponents among our interviewees. The critics of the Gorleben project are better respected even by the proponents of the Gorleben project.

Perhaps the most important implications of the shaft accident were felt on the parliament level both in the State Parliament of Lower Saxony in *Hanover* and in the Federal Parliament in *Bonn*. There have been expert hearings and discussions in the Federal parliamentary committee for the environment, nature protection and reactor safety and in the similar parliamentary committee of the State Parliament. In these committees there have been controversial debates on the causes and implications of the shaft accident and again on the nuclear waste disposal concept of the Federal Government in general. Because of the critical attitude to nuclear power in the general public but also in the CDU itself, the Federal Government could not treat the problem as a purely technical one. Hence, the decision on restarting work at the two shafts in Gorleben is considered as political. It is expected by the proponents that work will continue before the end of 1988; but a final decision has not yet made.

4.7. Coverage before and after the Accident

Within the nuclear power issue which receives a broad coverage in all West German news media the nuclear waste disposal topic is not a prominent one. The *Spiegel*, for example, published 46 articles (ranging from short news items to elaborated reports and essays) dealing with nuclear energy during the year 1987. Most of these articles are concerned with the prototype fast breeder reactor currently being built in *Kalkar* (11 articles), "Chernobyl" (5 articles) and irregularities in the West German nuclear industry (*Nukem*, *Alkem*, *Transnuklear*). In comparison to these topics the planned nuclear waste disposal site at Gorleben obviously was of less interest to the news magazine, at least before the accident

in May 1987. Up to this incident there is no reference to "Gorleben" at all.

"Gorleben" is first mentioned in a detailed report on the mining accident in the issue of May 25th. In the following issues two articles were found dealing with the problem of nuclear waste disposal in a more general way. In one of these articles plans of the *Kraftwerkunion* (KWU) to make a contract with the Chinese Government on the disposal of German nuclear waste in the Gobi Desert are critically discussed. The disposal site at Gorleben is mentioned only as a side aspect. The second of these articles is concerned with a nuclear waste disposal site in the German Democratic Republic near the border with Lower Saxony. "Gorleben" is mentioned in connection with some remarks about the Government of Lower Saxony which is criticized for not analyzing the risks emerging from that disposal site for the West German population in order not to endanger its own Gorleben project.

Finally there is a new detailed report on the causes of the shaft accident at Gorleben and its consequences for the final disposal of nuclear waste, on the occasion of a visit by the Minister for the Environment, Nature Protection and Reactor Safety to Gorleben (issue of August 8th).

A comparison of newspaper coverage before the accident, in the three-month period following the accident and the rest of the year 1987 (Figure 2) shows the following:

1. The accident in the shaft has received coverage in the national press as well as in the regional HAZ and the local EJZ. The number of articles dealing with the accident decreases with increasing distance - indicating that the relevance of the accident itself was perceived as having a strong local component.[33]

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[33] This is only true for the first months after the accident when primarily local actors reacted publicly to the event. Hence, in the coverage of the parliamentary hearings in Hanover and Bonn which took place in April/May 1988 after our content analysis was finished such great differences between the local, regional and national newspapers could probably no longer be found.

