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Understandings of Environmental Risk in Two Industrial Towns: Grangemouth and Ludwigshafen

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**A comparative study in
Grangemouth and Ludwigshafen**

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UNDERSTANDINGS OF ENVIRONMENTAL RISK IN TWO INDUSTRIAL TOWNS

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A note on direct quotations, confidentiality and anonymity

Research on the perception and understanding of risk in industrial towns is potentially sensitive. It is important to indicate therefore that we have taken extremely seriously the need to preserve the confidentiality of the interviews held. Where we have quoted directly from respondents, it has been with approval obtained at the time of interview. Each direct quotation is followed by the town's identity (GM for Grangemouth, LU for Ludwigshafen), a descriptive label for the individual concerned, and an ID number assigned for the research. We have done our utmost to remove identifying features of the individuals concerned. This has meant referring to people by fairly general descriptive labels. We of course appreciate that individuals have multiple roles and identities, and reducing identification to a single descriptive label scarcely does justice to multi-faceted lives. Yet on occasions to reflect such individual distinctiveness with more elaborate descriptions would offer too many clues to that individual. It is for reasons such as this that we have used the word 'regulator' to cover a wider range of people than might usually be typical, our yardstick being whether their post included some regulatory functions. Similarly, we have edited out passages of interviews which gave clues to the

speaker's identity. There have inevitably been instances where this has entailed sacrificing vivid detail for a blander statement, out of respect for anonymity in the research process. We hope that we have struck a reasonable balance in conveying diversity of viewpoint without compromising confidentiality.

Executive summary

Background

The importance we attach to 'risk' in our daily lives has changed greatly over the past two decades across Europe. Government and public negotiate risk concerns as never before in the policy process. Yet we still know little about the varying ways people actually live with different environmental risks in different countries. This project takes an anthropological approach, using intensive fieldwork to examine attitudes and values in two industrial towns: Grangemouth (Scotland) and Ludwigshafen (Germany). It explores the contrasts and similarities in the ways that people deal with risk in two towns built around substantial petroleum and chemical industries, each undergoing rapid change.

Britain and Germany are often said to attach different weight to environmental issues, with Germany seen as the more environmentally concerned and risk conscious. But is such a difference reflected in the life of individual industrial towns or cities? Selecting Ludwigshafen (population 165,000) on the River Rhine, and Grangemouth (population 18,000), in central Scotland, allowed us to compare towns whose residents have long been used to living alongside hazardous industries. Although Ludwigshafen is larger, with a more diverse population, both have been prominent chemical and petrochemical towns for several generations. Each is home to a number of companies, but dominated by one major one: BASF in Ludwigshafen, dating back to 1865, and BP in Grangemouth, dating back to 1924.

The purpose of this research has been to provide an analytical description of discourses of environmental risk in two towns whose entire histories have been shaped by industries commonly regarded as inherently hazardous. Our aim has been to use ethnographic methods as a sensitive means to connect individual perceptions, attitudes and concerns with wider public or semi-public debate about safety, health, security and the future in both towns. By placing public views alongside the perspectives of industry, regulators, planners and public health staff, we aim to present an ongoing local 'conversation' about risk in the life and politics of each town. By design, a social scientist from Germany (Dr Achim Schlueter) did the Grangemouth study, while a social scientist from Britain (Dr Patricia Bell) did the Ludwigshafen study.

Research findings

In both towns, people voiced more concern about the impact of accidents than routine pollution or health risks. In Grangemouth, industry was the issue. Residents focused on BP's recent safety record, the safety implications of massive redundancies, and unwelcome planning applications by other chemical companies. Behind these concerns was anxiety about the town's future safety and economic vitality. In Ludwigshafen, industry was not

an issue to the same extent. Traffic was seen as a more immediate environmental problem. However, echoing Grangemouth, BASF's use of sub-contracting was starting to create unease about safety as well as job security. Similarly, recent cutbacks in public services, as Ludwigshafen Council adjusted to a big fall in revenue after changes in the taxation of industry, were leading to new questioning of the town's industry. Yet overall, while people in Ludwigshafen generally emphasised how the town's environment had improved over time, people in Grangemouth were likely to emphasise what had got worse.

When people in either town talked about risk, they spoke of trust, along with familiarity, loyalty and obligation. Yet the two towns presented very different pictures. In Ludwigshafen, the chemical industry was trusted because BASF enjoyed wide public trust and pride. Even so, limits to this trust were increasingly apparent, as a more sceptical attitude to corporate safety claims was emerging. By contrast, in Grangemouth, public trust in industry was in short supply. BP may still have commanded loyalty because of its history in the town, but trust in industry procedures and intentions was being eroded. Regulators were criticised, not only for too cosy a relationship with BP and other companies, but equally with limiting Grangemouth residents to a mere token role in decision-making affecting their town.

Our research did not compare regulatory frameworks but concentrated on the views about regulation expressed by regulators and regulated alike. This proved a more sensitive topic in Ludwigshafen than Grangemouth. Despite the strong regulatory ethos in Germany, the sheer size of BASF posed unusual problems. How could public authorities, comparatively under-resourced, maintain oversight of a corporation which possessed all the necessary expertise to do the task more effectively itself? Grangemouth's regulators perceived themselves as having more influence and exerting more effective oversight of industry now than in the past. They viewed their most difficult task nowadays as dealing with public disillusionment and a new insistence by residents on being heard.

In Grangemouth, the recent mood of distrust has fuelled assertive campaigns against chemical storage planning applications and in favour of diversifying employment, even though national environmental organisations have not had a high profile in the town. Grangemouth residents have argued against plans they fear would further stigmatise their town as a chemical 'dumping ground'. This has no parallels in Ludwigshafen. The contrast reflected the different futures residents in each town imagine. In Ludwigshafen, we found local branches of national environmental organisations operating; but the few activists critical of the chemical industry conceded that they faced a struggle to be heard in a town where trust in industry, and above all BASF, had been so strong.

Conclusions from comparing Grangemouth and Ludwigshafen

- Safety concerns about the chemical or petrochemical industry among the public have been much more acute in Grangemouth than Ludwigshafen in recent years.
- However, these developments have been comparatively recent in Grangemouth: in the 1980s this was a booming town, confident in its strategic importance and future.
- A strong sense of confidence and trust in BASF and the chemical industry persists in Ludwigshafen.

- Regulators in Grangemouth were obliged to enter into dialogue with a sceptical public in a manner that had no parallel for their counterparts in Ludwigshafen, due partly to the predominant concerns of the community, but also due to the structures in place for public engagement.
- Public confidence in industry safety and government regulation has emerged as deeper in Ludwigshafen than would, we suspect, be likely anywhere in Britain. Yet Ludwigshafen may be unusual even in a German context, with its particularly long history of economic reliance on a single industry and a single company.

Questions arising from the comparison

- Should this trust and confidence in Ludwigshafen be seen as contradicting those initial assumptions about greater environmental consciousness in Germany than Britain? Or as an expression of security in the knowledge that Germany is in the vanguard in Europe on environmental issues? Most in Ludwigshafen would opt for the latter.
- Does the activism witnessed in Grangemouth reflect a more general widening of environmental consciousness in Britain? Or is this activism less about environmental risk per se, and more a matter of economic and social concerns about jobs and the future, which draws on the language of risk and safety to enhance public claims to be taken seriously? Certainly the majority in Grangemouth would emphasise their social and economic problems.

Policy implications: main messages for local government, regulators, industry managers and non-governmental organisations (NGOs)

Qualitative research like this does not lend itself easily to a set of lessons for policy makers – first, because it highlights what is particular rather than general; and, second, because it shows how deeply understandings of environmental risk are shaped by circumstance and context. Nevertheless, the following conclusions have relevance for those making and delivering policy in the field of industry and environmental risk:

- ***Transparency, trust and the long term***
 - (a) The link between transparency as a means and trust as an end is more complicated than is often supposed in policy debate. Public trust in institutions is a product of time; the promotion of transparency as a policy goal is not a substitute that produces instant results. Corporate transparency may create little trust, while a relative lack of transparency may not on its own weaken trust.
 - (b) Familiarity over time, a public belief in corporate responsiveness, willingness to acknowledge long-term local obligations, and economic security create foundations for trust on which transparency can build.

- ***Risk communication and its limitations***

Public judgements about local environmental risks were primarily shaped by factors other than official or scientific information and advice. 'Risk communication' strategies, with their emphasis on information provision, can therefore easily miss the point. Trust, familiarity, tolerance, confidence, loyalty and obligation provided the context of values and expectations in which risk judgements were generally made.

- ***Regulators and residents***

The recent past in Grangemouth has shown the importance of the relationship between regulatory bodies and residents in industrial towns, and the need to build upon existing dialogue. However, our study also shows that active engagement by the public with regulators may not of itself be a sign of dialogue working or consensus being achieved: it may equally be a sign of public outrage or unease in a crisis where other options are felt to be closed.

- ***EU policy framework and local context***

Despite the development of an EU policy framework for environmental regulation, a combination of the industrial culture of particular industries, places and regions, and social and political responses to local economic circumstances, will ensure that understandings of environmental risk are unlikely to become standardised across Europe. Local or regional policy responses must take account of these likely differences in order to respond appropriately.