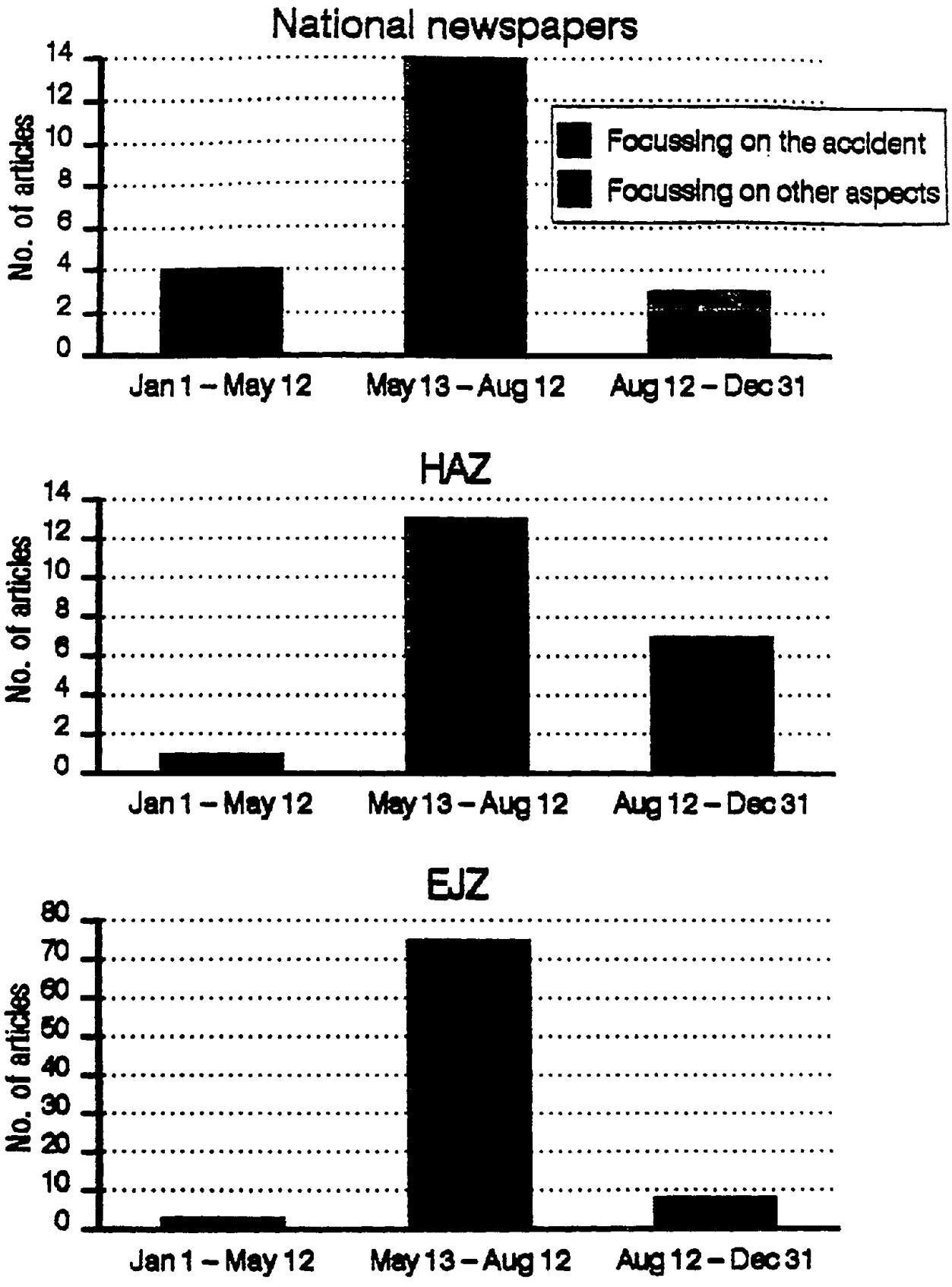

Figure 2: Newspaper coverage of the planned repository for high-active nuclear waste in the salt dome at Gorleben and the accident that happened during the shaft-building of a pilot mine on May 12th, 1987

2. The accident in the shaft has obviously directed the attention of the newspapers to the Gorleben project in general. Even articles not focussing on the accident but on other aspects of the Gorleben project were published more often in the time period following the accident than in the month before this event.[34]

3. Whether this effect of directing attention to the Gorleben project is limited to only a short time after the accident or lasted for a longer time cannot clearly be answered by our content analysis. The data of the EJZ and the HAZ support the view that the effect may have lasted for a longer period; the data of the national newspapers suggest the opposite. Anyhow, in the first half of 1988 the Gorleben controversy was again covered by the national media because of the expert hearing in the committee of the Federal Parliament. And future decisions to continue work at Gorleben will surely also be covered by the national media. Hence, the shaft accident will keep the Gorleben project on the national agenda - although not at the top of the rank order.

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[34] In the case of the EJZ the increase in the number of articles from the first to the second time interval must not be interpreted as important. Due to different selection procedures (cf. section 3.3) the figure leads to an overestimation of the increase in coverage.

5. Interpretations

5.1. Hidden Roots of the Controversy

The Gorleben controversy is primarily a debate on the suitability of the Gorleben salt dome for radioactive waste disposal only at a first glance. Social actors and individuals involved in the debate have differing motives and goals related to their behavior.

For the Federal Government, the PTB and the DBE the Gorleben project is a key element in the nuclear waste management concept. Although there are interim solutions for the reprocessing and storage of spent fuel elements that may be prolonged (contracts with France for instance), in the long run it seems necessary to have national waste management and disposal facilities. Even the high-active waste originating from the spent fuel elements reprocessed in France will come back to this country in a couple of years.

The local politicians advocating the planned repository (more or less the CDU) and the State Government of Lower Saxony primarily have in mind the expected economic benefits of the repository, the conditioning facility and the interim storage. These economic benefits consist of jobs, profit for the local firms and - last but not least - the Gorleben money.