1 Background

Introduction

The way members of the public, politicians, regulators and scientists interact about environmental risk has changed dramatically over the past two decades, across western Europe and beyond. Equally, recognition of the cultural significance of ideas about risk has also changed; and within the social sciences 'risk' itself has become a hotly debated concept, with large claims by some theorists for its importance in understanding both public safety systems in the widest sense and more private concerns around security in modern life (Douglas and Wildavsky, 1982; Beck, 1992; Giddens, 1994; Lash et al., 1996; Beck, 2001). Environmental risks often attract special attention on both these grounds, not least because there may be political controversy around their recognition or definition coupled with uncertainties in estimating their impact. Yet there are still few empirically-grounded accounts examining how environmental risks colour lives and experience, and how such concerns fit within the wider preoccupations of particular groups or places (Zonabend, 1989; Berglund, 1998; Caplan, 2000; Berglund, 2001). Even fewer are comparative and cross-national in scope (Boholm, 1998). This is the context for comparative ethnographic research examining 'cultures of risk' in two towns dominated for generations by a single potentially hazardous industry: petrochemicals/chemicals in Grangemouth (Scotland), and chemicals in Ludwigshafen (Germany).

The two settings

Amid the attention being paid to the post-industrial city, it is easy to overlook those urban centres which continue to be defined by their industries – 'producer towns' in an era which has shifted attention to consumption. Grangemouth and Ludwigshafen are just such towns. Both have long been dominated by their chemical/petrochemical industries, and indeed are associated overwhelmingly with a single major multinational corporation. Grangemouth, beside the Firth of Forth in central Scotland, has been an important BP site since 1924. Ludwigshafen, in Rheinland-Pfalz and directly across the Rhine from Mannheim, has been BASF's home base since 1865. A number of other chemical companies have also operated in both towns, often for many years, amplifying the distinctive industrial identity of these two places. All these companies, however, are dwarfed by the two main employers.

Despite the common elements in their histories as major chemical/petrochemical locations, there have not surprisingly been marked differences also. Grangemouth is a small town of about 18,000 people, which from the 1950s onwards grew rapidly as a petrochemical centre. North Sea oil consolidated its position and, in the heyday of the expansion in the North Sea oil industry, around 8000 were directly employed by BP alone. At that time, BP Grangemouth was the most important industrial centre in Scotland, of

strategic importance to BP and the British economy. This was 'Scotland's boom town', 'a very rich borough because they got rates from BP' and the 'Kuwait of the central belt' according to one regulator's description. Today, that strategic importance has waned. Although Grangemouth still remains the sole BP location in Britain involved in all three of the company's core activities of oil exploration, oil refining and petrochemicals, successive redundancies have cut the directly employed workforce to 1700 in the last two years, falling further to below 1400 in cuts announced subsequently. Further cuts could well leave Avecia, another chemical company, rather than BP as the leading corporate employer in the town. The physical scale of the BP site is now becoming a misleading guide to its economic centrality in the town and region. A new sense of economic vulnerability now pervades Grangemouth, unimaginable 20 years ago. In the words of one regulator, 'Grangemouth has slipped down the league', while in the words of the company magazine, '2002 is a make or break year for Grangemouth' (*BP Grangemouth Now*, 2002).

Ludwigshafen, by contrast, has a population around 165,000, making it the biggest town of Rheinland-Pfalz. Twelve chemical companies currently operate in Ludwigshafen, and the chemical industry accounts for 99% of business turnover (2000 figures, www.ludwigshafen.de). However, BASF dominates. It was a vast complex even at the turn of the 20th century, and still today BASF employs 39,000 on its Ludwigshafen site (with 5000 more employed by subcontractors). BASF themselves claim that this is the largest chemical production site in single ownership in the world. Ludwigshafen is also BASF's global headquarters, a crucial difference in comparison with Grangemouth. Devastated in the second world war, the town revived rapidly during the 1950s. From the 1960s its economy became heavily reliant on *Gastarbeiter*, and an indication of the continuing diversity of its composition may be gauged by the fact that about 20% of the population are today officially classed as *Ausländer*, that is, non-German citizens – a figure among the highest in Germany – with the highest proportions living in the areas closest to the chemical industry. About one-third have Turkish backgrounds, but there are also sizeable communities with roots in Spain, Italy and Greece, dating from the 1960s, while the most recent arrivals are largely from the former Yugoslavia and Albania. In all, well over 100 nationalities are represented in the town – another major contrast with Grangemouth.

2 Objectives

The comparative dimension has been fundamental to the overall purpose of this research, which has two main objectives. The first is to provide an analytical description of discourses of environmental risk in two towns whose entire histories have been shaped by industries commonly regarded as inherently hazardous. Our aim has been to use ethnographic methods as a sensitive means to connect individual perceptions, attitudes and even anxieties with wider public or semi-public rhetoric and argument about safety, health, security and the future in both towns. By placing public views alongside the perspectives of industry, regulators, planners and public health staff, we aim to present an ongoing local 'conversation' about risk in the life and politics of each town. The raw material of this research is thus people's *understandings*, articulated in words.

A series of more specific questions have shaped our enquiries:

1. *Conceptualisation*: How do people of different generations, social backgrounds and experience conceive of local environmental risks and adjust to them?
2. *Language*: To what extent do people use the language of 'risk'?
3. *Context*: How do they set local environmental risks in context alongside other pressing concerns?
4. *Politics and power*: Are there tensions between popular and official accounts of local environmental risks, and how are these manifested?
5. *Comparison*: What kind of differences are apparent cross-culturally, or between communities with differing industrial backgrounds or environmental consciousness?

The second objective is to use these two particular cases to contribute to theoretical arguments around the cultural and political significance of risk issues today. The rapid emergence of risk as a key concept in the social sciences, and an element in the rhetoric of modern governance, begs questions as to how much the idea of risk features in people's daily lived concerns in different places. Equally, while Beck's work has been criticised as 'Eurocentric', and based on little in the way of direct empirical evidence, there is still little written which elucidates aspects of the cultural diversity around risk and the environment *within* Europe. Our emphasis is upon *relatively local* environmental risks which are *place-specific* and *familiar*. This is not a study of global environmental risk (like the consequences of climate change), nor does it involve the kind of risks to which entire nations or regions might be potentially exposed (like foot-and-mouth disease). Equally, it is not a work which addresses the repercussions of new, hitherto unfamiliar risks (like BSE). We are instead dealing with patterns of adjustment and changing forms of awareness to activities occurring in well known visible landmarks, deeply familiar reference points in the lives of many residents. Despite Ludwigshafen itself being so much larger than Grangemouth, we judged that both towns had enough in common, as single industry towns of strategic importance to their regions, dominated by a single major corporation, and both with long chemical/petrochemical histories, to be appropriate for our comparative purposes.

We should note that the study of health risks was planned as a central objective. This project grew out of previous work by the applicants, both epidemiological (Pless-Mulloli et al., 1998) and sociological (Phillimore, 1998; Moffatt et al., 2000; Phillimore et al., 2000) in Teesside. That work had examined the effects of industrial air pollution on health, and later the pollution politics of the conurbation, in a context where health and pollution issues had a history of periodic prominence and controversy. To a degree that inevitably sensitized the applicants to anticipate similar issues being prominent in our two new locations. Yet as we will discuss later, health concerns never emerged as major issues in our enquiries, in either town. We do not wish to suggest that health risks had no relevance whatsoever, but they were not as prominent as anticipated in the proposal. Accordingly, the objectives of the study have been adjusted, as is appropriate in ethnography, to examine how risk was construed and contested, highlighted or ignored, in private and public rhetoric. In this, health risks per se form only part of the larger account.

Putting risk in its place

Why a Britain-Germany comparative focus? First, a commonly held view in Europe has been that Germany is generally more concerned about environmental issues and cautious about environmental risks than Britain. Indeed, Germany is seen as in the vanguard of European environmental thinking and public policy: the strength of 'green politics'; the degree of consensus around the avoidance of nuclear power for energy; the tough regulatory approach to atmospheric emissions; and the public commitment to recycling of household waste, are areas often highlighted. A difference between the two countries in attitudes to environmental risk is therefore commonly assumed.

This links with a second reason for comparison, which stems from the social science literature on risk. While risk has captured the interest of numerous social scientists recently, a fundamental difference in emphasis is associated with two seminal theorists who set the terms of much subsequent debate: Ulrich Beck (1992) and Mary Douglas (Douglas and Wildavsky, 1982; Douglas, 1992). While both emphasised how risks are socially constructed, and the politics of knowledge through which such construction is achieved or disputed, Beck has tended to take seriously the reality of many environmental risks, while Douglas has remained more sceptical. Writing originally at a time when 'risk' did not have the currency as a sociological concept that he so effectively helped to give it, we might speculate how much Beck was writing with the grain of his own cultural background, voicing an argument that at a visceral level would have been shared by many in Germany. Equally, we might speculate how much Douglas also was writing with the grain, reflecting an Anglo-American scepticism about how seriously environmental risks deserved to be treated. We do not wish to make more of this polarisation of Beck and Douglas than seems warranted. Yet these two continue to define two alternative judgements about the significance of environmental risk which can be recognised in public and policy debate about the environment in European politics.

Nevertheless, how readily does this ubiquitous image of an environmentally proactive Germany leading the way, and a reactive Britain lagging behind, translate to the level of individual towns or cities, and major industrial centres in particular? Does comparative research in different towns throw into relief the nuances of the contrasts suggested, or

instead underline the weakness of such generalisation? Our purpose is certainly *not* to imply that our two towns are a canvas on which larger British-German differences can be seen in microcosm. Selecting towns dominated by chemical and petrochemical industries ought itself to provide a check on such assumptions, for these are unusual places; but, perhaps more importantly, these two case studies provide a vehicle for moving beyond the broad brush depiction of trends and tendencies on which both Beck and Douglas rely.

3 Methods and methodology

The studies were framed within an anthropological tradition, and involved a six-member multidisciplinary research team from several social sciences, as well as epidemiology. Both projects were designed to run in parallel, with a social scientist from Germany undertaking fieldwork in Scotland, while one from Britain did fieldwork in Germany. Accordingly, Dr Schlueter went to Grangemouth and Dr Bell to Ludwigshafen. Why that 'cross-over' design? There has been much discussion in anthropology about the relative difficulties – practical, methodological and ethical – of doing fieldwork in an unfamiliar compared to a relatively familiar cultural setting. Here we deliberately accentuated the unfamiliarity of researcher and researched. Notions of risk are commonly tacit and taken for granted. To approach German environmental risk concerns through a British lens, and vice versa, seemed a highly effective way to call into question the common sense assumptions of each setting. A double cultural defamiliarisation was thus our approach to initiating a comparison that did not presuppose one context as the reference point against which the other could be judged. Moreover, a study in which our two researchers had conducted fieldwork each in their own country would have missed an opportunity to build in the dialogue across cultural boundaries that ethnography aspires to and presupposes. In short, we sought not only to compare Grangemouth and Ludwigshafen, but to look at both with German *and* British eyes. We acknowledge here that there is a tension in a comparative study such as ours, which takes particular settings as its focus. On the one hand, as we have insisted earlier, our two towns are not intended to represent two countries, let alone two cultures. Yet both methodologically (in a design which deliberately addresses implicit 'cultural biases' brought to fieldwork and analysis) and substantively (in recognising the wider contexts in which the histories of these two towns have unfolded), a cross-cultural argument is inescapable and desirable.

Fieldwork lasted 13 months (August 2001 to September 2002). Our data came from interviews, focus groups, conversations, attending meetings and local events, and many kinds of observations; discussion between the two fieldworkers about their detailed weekly reports to the team; and documentation and archives (mainly local government, local press, and industry's own information). Eighty-six people were interviewed in Grangemouth, and 78 in Ludwigshafen (see Appendix 1), a few more than once. Interviews were open-ended in format. With few exceptions they were taped and then transcribed. Apart from residents (over half of the interviews), we also interviewed a cross-section of key and 'representative' actors. Within industry, we interviewed managers, other employees and trades union representatives, as well as former employees; and not only those working for BASF and BP but personnel from other chemical industries also. In government, we interviewed politicians at various levels, public officials and those with specific regulatory responsibilities. Others interviewed included health professionals; journalists working for local or regional newspapers; environmental activists; and people involved in local groups, civic activities or religious organisations.

A key methodological challenge was to keep the two studies in parallel. It is a commonplace to say that because fieldwork makes 'data collection' a uniquely personal form of engagement, ethnographic accounts cannot but reflect a good deal about the

researcher, as a vast experiential and epistemological literature in anthropology now testifies. Yet anthropologists still seek to reconcile the tension between the discipline's relativism and its commitment to comparative analysis (Hastrup, 1995; Herzfeld, 2001). The possibility of intercultural understanding depends on both. In practical terms, a comparative design like ours is premised upon two researchers working in parallel, getting equivalent doors opened, to pursue similar lines of enquiry – requiring a degree of standardisation which sceptics might say is epistemologically unachievable with participant observation. However, we have sought to adhere to this goal of parallel working, and team meetings and continual exchanges during fieldwork were procedures to help make it work, without strait-jacketing individual lines of interest and enquiry. There is not space to discuss here complexities of translation in this field of research, but we note that even routine translations of many of the most fundamental terms conceal subtle differences in connotation, *Umwelt* and 'environment' being a case in point (Boehmer-Christiansen, 1994). A single example illustrates what may be lost or misleadingly assumed in translation. 'Emergency Planning' and *Katastrophenschutz* are in functional terms equivalent tasks. It is a moot point whether semantically they are quite so equivalent.

Although the study was conceived as a kind of Anglo-German dialogue around discourses of risk, the project language has been English. Data from Grangemouth and Ludwigshafen have therefore been subject to slightly different procedures. NUDIST software has been used to manage the data, with both researchers developing a common 'coding tree' alongside a supplementary coding tree applicable to their own setting alone. In the Ludwigshafen study, Patricia Bell coded her transcribed interview texts in German, and coded passages only have been translated – a partial translation justified by pressures of time and funding.

4 Research findings

We summarise our research findings under five headings, reflecting major thematic fields of interest, followed by a conclusion. These five headings have emerged in some cases largely from prior conceptualisation of interests (first, third, fifth), in other cases in inductive fashion from the case studies themselves (second, fourth).

Risk concerns

Concerns about possible chronic health effects of living near industry were infrequently raised by residents or health professionals in either town. Instead, when health risks were raised, public concerns centred on the possible consequences of a catastrophic accident. It was the risk of death or injury from some kind of explosion, not the risk of chronic illness from daily but regulated exposure, which figured most prominently in both places. Does this imply that routine pollution levels were accepted in both places as too low to be credibly associated with measurable health effects? This is hard to say. In both places, it was widely recognised that air quality had improved greatly by comparison with 20, let alone 40, years ago. The following description of Ludwigshafen was one of many:

'I can remember very different times when I lived on *Fabrikstraße* (Factory Street) when I was a child, and sometimes in the autumn when the fog came down, you could barely breathe. I mean, people with respiratory problems or asthma and so on, they really suffered a lot then because of all of the filth that came down, real filth. And even the houses, they were all completely black...A lot has been done in this area.'

(LU, resident 66)

However, that in itself may not account for the lack of health concerns, as chronic ill-health involves long time-lags, inviting association with earlier times when pollution was acknowledged as being worse.

In Grangemouth, a common view was that prevailing weather conditions effectively dispersed air pollution away from its source, reinforcing a sense that the risks of the Grangemouth complex were not primarily those of routine emissions. Interestingly, there had been a claim by an environmental campaigner shortly before our research started that emissions from BP Grangemouth contributed to raised cancer mortality across central Scotland ('corridor of death' was one headline) (www.countrydoctor.co.uk; *BP Grangemouth Environmental Report 2001*). Yet the claim provoked no more than a brief reaction in the town, and rarely surfaced during fieldwork. All the same, health professionals made occasional reference to respiratory problems which could plausibly have been exacerbated, even if not caused, by industrial emissions:

'Prescribing figures show that the three [general] practices in Grangemouth have the highest spend on inhalers and such in the whole Forth Valley. Which is quite interesting I guess...the respiratory side, the top three practices for the Forth Valley are all here...It's quite suggestive that the three huge spending practices are all in the

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one town... I suspect there is more respiratory problems out there... What confuses the issue is really a lot of them still smoke a lot, and that's probably causing more problems than anything else.'

(GM, health professional 68)

In Ludwigshafen, a wry joke was that Ludwigshafen got the rates (or used to get them – see earlier) while the prevailing wind ensured that Mannheim got the pollution – a view echoed by a public official who spoke of maintaining 'a fresh air corridor that can take away the smog to the regret of the inhabitants of Mannheim who then get hit by it all!'. (This assessment of prevailing winds was disputed by one BASF executive, who observed that only 10% or so of complaints each year came from the Mannheim side of the river.) Yet reference was equally made to the stifling air which sometimes prevailed in Ludwigshafen: the absence of circulation, and the topography of the Rhine-Neckar valleys which favoured the build-up of temperature inversions. Moreover, many of those interviewed were quick to acknowledge that Ludwigshafen had been and still was a relatively polluted place, and was widely known as such, as if this was an inescapable characteristic. Nonetheless, a common argument was that whatever air pollution problems still existed, they were overshadowed and put into perspective by the air pollution problems emanating from the former socialist countries.

But behind these similarities surrounding health risks, there were several differences. While public risk concerns in Grangemouth revolved around industry, that exclusive focus was much less evident in Ludwigshafen. To ask about the pros and cons of living in Grangemouth almost always generated responses about industry; that was by no means the case in Ludwigshafen. In Grangemouth, concerns related partly to BP's recent safety record, and the perceived future safety implications of large-scale redundancies at the BP site. The local Member of Parliament (MP), Michael Connarty, expressed it like this in the House of Commons (21.5.03):

'I ask that you, Mr. Speaker, grant an emergency debate on the health and safety impact of BP's demand for 240 new redundancies at Grangemouth in my constituency. Those are additional to the 700 redundancies agreed in 2001–02, which are still being implemented... The impact on health and safety is the most urgent, most important and specific reason for calling for a debate. I am sure that you will recall, Mr. Speaker, the seven major health and safety incidents at Grangemouth between 1998 and June 2002 – including a major fire and an explosion.'

He was articulating a concern with safety which had become magnified in recent years:

'It doesn't make things safer paying off a thousand men... nobody can convince me or anybody else that safety isn't going to be jeopardised by these lay offs because the same men can't maintain the plant, a thousand men, 43% of the work force. It is obvious that if the plant wasn't up to scratch before, and all of these men employed to look after it, what is it going to do now? It must deteriorate further.'

(GM, local politician 56)

Still another politician spoke of the urgency of safety in people's minds, adding 'because it is not a clean town'. From the point of view of residents, safety has become *the* most important environmental risk associated with the petrochemical industry, even if most people would probably not call it 'environmental' nor even use the word 'risk'.

However, there was another equally important concern about industry in Grangemouth which, while having nothing to do with BP, also went to the heart of anxieties about the possible future awaiting the town. That related to proposals for new operations by other chemical companies, proposals which were strongly resisted because they were seen as bringing risks without compensating employment. That trade-off (or its lack) was a recurring concern in Grangemouth throughout our fieldwork.

In Ludwigshafen, environmental risk concerns were more diverse. Traffic was one common concern, in a town criss-crossed by flyovers. Some 50,000 commuters a day come to Ludwigshafen, the majority by car. Among those who did acknowledge that air pollution was a problem, a number of people, representing a range of opinion (residents, regulators, activists and health professionals), considered that road traffic had overtaken industry as the main pollution issue. Household commitment to recycling was another concern, one that was also turned into a litmus test of 'belonging' within German culture in a town where 20% of the population are classed as *Ausländer*.