The opposition to the Gorleben project is based on a set of motives found to a varying degree in the individual opponents. First, there is certainly a fear that the repository and the other nuclear facilities may not be safe. For example, the expert critics and the ecological "*Institut für ökologische Forschung und Bildung*" are arguing along these lines. Many of the passive public may have doubts because of the perceived risks. Secondly, the planned repository is seen as an important element of the national nuclear power system. Hence, people who want a withdrawal from nuclear power are opposing the repository in order to create problems for the

"atomic lobby". Thirdly, there are many people who have an interest in, or at least a preference for the county of Lüchow-Dannenberg keeping its rural character. Conservative farmers, young people who have immigrated into the county in order to live according to ecological principles and people who own a house in the county of Lüchow-Dannenberg and want to live there after retirement form the group in which this motive plays an important role.

The public discussion does not mirror this complex pattern of motives and goals. It is based more or less on the fiction that the common goal is to build a safe repository and the conflict is about where to build it and how to build it. Hence, many of the motives driving the behavior of the social actors and individuals are not made explicit during the communication process between the two sides of the controversy but remain hidden. Consequently it cannot be expected that the communication process will lead to a consensus, or compromise or at least to a convergence of positions.

5.2. Perception of Strategic Argumentation

Of course everybody participating in the controversy knows about the hidden roots of the conflict. The proponents therefore tend to assess critical remarks on the safety as tactical maneuvres and the opponents themselves as not credible. The same is true for the reverse situation. Since the opponents perceive the proponents as being subject to several inherent necessities they too doubt that the arguments origin from true conviction.

The ultimate goal of the public dispute about the risks of the repository does not seem to be to convince the other side of the controversy from ones own point of view but to mobilize public opposition to the repository or to calm the public, respectively. Hence, not any kind of rational dispute but the classical Greek art of rhetoric with its goal not primarily to convince the communication partner but to win

the audience is the adequate paradigm to describe this controversy.[35]

To be efficient one has to undermine the trustworthiness of the other side. Hence, moral aspects become more and more important in the debate. This communication strategy tends to increase the gap between the positions of the two sides rather than to close it.

5.3. Placing Gorleben on the Political Agenda

We will now try to understand the effects the shaft accident had on the communication about the Gorleben project. The most obvious implication of the accident was to direct the attention of media and politicians to the planned repository for nuclear waste. We have to distinguish between the local and the national political level.

On the local level the Gorleben project was already topical before the accident. The proximity to the nuclear facilities and the pilot mine, the activities of the local citizens' action group and the political discussion, for example in the Gorleben commission, implied that a certain degree of attention was given to the controversy by the local media and the population. Hence, the accident on the local level caused an increase in the salience of the controversy about the planned repository but did not create a completely new issue.

However, on the level of the national political process the accident led to a new facette or "sub-issue" within the broad nuclear issue which has existed with changing patterns since 1975. The Gorleben "sub-issue" is not only fed by the accident itself but also and primarily by the reactions of the political and legal institutions to the event. Hearings in the parliaments of Hanover and Bonn, expert opinions that are published, decisions to stop or continue the work at the shaft in Gorleben, possible legal proceedings against the

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[35] This is not a characteristic specific to the Gorleben controversy but it is true for most political controversies.

people responsible for the accident - all these activities catch public attention and make the Gorleben controversy a national issue - at least for some time.

It is quite interesting to note the difference in the effects of the Chernobyl disaster and the *Nukem/Transnuklear* scandal on one hand and the shaft accident on the other. The *Nukem/Transnuklear* scandal and the Chernobyl disaster had diffuse impacts on the public attitudes toward nuclear power. The main message of these events for most people was that nuclear power is dangerous and the institutions responsible for the safety of this technology cannot be trusted. On the national level there was no specific impact of these events on the evaluation of the Gorleben project. In the county of Lüchow-Dannenberg, however, these diffuse fears were specified with respect to the planned repository and the other nuclear facilities und decreased their public acceptance.

The shaft accident, however, hardly had any diffuse impacts comparable to those of the Chernobyl disaster or the *Nukem/Transnuklear* scandal. On the local level, where there was already attention given to the planned Gorleben repository, it had relatively little influence on public acceptance of the planned repository. Since there was no direct danger for people other than the miners it did not raise much emotion.