However, industry was not exempt from concerns. BASF's increasing use of sub-contracting and recent changes in working practices have created growing unease about safety as well as job security (an echo of Grangemouth), conveyed in the following comments:

'I'd say the safety precautions are not what they once were... of course, we rely on the chemical industry, we obviously need the jobs, but I think safety precautions are disregarded more and more. Why? They're cutting down on staff. And I think by now they really ought to consider what's more important, cutting down on staff or the safety that results from having more staff.'

(LU, resident 49)

'They [those working for sub-contractors] have worse tools, earn less money and to a certain extent the quality of their work sometimes reflects this. Then from the BASF side we have to go back and correct the work they've done. But with us, they always say that BASF workers are too expensive.'

(LU, BASF employee 56)

Also meanwhile, national tax reforms to industrial rates, introduced in 2000, have saved BASF vast sums while simultaneously creating a major fiscal crisis for such an industry-dependent town (a 68% reduction in income from industrial rates in 2001). Widespread dismay as public services have been cut has just started to fuel new criticism of the town's dominant employer, including a more sceptical approach to industry-linked risks. One activist remarked on this:

'I now find it interesting to see how that will develop, because new things have now happened... will the whole thing become a bit more vicious, will people be less tolerant of BASF? I'm curious.'

(LU, resident activist 27)

Even concerns about traffic linked back to BASF, for the company was seen as the main reason why the flyovers and motorways were so busy. In particular, the company was blamed by environmentalists for its refusal to participate in a collaborative initiative of local authorities in three federal states to encourage employers to provide their workforce with free access to public transport (the 'job ticket' scheme). Yet in general we

would judge that while people in Ludwigshafen were more likely to speak of the improvements in the town's environment over time, people in Grangemouth were more likely to emphasise what had got worse.

Trust in industry and regulators

'Grangemouth used to be a boom town and, I am not going to say it's a bum...but it is getting close.'

(GM, resident 20)

'The people of Ludwigshafen truly love their city. But I'm convinced that one has to have been born here in order to really love it.'

(LU, regulator 8)

Perceptions of risk are strongly influenced by trust, and vice versa, and these two towns presented a very different picture. One of the most striking observations from Ludwigshafen has been the depth of affective ties among those who consider themselves to have roots in the town. BASF (*'unsere Anilin'*, 'our Anilin', referring to the second word Anilin in BASF's initials) continues to command enormous loyalty, identification and pride in a corporation which has put the town on the map. As one individual said: 'Surely it can't be disadvantageous for Ludwigshafen that BASF is located here, because Ludwigshafen only exists because of BASF.' That Ludwigshafen is both the original site and global headquarters of BASF, and employs so many, undoubtedly assists this striking loyalty and trust. The commonly heard epithet 'a workers' town' may carry a sense of stigma in the world beyond, but not within the town itself, which is scarcely imaginable without its chemical industry. Its long history in chemicals ensures that its industrial character extends back far beyond the lifetime of even the oldest residents. Indeed the industry predates the town itself by a couple of years:

'The farther you get away from Ludwigshafen or the centres of the chemical industry, for example in my home town, the worse the reputation is. Obviously, you are used to it when you live nearby because you know what it's all about, you live with it. The company has been here for one and a half centuries and people have got used to it.'

(LU, employee representative 6)

Equally, the scale of operations at BASF means also that a comparatively small proportion of residents have been without some sort of family association with the company:

'You really won't find anybody living here who doesn't have at least one relative who works there or one friend who works there. And because of that, nobody regards BASF as a strange entity that you would fundamentally class as negative. Everybody knows somebody who works there and therefore they somehow get positive feedback about BASF.'

(LU, environmental engineer 36)

Time after time, individuals expressed confidence in the secure employment provided by BASF, in the rigour with which safety procedures were followed, and in the ability of the company to deal with unexpected pollution incidents (for instance, the capabilities of

BASF's own fire brigade):

'I trust a) the technology, b) the people who work at BASF – they want to do their work well, they want to live and they want to live even longer. So I assume that 99% of my feelings of safety are justified.'

(LU, local politician 23)

None of this meant that pollution or risks were denied, but the tone tended to take the form (paraphrasing): 'What do you expect, of course chemicals are dirty, of course air quality is not as good as in other places'. This was a 'simply functional' town – but its industry had made it comparatively wealthy. Employees had a good standard of living and a high level of job security, while there were further benefits in company-sponsored kindergartens, sports and recreation facilities, subsidised holiday centres, medical services, cultural events and more. This was corporate welfare on a large scale. The symbiotic relationship conceived as binding BASF and Ludwigshafen brought pride, confidence and trust, and through that a degree of protection from criticism for the company:

'I have to say it's a development which sometimes surprises me when a resident phones BASF all excited and outraged to say there must've been some kind of malfunction, it smells, my eyes are watering etc. Well, if you have a large organisation right on your doorstep, you have to expect that because of the laws of probability something will always happen now and again, whether it's an explosion, a loud popping noise, emissions coming out of a chimney somewhere, whether it's acidic fog or some kind of white powder floating around, we have to live with stuff like that... If you ask a proper, genuine BASF worker, would you rather work at BASF or somewhere else because it stinks at BASF, he wouldn't want to swap places with anybody.'

(LU, local politician 23)

Yet limits to this trust in BASF are also now becoming more evident, largely for reasons mentioned in the last section. There is a growing public awareness that the industry on their doorstep is focused on global rather than local aspirations, a shift often summarised by their own staff in terms of the company putting the interests of shareholders above that of employees. Moreover, alongside the optimistic perception of overall improvement in the town's environment, and air and water quality in particular, runs an undercurrent of nostalgia, among the older generation particularly, for 'better times'. What was regarded by some as heavy pressure to take early retirement from BASF, the ending of a long company tradition of sponsoring orchestra, tennis club, and other local organisations, coupled with good financial results benefiting shareholders, were put together in a number of cases as signs that BASF's ties with 'its' town were weakening, and were linked to a wider debate in Germany about the erosion of workers' rights – a theme which resonated in this self-consciously 'workers' town'. With jobs no longer 'for life', a more pragmatic attitude to the company was becoming apparent, particularly among younger employees and their families: 'It's not the big beautiful mother any more who takes care of everyone', as one city employee put it, using far from isolated imagery. Or in the words of a BASFler:

'We are Aniliner, that's Pfalz dialect for "we are BASF people". You no longer hear that saying nowadays, because the plant is operating on a more global level, worldwide... I doubt whether there are any Aniliners now who still identify 100% with BASF.'

(LU, BASF employee 7)

Moreover, even though there was little public questioning of regulators, and a widely shared confidence in the fact that Germany has always been in the vanguard of environmental regulation, another more sceptical view occasionally surfaced, suggesting that as with industry there were also limits to the trust invested in regulatory authorities or the local authority. Symbolic here was a common joke alluding to the Mayor collecting daily instructions from BASF on the way to the office each morning:

'Malicious tongues once said that the Mayor goes to the Engelhorn House every morning – that's BASF management's head office – that he picks his instructions up from there every morning before he goes to the town hall.'

(LU, manager 10)

Quite a different picture emerged, however, in Grangemouth. The implicit social contract between industry and local population that fostered such trust and loyalty in Ludwigshafen may never have been so deep-rooted in Grangemouth. BP has not been the local-firm-become-global in the same way as BASF. On the other hand, Grangemouth's compactness, and its lack of a relatively transient population such as the much bigger Ludwigshafen has inevitably attracted, has added to residents' identification with its industry. More than that, it was for many years a thriving town – 'Scotland's Rotterdam' was one metaphor for its economic vitality. But however strong the trust and identification in the past, it has in recent years come under growing strain. The two remarks below present a very different picture from that described above for Ludwigshafen:

'I have the feeling they are all the same here, they are always having accidents and they play them down, I don't trust, I don't think many people trust big business... you speak to some guy and he tells you, "oh yeh, I'm sorry we've got a breakdown in our compressor, but there is no risk, no danger we are trying all we can to...". But you are just speaking to anyone like all of those call centres.'

(GM, resident 10)

'I am born and bred in Grangemouth. I am a Portonian, my sons and daughters, my grandchildren are all born and bred in Grangemouth, and I hope that my great grandchildren are born in Grangemouth. And I want them to have an environment and a town that they can be proud of, because I was proud of my town at one time. I am not proud of it now.'

(GM, local politician 56)

In part this has to do with issues of environmental risk; in part with jobs and economic security. Both link to the idea of the future. A series of incidents at the BP site – three in particular within a fortnight in 2000, leading to a fine of £1 million (at the time the highest of its kind imposed in the UK) – have created unusually deep unease within Grangemouth about the company's safety. More than ever previously, public trust in BP's safety has been called into question. But this distrust did not just suddenly emerge. It fed on a longer period of growing dismay at the implications for the town of successive redundancies, which continues even now. For the first time, people in Grangemouth were questioning BP's commitment to Grangemouth as a place, and starting to recognise that it was no longer the strategically vital site it had been to the company. Distrust of safety and distrust over future intentions combined, as the following comment shows: 'with a thousand jobs already going at one petrochemical industry, we are losing safety at such a rate that it's detrimental to this town, its children, shops and facilities'.

Yet, despite this, local loyalty to BP should not be under-estimated. Its history in the town has given it a position where it still commands a degree of loyalty no other company can aspire to; BP may have found its activities and plans scrutinised more sceptically than hitherto, but the overwhelming desire has been to see its future in the town secured. The dilemma is well expressed in this comment:

'Do you understand what it's done to the hearts, minds and souls of the people of Grangemouth? Although they are very uptight about all this environmental problems and noise and that, they still don't want to see their town a ghost town.'

(GM, local politician 47)

In this shifting picture, regulators have also attracted criticism: particularly the HSE, but also SEPA and Falkirk Council. It would be hard to speak of *growing* distrust here: there has not been sufficient history of public engagement with regulators against which to judge present moods. The charge, however, has been partly of too cosy a relationship with BP and other companies, but equally that Grangemouth's residents felt excluded from anything but a token role in consultation and decision-making affecting their town. The following comments typified several along the same lines:

'I don't think HSE is working for us. I think HSE is working for the companies, they are not doing their job properly. I really don't think they are protecting people.'

(GM, resident activist 82)

'As far as I'm concerned the BP are there to do their business and the HSE are supposed to be there to protect the residents and we hear very little about it. As my dad said it seems a closed shop between BP and HSE.'

(GM, resident 83)

Regulators and regulated: perspectives on risk and safety

How recognisable would this picture of public risk concerns and trust be to regulatory authorities and the main industries? For reasons of space, we concentrate here on regulatory perspectives. Regulatory tasks for Grangemouth are divided between the HSE, SEPA and Falkirk Council (with Environmental Health, Planning and Emergency Planning). In Ludwigshafen, similar functions are divided between the state level Factory Inspectorate (*Gewerbeaufsichtsamt*) and Stadt Ludwigshafen (town council), chiefly the Environment Department and Fire Service.

In both towns, regulators professed that the smaller chemical companies tended to pose a bigger challenge than the larger and better known multinationals, the latter having both the economic and technical resources and the investment in reputation to ensure that regulatory crises were minimised. In both contexts too, there was some recognition by the external regulatory authorities of the difficult balancing act facing the local council's regulators. Yet, beyond that, there were some subtle and important differences between the two situations.

The dominant account about Ludwigshafen (at town council and federal level) was broadly consistent. BASF was widely regarded as highly responsible in its approach to

regulatory matters, and as co-operating in an open manner with regulatory bodies. Industry and regulators worked hand in hand. It was the smaller companies rather than BASF which were more likely to pose a regulatory problem, reflected in the greater number of public complaints concerning the Mundenheim industrial estate (home to several chemical companies, and the second largest concentration of chemical operations in the town). Regulation of the petrochemical industry was broadly viewed as working well, and as based on mutually trusting relationships:

'BASF has a company ethic, that means... we'll take care of things ourselves and we won't wait until the authorities come and incite us, we'll do it ourselves, we'll find a solution ourselves. And I can say that that's true... one doesn't have to threaten and pressure BASF, rather if they see that something has to be done, then they do it and there's no to-ing and fro-ing and it's done very respectably, and one doesn't have to argue much and the plans are always, or almost always, such that one can accept them.'

(LU, regulator 57)

Two intractable issues facing environmental regulation in Ludwigshafen were often highlighted. First, there was traffic volume, and the vehicle pollution generated by the massive daily influx of private cars bringing employees to work. Here BASF was criticised for its refusal to participate in the 'job ticket' scheme to boost public transport (as mentioned earlier). However, others argued that it indeed made planning sense to design transport options to suit a company employing 20 times as many people as any other. Second, there remained the still unresolved legacy of soil contamination in industrial areas (particularly Mundenheim), going back to the second world war and even earlier. In terms of both cost and practicability this was a problem which threatened to undermine major redevelopment plans in the town:

'Everything you do in Ludwigshafen is always hindered by soil contamination. It doesn't matter where you dig something up in Ludwigshafen, you'll almost always come across soil contamination. That means we're always needing more investigations into soil contamination in the town; that costs money. Then whenever you find contaminated soil, of course, it costs a far greater amount of money to dispose of... It's not just a matter of toxicity either, but also the stability of the land... Ludwigshafen is a town which has been erected on top of contaminated soil. It has to do with the fact that it was so heavily bombed, a lot of things leaked out of the chemical plants back then, but all of the bomb holes were filled with some kind of waste too... It makes the development of Ludwigshafen very difficult because it simply can't be financed.'

(LU, local politician 69)

But a more ambiguous judgement about the regulation of BASF was also guardedly suggested. Despite the strong regulatory ethos in Germany, the sheer size of BASF was seen to pose special problems for those charged with its regulation. When a city is so dependent on one industry and one employer, environmental regulation of that industry becomes more than usually a matter of careful negotiation. A second difficult issue in regulating big business was that the resources available to both parties engaged in this negotiation were recognised to be imbalanced. The key dilemma was this: how could regulatory authorities, comparatively under-resourced, maintain oversight of a corporation which possessed all the necessary expertise to do the task more effectively itself? To differing degrees, some regulators voiced unease about this unequal relationship and the way it worked in practice as well as about the capacity of, and

resources available to, regulatory authorities. BASF was too vast and powerful a corporation, it was suggested, to make adequate external regulation wholly realistic. While the Factory Inspectorate approach to the issue was to dedicate an entire department to BASF alone (matching the department within BASF set aside for handling regulatory matters), Ludwigshafen Council lacked the resources to do other than rely a great deal on information and guidance with interpretation provided by BASF. While some we spoke to accepted this reliance on BASF as a practical solution, there were others who argued that in effect BASF was its own regulator to an undesirable degree. Its expertise had also led to a situation where BASF contributed advice and guidance in the regulation of the town's smaller chemical companies – again, a situation which was often seen as an unambiguous advantage for both the town and the companies concerned, and in BASF's own interests, but which more sceptical regulatory voices tended to question as undesirable:

'My experience is that the authorities were pretty much swamped with their obligation. So somebody within the authorities who has to make sure that a business sticks to its limits and doesn't damage the environment naturally has an easier time if it's a smaller, more manageable operation. I mean, it's all relatively simple. And if it's a large operation like BASF or Höchst back then, then it becomes very, very, difficult... they [regulators] have the feeling that they're inferior. And large industries aim to evoke that feeling.'

(LU, environmental engineer 36)

'I have to be entirely honest – our equipment is to some extent antiquated... I also think that if we had a few more people then there are some interesting things that we could certainly be doing together... a one-man show like we've got here and the combined expert knowledge there, of course it makes a difference... Of course I'd rather we had more tools to hand in certain places... Most of all I wish there was more expertise and specialist knowledge within the civil service, in supervisory authorities, or that we'd consider other ways of being able to install an additional monitoring instrument outside of this big industry, and I can only do that if I approach them with a similar level of expertise.'

(LU, regulator 54)

Interestingly, the wider public hardly featured in these assessments. It was not as if the public were disparaged as a problem or identified as raising problems which complicated the task of regulation. Regulators rarely referred to them at all. Just occasionally, a sense of 'if people really knew' surfaced, one instance being in relation to what was privately acknowledged as a flawed response to an accident at BASF in May 2001, when emergency response procedures were shown to have some serious weaknesses. There was also little reference by regulators to the press. Essentially, in a context of considerable public trust, regulatory relationships largely came across as a closed circle linking industry, regulators and the local authority.

Yet the public are evoked, at least, when regulators engage with politicians. For these politicians in turn are answerable to an electorate whose main concern in Germany today is employment. This provision of jobs at a time of rising unemployment is a source of considerable influence which impacts in various ways on the role of regulators:

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'The trend is so clear that if in doubt we approve something, especially at a time like this, when the job situation is such a hot topic, something like this would definitely be approved.'

(LU, environmental engineer 36)

In Grangemouth, as in Ludwigshafen, the dominant regulatory account stressed the good co-operation with the main chemical companies, BP included:

'Yes, I would praise them [BP] or being one of the most open companies I have dealt with.'

(GM, regulator 74)

'We have had excellent relationships with BP refinery and BP chemicals over the years.'

(GM, regulator 40)

Yet in parentheses, so to speak, there were qualifications expressed to this picture, just as there were in Ludwigshafen, and largely in relation to BP: criticisms of its recent safety performance and wider safety culture:

'If you go into the web site you will see their safety, health and environment policies and they are all very well written. If they deliver on those they shouldn't be having incidents. So clearly my concern is that BP does not deliver on its fine words and...I think they recognise it themselves. It is all very well writing these things down, but at site level it has to translate into managerial action, workforce action... The phrase we would actually use is "actions speak louder than words"... I think they have now recognised the linkage between reliability, availability and safety performance. But I don't think they recognised that before.'

(GM, regulator 74)

Unlike the Ludwigshafen situation, however, regulatory authorities appeared less daunted by the resources and expertise of the main companies, BP included. The perception was that regulatory tasks were negotiated from a position of relative institutional parity. But perhaps the biggest contrast with Ludwigshafen was in relation to regulators' perspectives on the wider public and the role of the local media. While these were notable only by their absence in the German regulators' accounts, they featured prominently in the Scottish case:

'To satisfy the local community in a lot of cases we would need to be there sort of 24/7 almost. At least in a kind of an analysing and monitoring emissions capacity, I mean, and even then I'm not sure whether they would truthfully believe us.'

(GM, regulator 72)

Certainly in recent years it is arguable that the more difficult task facing Grangemouth's regulators has arisen from rising public disillusionment and a new insistence by local residents on being heard. This is something their Ludwigshafen counterparts have not had to face. Regulators' views about the Grangemouth public's general level of understanding of environmental risk issues could be unflattering (a familiar finding in environmental literature). Yet interestingly, considering the often tense relations between the public and regulators in Grangemouth recently, there was also widespread acceptance, indeed defence, of the increasing policy emphasis on 'transparency', of good

communication between regulators and affected communities, and of the importance of consultation:

'We do have a difficulty in what people perceive we do, so what I try to do to address that is be much more up front and be much more engaged with the public through these meetings... I think that is better done face to face, if you like than it is by people reading web sites.'