But the social effects of the shaft accident were specific to the Gorleben repository. And, hence, on the national level it caused the political institutions to focus their attention on the event and the pilot mine at Gorleben. The most important effects of the accident are therefore to be observed on the national rather than the local level.

5.4. Changes in Communication Behavior

The theory of the "spiral of silence" (Noelle-Neumann, 1980), somewhat modified, provides us with the theoretical framework required to understand the effects of the accident and other events such as the *Nukem/Transnuklear* scandal on the public

communication about the Gorleben project. According to this theory people tend to orientate their communication behavior to public opinion which may be understood in this context as the perceived opinion of the public. Public opinion serves as a social norm for communicative behavior. Events like the Chernobyl disaster or - at a much lower level - the accident in the shaft at Gorleben are taken as hints by people that public opinion has changed. They will change their communication behavior accordingly: opponents of the project will formulate their opposition more frequently, consequently and aggressively while proponents will tend to "hide" their position. The modified communication behavior will increase (or even create) the assumed changes in public opinion. We find the first effect in the communication behavior of individuals and social actors; hence, after the accident the critical position is represented more strongly in public debate than before.[36]

But also a second more subtle effect has to be considered. The accident in the shaft obviously changed the "norm" according to which communicative behavior is evaluated as legitimate or not - by the "gatekeepers" of the mass media system as well as by ordinary people.[37] For example, the term "atomic mafia" becomes acceptable, proponents have at least to mention problems of the Gorleben project in their defense of these plans, and the necessity of opponents to substantiate their opposition decreases.

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[36] Strikingly, even the conservative (and pro nuclear) newspapers FAZ and WELT published critical comments on the Gorleben project after the shaft accident. The FAZ (July 8th, 1987) criticized the fact that only the salt dome of Gorleben was being investigated and insinuated that political rather than geological reasons might have influenced the decision in favor of the Gorleben site. The WELT (May 20th, 1988) cited extensively the BGR expertise which criticizes the DBE for not being careful enough and mentions the warnings of the critical expert, Prof. Klaus Duphorn.

[37] We all know that in the political process the formulation of very different opinions is the rule. Hence, public opinion as a norm for communication behavior must be understood to mark a range of legitimate opinions rather than a single opinion.

It seems as if the duty to substantiate one's position is stronger the more it differs from what is to be found in public opinion as the "normal" or "neutral" point of view. Hence, if the social definition of what is "normal" or "neutral" changes, for example after the accident, the necessity for the two sides of the controversy to substantiate their positions will also change. The accident in the shaft has obviously shifted the evaluation scale for communication behavior, implicit in public opinion, into the direction of the "critical" end.

5.5. Motivation of Ecological Activists

Citizens' action groups, as voluntary low-structured social systems, permanently have the problem of motivating their members for activities. The number of people who can be activated is heavily dependent on the emotional "climate" created by events such as the accident. Resistance to nuclear facilities, for example, cannot be run as a routine job. The local citizens' action group (BI) at Gorleben perceives the "chance" to mobilize many people for their goals, as a result of the shaft accident and the *Nukem/Transnuklear* scandal, very clearly. Alluding to the shaft accident and the other events, it wrote in its newsletter *"Gorleben Rundschau"* (2/1988):

> "Even if the good old days of euphoric resistance have gone, the BI cannot be anything other than a coalition of many activists.
>
> Resistance has to be fun again! The other side contributes a lot, so that at the moment this is the case: they hardly miss any opportunity to put us in a good mood. Presently, it is easy to mobilize old participants and to recruit new ones."

It cannot be expected that the mobilizing effect of the shaft accident will last very long. But it seems important for the citizens' action group that the intervals between the periods of high mobilization do not last too long in order to have some continuity in its work.

5.6. The Accident in the Light of "Risk Amplification"

In the introduction we mentioned three hypotheses about the amplification effects of the Gorleben shaft accident which we expect by interference of different levels of communication. We are now trying to relate our results from the case studies to these theoretical assumptions.

First, the sensibility with which the public, the mass media and the political institutions reacted to an accident at work that just had the consequences of one ordinary car accident (more than 10,000 people are killed each year in car accidents in West Germany) impressingly demonstrates the relevance of the political communication context for the assessment of such an event. For 15 years "nuclear power" has been among the most important political issues. This has led to a high sensibility of the public, the mass media as well as the political institutions (even those in favour of nuclear power) to all events related to nuclear power.

The accident is given high priority, by the opponents of nuclear power as well as by the proponents who have to demonstrate their credibility, because it can be used to raise questions about the suitability of the salt dome for a nuclear repository or the trustworthiness of the nuclear industry.