(GM, regulator 74)

Green politics and environmental activism

Associated with the contrasts outlined earlier, forms of environmental activism in the two towns show marked differences; and it has been Grangemouth, not Ludwigshafen, which has witnessed greater activism and campaigning in the recent past. In Grangemouth, national environmentalist organisations and initiatives have not to date had a high profile. The immediate natural environment (for instance ecologically important local mudflats) has not figured highly in local concerns; while organisations like Friends of the Earth or Greenpeace have been viewed with more suspicion than enthusiasm, and rarely as possible engaged as allies in a coalition to challenge unwelcome developments.

Yet the recent mood of distrust of industry and public authorities has fuelled an assertive local environmental response. Short-term campaigns have resisted unwelcome chemical storage planning applications (notably involving a company called Simon Storage); but there has also been local pressure on planners and regulators to permit proposed developments which would diversify employment in and around the town. Local opposition has been greatest where a company has lacked an association with the area, and where new jobs were likely to be negligible in number, stoking fears of the town being labelled a chemical 'dumping ground'. In the words of one individual involved in the opposition to plans for a chemical storage facility:

'They felt that enough was enough... decisions have been made without involving them... I think people felt they needed to have a voice and have their say.'

(GM, local politician 80)

Or in the words of two others, evoking the bleak future prospects that recur in many pessimistic comments and asides:

'If Simon Storage came to Grangemouth, the last person out the town would be as well to switch off the lights and lock the doors because Grangemouth would be finished.' (quoted in Grangemouth Advertiser, 20.2.02)'

'We were the big boys to start off with, but we're nothing now.'

(GM, resident 31)

The bitterness also reflected anger at the way that a once booming town of highly skilled jobs and good infrastructure had so rapidly seen its economic fortunes plunge downhill ('from boom town to doom town' in the words of one man). The minutes of one meeting summed up public attitudes:

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'Chemical industries in Grangemouth are a national asset but a local cross to bear... [The people] do not want any more chemical developments – Grangemouth is not a dumping ground... National interest shouldn't prevail over local needs – Council should stick up for local needs.' (Minutes of a council workshop on reformulation of local plan, n.d)

Another remark harked back to a long-standing grievance that revenue from Grangemouth's industries went to Falkirk Council, whereas prior to local government reorganisation in 1973 this revenue 'belonged' to Grangemouth:

'Grangemouth itself doesn't benefit... Falkirk is getting all the benefits. So naturally they are not caring what comes to Grangemouth... would it not make sense that we should have some of the benefits?'

(GM, resident activist 82)

In the discussion around the planning application for the chemical storage facility mentioned earlier, Grangemouth's self-image as nowadays distinctly disadvantaged was affirmed by reminding others that residents of any of the 'hosh posh places up the braes' just a few miles away were unlikely to be confronted with such facilities being introduced on their doorsteps. A similar effect could be achieved in a more abstract way by asking rhetorically which places became 'dumping grounds', as this vocal opponent did:

'So where is the stuff coming from? They are telling us they are going to be bringing ships in. Where's the ships coming from? It's not going to come from the end of the BP dock, you know, so where's the ships coming from? From countries that will not allow that stuff to be stored. Companies abroad say, "Oh there's Britain". And I always say that Scotland is the most beautiful dumping ground you've ever seen. Go round about Scotland, it's a tip. What's Grangemouth? A dump!'

(GM, resident 60)

These comments reflected an increasingly vocal articulation of views about the inequitable distribution of risk burdens (echoing some of the language associated with the Environmental Justice Movement in the USA). Linked to this, a sense of the stigma associated with place had become a major issue for many people in Grangemouth. Not only were the penalties of pollution and risk distributed unfairly; this unsatisfactory state of affairs was further compounded by the negative reputation the town acquired as a result.

Some also linked the willingness to challenge claims about safety and security in the town to a wider cultural change:

'I think it's just growing awareness...people are seeing TV and media coverage of environmental problems increasing tremendously...people's concern is changing dramatically.'

(GM, council official 33)

'People are more critical now, they don't always accept things...Ten years ago people were more ready to accept things. I think we now live in a society right across the western world where people are happier to complain, they know their rights. Especially when people own their own houses they are more protective of it, and in

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general we just live in an age where people aren't frightened where we once were of picking up the phone and making their views known.'

(GM, local politician 55)

Despite the strength of the Grangemouth opposition to the Simon Storage application, most siting issues in the town in reality provoked an awareness that there were options lying between outright rejection or willing acceptance. Even in relation to chemical storage, there were degrees of antipathy: for instance, part of the resistance was to the exact location selected, rather than an outright rejection of what would not have been the first chemical storage facility in the town.

These reactions have no parallels at present in Ludwigshafen, and the contrast clearly reflects the different futures residents in the two towns imagine. Ludwigshafen has its own Agenda 21 organisation, an umbrella within which several small conservation groups are active, with some divisions among environmentalists along generational lines in ethos, expectations and attitude to the chemical industry. Litter campaigns, recycling, energy saving, transport issues, the 'greening' of the town and global issues like the Rio or Kyoto summits – all were issues engaged by local activists during fieldwork, in marked contrast to Grangemouth. But capturing the interest of a wider public audience for environmental issues or environmentalism was seen as much harder than in, for example, Mannheim or Heidelberg. And the one issue skirted around was the chemical industry's presence, again in contrast to Grangemouth. The few activists voicing criticism of chemical industry environmental impacts and safety conceded that they faced an uphill struggle to be heard in a town where trust and pride in the industry, and above all BASF, has been so strong:

'I can remember very well a works councillor at a chemical factory saying "wherever it stinks, we're well off, wherever it stinks, we're earning money, we've got work". And let's just say, everyone who fought against environmental pollution was always a potential "job threatener".'

(LU, local politician 69)

'You can notice the dependency on the chemical industry. A lot of people work there. And those who don't work there identify with it in a way. They say, well, we have to live from it... when it came to the topic of chemicals, it was, well, it was almost impossible to win anybody over in this respect... What are you going to say to a worker who stands around in a factory all day where there are toxic fumes, which he has to live off? The people have to live from it.'

(LU, resident activist 64)

The emphasis BASF itself placed on promoting its own environmentalist credentials has made it even harder for critical voices to be seen as credible. Indeed, some Ludwigshafen environmentalists argued that it was more important to engage BASF and other companies in dialogue around the profitability of sustainable development than to adopt a position which closed off the possibilities of dialogue:

'The relationship between BASF, the Greens and the environmental movement has changed massively. All the sustainable care stories [i.e. BASF's own appropriation of the language of sustainability] going on at BASF, they didn't exist 20 years ago, and the energy efficiency and so on.'

(LU, local politician 69)

That major chemical companies in Ludwigshafen now work together with environmental groups was unthinkable even 10 years ago, even if some activists remain sceptical about chemical industry motives for such collaboration. Yet, as one activist acknowledged: 'Anyone who does politics in Ludwigshafen and doesn't think that BASF has any influence on things, they would fail fairly quickly'. The BASF complaints hotline illustrates one of the difficulties critics face: for critics, this was an effective way in which BASF ensured that potentially damaging complaints were handled internally and adverse publicity minimised; yet the majority of residents tacitly accepted the company's own presentation of the facility as a laudable case of responsiveness and local sensitivity. Nonetheless, despite jobs and services being the crucial consideration, many acknowledged that a shift in expectations and values was taking place in the town, in which the former tolerance of pollution was increasingly untenable:

'And consciousness is different as well. I think that it's the new generation that doesn't think of the Rhine as their rubbish bin, rather a place they'd like their children to be able to drink from. That's the difference. The whole direction of thinking has changed across the whole of Germany, almost the entire world, which has led to their quality of life no longer having to suffer at the hands of the chemical industry as much. I don't think that it could've gone on the way it was before.'

(LU, manager 10)

There was another level at which quite different environmental narratives nevertheless alluded to a shared preoccupation with issues of identity, belonging and exclusion. In Grangemouth, the activism and campaigns mentioned above embodied a wholly self-help spirit, and reflected a somewhat defensive, beleaguered outlook, in which the world 'out there' – Falkirk Council, and above all Edinburgh with the HSE, SEPA and the Scottish Executive – tended to treat Grangemouth unfairly. The activism described had a strongly David versus Goliath flavour. It defined who belonged and who did not, a distinction echoed also in relation to chemical companies ('insider' and 'outsider' companies). Whatever the criticisms levelled against BP in recent years, it unambiguously 'belongs' – in contrast to some smaller 'outsider' companies now regarded as seeking to exploit the town's decline in fortune.

Quite a different play on belonging and exclusion emerged from the Ludwigshafen study. There, norms of cleanliness, hygiene and household refuse disposal, presented as uniformly adhered to by the 'German' population, were drawn on to exclude and marginalize the 'non-German' community. While interviews with 13 immigrants from six countries elicited very similar responses regarding perceptions of pollution and strategies for managing waste, the non-German community in general were frequently perceived by German respondents as not 'caring' for the environment and, in particular, not conforming in separating household waste. Thus explicit judgements about environmental pollution became translated into implicit judgements about people who did not 'belong' to the same degree. Environmentalists drew attention to this exclusion, yet ironically sometimes reproduced the same underlying assumptions:

'You'll barely find a foreigner who really deals with environmental issues. They have a lot more personal problems, keeping their jobs, school, language, relationships with German residents and so on as well. And anyway, even the countries of origin themselves, they have less to do with the environment than here anyway.'

(LU, resident activist 64)

'One also has to see that they've already taken a risk by leaving their own home and coming here just to earn money, and you can't expect them to become critical towards their employer.'

(LU, resident activist 63)

Yet such perceptions were challenged by Turkish residents who had grown up in Germany. In the words of one:

'I believe I have the same views because we grew up with Germans. Then it develops automatically, 80% let's say, the same opinion of it I'd say.'

(LU, resident 53)

Ludwigshafen is far from unique in this respect, but the issue has nevertheless arisen there with particular strength given the combination of the town's industrial character and a growing disparity between the more affluent suburbs and the neighbourhoods close to industry where much of the Turkish community, as well as more recent arrivals, have settled.

Communicating about risk: dialogue between stakeholders

So far we have given priority to the perspectives of the public and to some extent to regulators, while alluding to industry and the media. Clearly the local 'conversation' around environmental risk, which our research sought to encompass, went wider still. In this section we illustrate some of the opportunities for dialogue, the difficulties such dialogue throws up, and the part played by both the press and the local councils in shaping or reflecting that dialogue.

Central to all this is industry itself. Not surprisingly, the larger companies play a major part in steering and monitoring the local conversation about their activities, and actively endeavour to inform and reassure their local publics about the benefits and safety of their presence. The permanent exhibition in the BASF Visitors Centre in Ludwigshafen aims to do just that, and reinforces the notion that the corporation has put the town 'on the map'. The public relations effort that goes into sustaining company reputations and credentials *locally* is considerable, but what comes through repeatedly is that the task is harder in Grangemouth than Ludwigshafen, the local audience less ready to take on trust company claims. Air quality is one of several issues around which debate takes place, and frustration is evident in the following comment by a BP executive:

'We are almost victims of our own success as far as the air quality is concerned, because when I started here flares were flares and they were smoky and they were smoky every day because that is what a flare does. So people were used to seeing a smoky flare... We have worked so hard to get a clean environment around about here that when you do get a smoky flare it is an exception – and people say, "What is happening here?" And you can't say, "You should remember the bad old days", because people are entitled to clean air.'

(GM, manager 29)

Chemical and petrochemical companies are now expected to be much more accountable than in the past to various stakeholders, including those who live alongside their factories. In both towns this has led to the creation of organisations in which face-to-face contact between industry and local representatives can in principle take place. Sceptics have doubted whether such forums are ever likely to be more than a token nod towards principles of openness and accountability, suspecting the semblance of dialogue without the substance. That said, in Grangemouth at least, recent public disillusionment runs so deep that no forum can now guarantee BP or any other company a critic-free dialogue. The Area Forum, the Community Council and a number of company-community Liaison Groups provided three contexts in which public debate around company intentions and popular concerns was possible. The Liaison Groups provided for this most directly, albeit on terms set largely by the major companies which created them: BP, Avesia and Syngenta. Members were well aware that critics readily dismissed them as public relations window-dressing by the companies, 'a dead duck in the water' in one phrase. That suspicion was reflected in the following remark:

'There's a favourite phrase used by one of BP's senior people... who's basically got an attitude that as long as you give people their turn, as long as you give them a hearing, as long as you go along to a meeting with them, it's okay, you don't actually have to do anything about the fundamental grievances.'

(GM, local politician 77)

Yet there was also a perception within Grangemouth that, whatever its limitations, the BP Liaison Group was the most open of the Industry Liaison Groups and witnessed the most vigorous exchange of views. Neither the Grangemouth Area Forum nor the Grangemouth Community Council provided for *direct dialogue with* industry, though meetings often included agenda items generating *discussion about* industry. However, face-to-face dialogue with company representatives might occasionally take place, and the Community Council was the body which organised special open meetings about particularly sensitive planning applications. (On the business of engaging the public in environmental policy, there is an extensive literature now: see for example Burgess and Harrison 1998; Walker 1999; Owens 2000).

By contrast in Ludwigshafen, there was not the same range of forums where such engagement between the public and their local industry was feasible. The one exception was the Neighbourhood Forum set up by BASF (and latterly being copied by one or two of the smaller chemical companies) – the equivalent of the Liaison Groups in Grangemouth. But Dr Bell was not permitted to attend the Forum, on the grounds that members were only likely to speak freely if the confidentiality of discussion at meetings was assured. As in Grangemouth, we discerned both acceptance and cynicism about the company's tight control of the forum, though in contrast to Grangemouth acceptance was far more widespread. A longstanding critic knew well that he was in a small minority when he suggested 'It's to take care of their image, it's just to say, look how good we are, we're tolerant, we're transparent, we talk to everyone, we're open to criticism and we make an effort to get rid of nuisances'. (LU, activist 65)

It would be a mistake, however, to infer from this any casualness on the part of BASF towards its image and reputation: 'The bigger a company, the less it can afford, BASF can't afford to seem destructive towards the environment. It just can't.' (LU, local politician 23) Noting that the smaller chemical companies in the town cannot invest in environmental engineering as BASF do, the same individual added: 'safety- and quality-

wise, what they [BASF] have built there, you have to admit that a smaller company could never afford what they can'. A regulator stressed more the public relations effort:

'The chemicals industry here in Germany has a tough time of it. And if they're clever then they'll communicate and try to win back people's trust. Some areas do that in a very intelligent way... They've learnt how to do it, they've hired experts in communication and psychology, they've attended coaching seminars with a vengeance. They've learnt a lot. They've invited Greenpeace on site and have told them, "Come in, you can have everything we've got."'

(LU, regulator 8)

In this business of representation, the press plays a key part. We limit discussion to four newspapers: in relation to Ludwigshafen, the *Rheinpfalz* and the *Mannheimer Morgen*; in relation to Grangemouth, the *Grangemouth Advertiser* and the *Falkirk Herald* (both published weekly). The two German papers are more like regional papers than the two Scottish ones (while the *Grangemouth Advertiser* is a 'free' paper with the narrowest distribution of the four); but all four count as immediate local sources of news. The two German papers make a revealing contrast. Ludwigshafen's daily newspaper, the *Rheinpfalz*, was much less likely to take a critical line about the chemical industry, and above all BASF, than its Mannheim equivalent. One example may illustrate this. After an explosion at BASF on 21st May 2001 (shortly before our fieldwork started), causing the alarm sirens to be sounded for the first time since the second world war, the *Mannheimer Morgen* had twice the coverage of its Ludwigshafen counterpart, and maintained coverage of the incident for longer and more critically. The incident highlighted the political sensitivities surrounding media reporting within Ludwigshafen. The following comparison provides an insight into how the two newspapers were seen within BASF:

'The *Rheinpfalz* works along with us, with the *rheinneckarweb.de* as well. And naturally the *Rheinpfalz* knows us very well and the employees here as well and they work together as a paper orientated towards employees. It's a bit different with the *Mannheimer Morgen*. The *Mannheimer Morgen* doesn't see itself as an employee paper for BASF, rather the *Mannheimer Morgen* sees BASF as one of many large operations. They feel it's their duty to be scientific reporters, not employee-orientated reporters. The *Rheinpfalz* see themselves more as there for the employees... So we have a very close relationship with them, naturally because a lot of topics which are in the *Rheinpfalz* have to do with BASF. In other words, if BASF wasn't in Ludwigshafen, then it would be totally boring here.'

(LU, manager 26)

In Britain, local newspapers are often criticised for their reporting, but both the local papers for Grangemouth received approving comments alongside the criticism. The more interesting case was that of the *Grangemouth Advertiser*. Where there was a 'settled' view about the *Falkirk Herald*, which was widely seen as reporting little that might upset BP (echoing the *Rheinlandpfalz* in Ludwigshafen), the *Grangemouth Advertiser* attracted a wide range of views, from the scathing to the approving. Our impression would be that this paper has gradually changed as the local community has changed, its reportage reflecting the shift towards an ever more sceptical attitude concerning BP on the one hand and new planning applications on the other. Critics argued that it had always been little more than a mouthpiece for BP and Grangemouth's industry more generally: 'It's a propaganda sheet for BP at the moment' typified such views. But others defended it with a vigour surprising for such a paper. The arguments in its favour tended to emphasise how it was the town's 'own' paper (relating to Grangemouth and not to Falkirk), and above

all how it took seriously residents' concerns and did not make light of the predicaments facing the town. Furthermore, for every critic who derided it as a corporate mouthpiece, there were others, including BP managers, who were periodically angered by what was perceived as its hostility to BP. The following comment by a regulator paints a picture of the cosy relationship that critics of both papers decry, illustrating too the unpredictability of dealings with the national media:

'I mean BP and the *Falkirk Herald*, *Grangemouth Advertiser*, they, you know, they speak to each other every week. They are well known to each other. Whereas a report that goes out to one of the national papers, it basically comes as a complete surprise to the refinery. Therefore they then have to do their own investigations as to where the report came from, whereas if it's in the Herald it's probably been discussed beforehand, and the report will say here we have this information and BP responded this. So that you know it's all reported accurately in the local papers whereas in the national papers it can be completely fictitious.'

(GM, regulator 40)

However, the next remark comes from a local environmentalist appreciative specifically of the Advertiser's reporting of industry issues:

'[The Advertiser] followed a lot of campaigns and a lot of incidents. It's not easy writing bad news stories... over the years [journalist's name] struck a sense of balance in the community... delivers bad news with sensitivity but factual and straight to the point...not the stuff of tabloid journalism.'