Hence, the nuclear power issue strongly amplified the relevance assigned to the shaft accident. It led furthermore to its interpretation in terms of the Gorleben controversy (suitability of the salt dome) and the general nuclear power controversy (trustworthiness of institutions operating, promoting and controlling nuclear power).

We saw that the relevance of an event may be amplified by its relation to a political issue. But the opposite is also true: The salience of a political issue may be amplified by events related to those issues. After the shaft accident many administrative, political and legal institutions were involved in the management of that issue. Hence, a lot of social

activities were induced by the accident and these were covered by the media. According to the theory of the agenda-setting function of the media (cf. Shaw/McCombs, 1977) the amount of coverage of an issue strongly influences its perceived salience. Although the Gorleben controversy and the shaft accident were poorly covered compared to the Chernobyl disaster, the reprocessing plant at *Wackersdorf*, the fast breeder reactor at *Kalkar*, and the scandal in the nuclear industry it contributed to the total amount of coverage.

Besides this quantitative effect (the more coverage the more salient the issue) the shaft accident may also have contributed to a certain quality of the nuclear issue: complexity. According to the "issue-attention cycle" (Downs, 1972) an issue should disappear some time after its climax. But the nuclear issue in West Germany has now been at a climax for nearly 15 years. This phenomenon can be explained by the complexity of the nuclear power issue. If one aspect of nuclear power is "exploited" with respect to its function of attracting public attention it is rather easy to switch to another "fresh" one. Those who are interested in keeping the nuclear issue alive are always in search of appropriate events like accidents or scandals.

Finally, not only the salience of the nuclear issue has been amplified by the shaft accident (this effect is only moderate) but also the social reputation of the critical side in the Gorleben controversy. This is true for the local as well as for the national level. In the eyes of the opponents and many uninvolved observers, the shaft accident proved that people and institutions who were already critical of the Gorleben project before the accident such as the geologists Professor K. Duphorn and Professor E. Grimmel and the citizens' action group at Gorleben, were right in their criticism. Since people tend to make conclusions according to psychological rather than logical laws the assessment of trustworthiness of critics may well be generalized to aspects which have nothing to do with the event that led to that assessment.

6. Summary

The controversy on a planned repository for high-radioactive waste in the salt dome at Gorleben (Federal Republic of Germany) was investigated i the form of a case study, combining the methods of direct explorative interviews, analysis of documents and content analysis of mass media. Particular emphasis was given to the effects of an accident that happened in May 1987 in the shaft of the pilot mine on the public debate on the planned repository. In the accident a miner was killed and others were injured.

It was found that, although the potential health risks of the planned repository and related nuclear facilities are covered almost exclusively in public debate and in newspaper content, there are several underlying motives besides the perceived risks that influence the Gorleben controversy. Most important for the national as well as for the local level is the nuclear power controversy. According to legal requirements the disposal of spent fuel elements of nuclear reactors has to be demonstrated before a licence for the operation of a nuclear power plant is granted. Hence, if it became evident that nuclear waste disposal was not guaranteed, the nuclear power program of the FRG would have to be stopped. And this is a primary goal of the critics of the Gorleben repository. Furthermore part of the opposition to the Gorleben project is motivated by a rejection of the industrialization of the rural county of Lüchow-Dannenberg.

The assessment of the accident varies strongly between the opponents and proponents of the project. For the proponents the accident in the shaft was an ordinary accident at work without any relevance to the repository concept. The opponents, however, think that the accident, first, proves the unsuitability of the Gorleben salt dome as a repository and, secondly, demonstrates the lack of competence of the institutions responsible for waste disposal.

Three hypotheses were formulated concerning the interdependence of the accident as an "event" and broader political

issues. The first hypothesis is that the relevance of events is strongly dependent on their relationship to political issues. The accident in the shaft would certainly not have received much public attention if, for example, it had happened in a coal mine. The second hypothesis is a reverse impact: the salience of political issues is influenced by events such as accidents or scandals which may be used by one side of a controversy to support its point of view. This was true of the shaft accident which was used to argue against the repository concept. The third hypothesis is concerned with the "power balance" in communication between the different sides of a controversy. In the Gorleben controversy it became evident that after the accident it became easier for the opponents of the project to find an open ear for their arguments.

Of course, a single case study cannot verify our hypotheses on the interference between general issues and events. Furthermore our methods were exploratory rather than hypothesis-testing. But our study provides some evidence that the accident in the shaft of the pilot mine at Gorleben indeed had the postulated effects.

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