(GM, environmental activist 78)

In all this, the two councils, Falkirk and Ludwigshafen, have what their staff saw as a delicate balancing act to perform. At one time, the requirement to support industry and the obligation to reflect public concerns would rarely have clashed (or been allowed to clash) in single industry towns like these. 'Dancing to industry's tune' would have served public expectations also. Matters are much less straightforward now, particularly in a town like Grangemouth. Moreover, what one official referred to as 'the Grangemouth dilemma' alluded to a particular problem in attracting inward investment. Grangemouth's industrial base and existing infrastructure should help attract new chemical or petrochemical investment. Yet the residents of Grangemouth are, as we have seen, increasingly reluctant to be used as a convenient location for chemical developments unless a sizeable number of jobs are also created – and to date such new employment opportunities have not been forthcoming. Many would prefer a measure of economic diversification, to avoid such reliance in the future on the industry that has created the town's identity. Yet, as we have also seen, health and safety concerns have tended to block investment options which might have received a welcome. The dilemmas are recognised in this reflection:

'You are always in the cross fire in that situation. Because on the one hand chemical companies will think you are being terribly unhelpful... They are looking for the Council to be nice to them, and so if we go challenging this and challenging that, whereas the people on the other hand feel that the chemical industry is [given] an easy ride off all the regulators... That's the trouble, if you are being fair and down the middle you get caught in cross fire... If you go on all the web sites of the companies, they always talk about, you know, we have a licence from the community. And I mean I'm sure that's right. They do. And basically I think, in Grangemouth, you know, there's a move to renegotiate that licence... And it means from the Council and Health and Safety and other regulators, we've got to strike a much harder bargain... And that's

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going to be quite a difficult one to pull off...politically we just can't roll over and get our tummy tickled by the chemical companies any more, we need to be fairly critical of what they are up to and making sure that they address the concerns.'

(GM, council official 64)

It is precisely that licence from the community that distinguishes the two places. So many in Ludwigshafen still gain employment from the chemical industry – and, just as important, see a future in it also. The pressure to renegotiate it has thus not arisen there so far. We say 'so far', because that may be changing: both because of changes within BASF (notably its increasing use of sub-contractors and the declining sense that employees have a job for life), the sharp fall in Ludwigshafen Council's revenue from the chemical industry, and the consequent cuts to once well regarded public services. Even so, the council, like the residents and the local press, is only too aware of its unusual dependency on one company and the need for sensitivity to it. In the words of one local politician, and notwithstanding the declining tax revenues:

'We live from BASF, the whole time...You can do the maths...at the end of the day BASF is something we can't do without, whether it stinks, or smells, or is loud.'

(LU, local politician 23)

A regulator described the dependency of the town, and the potential ambiguities of the relationship between the council and the company, like this:

'I think that the relationship between the officials and BASF is good. Whether it's good for the city or not, I don't know. It's taken care of, the relationship. One isn't upset with the other. BASF doesn't let them see what's up their sleeve, and the city is always ready to make a compromise. That's how I see it.'

(LU, regulator 41)

A corollary of this relationship between town and industry, and the deep vein of public trust we have described, has been a highly paternalistic style in local government. A similar style might well have been apparent still in Grangemouth were it not for the recent public resistance to being 'spoken for': it certainly does not survive now. This paternalism can be seen in a reluctance to communicate with the public about possible risks any more than is deemed strictly necessary. Assurances of reliability and safety have been trusted for so long in Ludwigshafen, and have been 'proven' in practice over so many years, that there is little pressure or incentive to change a tried and tested formula. The following comment by a local politician illustrates discomfort at unsettling people, or creating anxieties unnecessarily, by too much discussion of risk issues. Moreover, judging by some comments from individual members of the public to whom we spoke, a good many would agree:

'What is the consequence? Fear rises. It hasn't helped anybody. And that's why it's important that information regarding such incidents is dealt with, a reasonable amount of justice has to be done to the matter. On the one hand you have a duty to inform people, but you ought to avoid bringing on hysteria, because I'm worried that for some people such environmental discussions [affect] their psyche; we cause more psychological than purely physical suffering.'

(LU, local politician 47)

5 Conclusion

If 'risk' was our starting point, what has emerged from examining it in specific industrial contexts, contexts moreover in which the industry has a long history? A vital observation is that risk can only be understood in Grangemouth and Ludwigshafen alongside consideration of trust and obligation (the assumed social contract between town and industry). To consider risk in isolation would distort how people themselves dealt with it in daily life. Although risk was a familiar notion, it was not the idiom most readily adopted in expressing attitudes in either town. Trust, safety, security, familiarity, loyalty and obligation were not alternatives to talking about risk but rather the cognitive frame within which people chose to talk about it (Wynne, 1996; Szerszynski, 1999). Judgements about risks, narrowly conceived, were coloured by the wider picture of corporate responsibility and commitment to their town that people affirmed amongst one another (Irwin et al., 1999). That applies equally to both our towns, even if the dominant narrative in Ludwigshafen expresses much greater confidence than in Grangemouth. Moreover, our research suggests that the link between transparency and trust is more complicated than is often supposed. Trust does not appear to be an automatic result of transparency. Corporate transparency may create little trust while, conversely, a relative lack of transparency may not on its own hinder an enduring sense of trust, if compensated by familiarity, a public belief in a company's responsiveness and willingness to acknowledge long-term local obligations, and some degree of economic security.

At first sight we appear to face a paradox. If environmental risk issues have indeed generally aroused greater concern in Germany than Britain, we might have expected to find a more sceptical attitude towards the chemical industry and even its regulators in our German research. We might equally have expected to find a stronger environmentalist lobby making its voice heard about the risks posed by the chemical industry. Yet that has not proved to be the case. Whatever the many similarities between these two industrial towns, scepticism and distrust of both industry and regulatory authorities have emerged as stronger in Grangemouth. In Ludwigshafen, trust in BASF and regulatory authorities has stood out. Environmental politics in the two places has broadly echoed this picture. Grangemouth's 'conversation' about environmental risks has thus been both more anxious and more bitter than Ludwigshafen's. But this seems to be a recent development in Grangemouth, with the past decade having magnified public insecurity about the town's economic future as well as its safety. Whereas people in Ludwigshafen tended to emphasise the improvements occurring over time, people in Grangemouth were likely to stress the opposite – despite agreement in both places that industrial pollution had greatly reduced. Contrary to what might have been expected, therefore, environmental risk has been a more sensitive and politicised issue in Grangemouth than Ludwigshafen.

Yet this is not quite the paradox it may appear to be. Towns still dominated by a single historic industry are nowadays rare in northern Europe, particularly those the size of Ludwigshafen (Byrne, 2002). Its industrial culture has nurtured a tacit public sense of the town's unusual character, which has come partly from an expectation of an implicit social contract binding the town and its main employer. Public tolerance, familiarity and trust have consequently been powerful enough influences to deny much local legitimacy to risk concerns about the chemical industry. Yet, if this has made Ludwigshafen an unusual

town in Germany, it should also be noted that until recently similar values and assumptions were evident in Grangemouth's risk culture too, and for similar reasons. That has now changed dramatically, in the space of a few years, with a profound shift that has seen trust decline in both safety regimes and corporate intentions, and risk concerns gain in both local credibility and legitimacy. However, there is more to this than a contrast between a Grangemouth experiencing radical change and a stable Ludwigshafen. For Ludwigshafen is also a town in flux, socially, economically and politically. The once dominant risk culture, epitomised in the proud title 'BASFler', is becoming less influential and, gradually, open to challenge in a way that is new to this particular town. From this perspective, the imagined social contract between town and industry is increasingly being put in question in both towns, as the pressures of a globalised economy take effect.

We have pointed towards the complexities of translation in the context of our work in Grangemouth and Ludwigshafen. In some cases the mismatch of translations itself may point towards potential cultural differences in attitude to concepts underpinning perceptions of environmental risk. One important example concerns the 'precautionary principle', translated from the German *Vorsorgeprinzip*. The precautionary principle has been described as a culturally framed concept that takes its cues from changing social conceptions about the appropriate roles of science, economics, ethics, politics and the law in pro-active environmental protection and management (O'Riordan and Cameron, 1994). The term is said to have entered the English language during the early 1980s, having been applied for the first time to environmental policy in the 1970s (Boehmer-Christiansen, 1994). The stronger footing of the *Vorsorgeprinzip* within German legislation and culture compared to that of the precautionary principle in UK legislation and culture may in turn have influenced the way risk is conceptualised and communicated by regulators and residents in Grangemouth and Ludwigshafen. In particular, we hypothesise that the more qualitative, contextual approach of the *Vorsorgeprinzip* may facilitate an easier dialogue about risk in Germany, compared to the more quantitative approach to precaution that has formed the basis for environmental legislation and regulation in the UK.

We end by reference to the distinction between the perspectives of *adaptation* and *impact* in looking at burdens in people's lives. Prout et al. (1999) have discussed how accounts of chronic illness which emphasise adaptation appear very different from those which emphasise impacts. This distinction also illuminates the business of living with environmental risk. 'Adaptation' by definition plays down the significance of risks, with its emphasis on the 'ordinariness' and 'normality' of exposures – the normalisation of risk. 'Impact', on the other hand, highlights the costs of risks, with its emphasis on human vulnerability and the difficulties in attaining such perceived ordinariness and normality. It is not hard to see that in Ludwigshafen the perspective of adaptation remains the common currency of everyday life. In Grangemouth, the last few years have undermined what was previously a similar emphasis on adaptation. However, as the former social contract is perceived as weakening, a new stress on impact has recently become both more apparent and, for residents, more persuasive, as the balance of costs and benefits has shifted in public estimation.

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Appendix 1

Characteristics of individuals interviewed in Grangemouth and Ludwigshafen

Interviewees	Grangemouth	Ludwigshafen
Residents	43	47
(non-German residents – Ludwigshafen only)	–	13
Chemical/petrochemical managers	9	12
Chemical/petrochemical employees	5	5
Chemical/petrochemical ex-employees	11	13
Subcontractor ex-employees	4	–
Trades Union/Works Council officials	2	3
Politicians/elected representatives	9	4
Local Government officials (excluding regulators)	9	5
Environmental regulators	7	8
Health professionals	7	5
Environmental/community activists	4	10
Journalists	2	3
Men	60	45
Women	26	33
Total	86	78