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Marilyn Aronoff
Major professor

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RISK PERCEPTIONS AND ENVIRONMENTAL MOBILIZATION – TRACKING THE TRANSFORMATION OF COLLECTIVE ACTIONS IN A RADIATION CONTAMINATION INCIDENT IN TAIWAN

By

Shu-Fen Kao

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ABSTRACT

RISK PERCEPTIONS AND ENVIRONMENTAL MOBILIZATION – TRACKING THE TRANSFORMATION OF COLLECTIVE ACTIONS IN A RADIATION CONTAMINATION INCIDENT IN TAIWAN

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Shu-Fen Kao

Variation in public responses to the environmental hazards associated with humanly produced disaster agents revealed in the environmental sociology literature makes further investigation of theoretical gaps in the existing literature critical. These gaps include examination of micro and macro level factors that shape people's risk experiences of environmental insults, as well as their responses to such environmental grievances. A more integrative framework is essential in order to account for variation in responses and to enhance our understanding of social experiences of risk and their interplay with the broader social, cultural and institutional contexts.

This dissertation employs such an integrated framework – social amplification of risk – to study the incident of Cobalt-60 radioactive contamination in residences in Taiwan. Here, local collective actions were only briefly resident-driven and the broader movement was subsequently dominated by activists who had never been directly impacted. The author utilizes a qualitative case study that draws upon in-depth interviews and analysis of documentary data to investigate the Taiwan case. The endeavor is to examine the interplay of various factors, such as social stigma and trust (or mistrust) of the risk management institutions, with the experience of risks and risk-related behaviors, as well as their influence in shaping the emergence of the collective activism in response to the chronic residential radiation contamination.

The accounts of varied risks perceived by a number of key actors are described. Collective actions on the local and national levels and their transformations are discussed. In addition, the analysis examines how individuals, environmental activists, and governmental institutions select certain risk information, communicate with others and subsequently shape the public's ongoing interpretation and collective responses towards the event. Social stigma and contextual factors, the characteristics of the contamination agent, and differential remedy policies are presented to explain why, while people experience similar risk concerns, some have not taken collective actions. Findings from this study serve to fill gaps in the current environmental sociology literature and especially to account for why in some settings, such as the Taiwanese case, grassroots activism is at best limited and short-lived.

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CHAPTER ONE

INTRODUCTION

Divergence in the Environmental Sociology Literature

The literature on the environmental social movements, based largely on studies in western society and particularly in the United States, argues that the toxic waste movement has been emerging as a new type of social movement over the past two decades (Brown & Masterson-Allen, 1994; Szasz, 1994). This type of activism arises from working class and lower middle class people's responses toward their direct experiences of disproportionate shares of society's environmental threats in their local communities (Bullard, 1990; Brown & Masterson-Allen, 1994; Morrison & Dunlap, 1986). Unlike other environmental social movements, such as the conservation movement, this one is not characterized by national organizations, but is highly decentralized and composed of thousands of small community-level groups whose approach is based more upon direct local actions than on lobbying.

In addition, in some cases, movement concerns had expanded from direct responses to localized environmental degradation, to a wider set of environmental issues such as food irradiation, electronic pollution and global warming, accompanied by an increasingly comprehensive critique of modern economic production and political power distribution (Szasz, 1994). Emerging at the community level, these entities go on to challenge the status quo of business and corporate dominance and dispute the scientific criteria for assessing risks reflected in their direct experience of technologically-based hazards (e.g., toxic chemical contamination or nuclear accident / radioactive contamination). Consequently, this movement demands more public participation in

decisions about the uses of technology and its development and, therefore, promises to promote a revival of democratic institutions (Glazer & Glazer, 1998).

Findings in another branch of the environmental sociology literature, however, raise questions about the uniformity of local responses that had been claimed in studies of the grassroots environmental movement and challenge researchers pondering the extent to which this local activism might transform social, economic and political structures. This branch of literature is based on studies in other communities confronting chronic technical disaster (CTD) caused by humanly produced hazard agents, such as toxic chemicals and radiation. It emphasizes the inherent ambiguity of the toxic contamination as a characteristic that makes it necessary for social groups to have cognitive framing procedures (Couch & Kroll-Smith, 1985; Erikson, 1991; Kroll-Smith & Couch, 1991).

When local residents have different cognitive framings of the hazard and the risk, various social dramas take place that are reflected in conflicting interpretations of what has occurred, how much risk is involved, and the varied remedies required by the problems identified. As a consequence of varied interpretations of the hazard event, "corrosion" of local social ties frequently occurred (Freudenburg and Jones, 1991; Kroll-Smith & Couch, 1990). Elsewhere, studies revealed that some residents were more fearful of threats that local environmental protest might pose for their livelihood than of less tangible future health impacts (Brown & Mikkelsen, 1990; Gould, 1993; Gould et al, 1996). Moreover, even in communities which had encountered similar environmental threats, while some had acted collectively to address local concerns about health risks from toxic chemicals (Brown, 1991; Gibbs, 1982; Levine, 1982), others had not displayed a mobilized collective response (Fitchen et al., 1987; Gunter et al., 1999).

It seemed then that the severity of the particular environmental insults was not necessarily perceived as problematic and did not always lead to collective environmental activism. Even when environmental awareness arose among lower status groups, their social locations and the relative lack of resources at their disposal might be a constraint in achieving the social changes envisioned by Morrison (1986) and other scholars (e.g., Szasz, 1994). This opens up an interesting area for further investigation for researchers working at the intersection of studies of environmental sociology, sociology of risk, and social movements. For the author, initial acquaintance with a radioactive contamination case in Taiwan in which the impacted residents' responses to this chronic disaster varied from the predicted outcomes, suggested itself as the means to examine a number of key issues in the literature on environmental responses to chronic technological hazard. A brief introduction to the residential radioactive contamination incident is presented in order to emphasize the importance of studying this case, and to highlight the objectives of this dissertation research.

Residential Radioactive Contamination in Taiwan: Rationale and Research Questions for the Case Study

In the early 1980's, Cobalt-60 was mysteriously mixed into the production of steel construction rods produced for building apartment complexes. This caused more than 15, 000 people to be exposed to varied levels of gamma radiation. In the early 1990's when this incident was revealed to the public by a journalist's report, local collective actions were briefly resident-driven but subsequently the broader movement on the national level was dominated by non-resident activists. From the author's exploratory field study, it

was discovered that the public's responses to this mass residential chronic radioactive contamination exposure varied widely. The radiation contamination levels were not necessarily associated with responses from the affected people. For example, local activism emerged in several contaminated complexes which had low to high levels of radiation contamination. In addition, a couple of impacted residents whose households showed slightly excessive radiation levels had actively participated in activism on the local and national levels, while most others whose residences were affected with varied higher levels of radiation remained immobilized.

This Taiwan case suggests that the relations among environmental hazards, experiences of risk, and environmental collective actions are complicated and it is critical to investigate the dynamic interactions among them. For example, encountering similar environmental insults, why do varied groups perceive risks differently? How do various interpretations of the hazard event provide rules for individuals and / or social groups to select certain risks while, ignoring others? In addition, it is important to understand the interplay of various factors, such as social stigma and trust (or mistrust) of the risk management institutions, with the experience of risks and risk-related behaviors, as well as their influence in shaping the emergence of collective activism in response to chronic technological hazards.

The issues pointed out above and interesting phenomena in this specific radioactive disaster in the Taiwan case are crucial to the environmental sociology literature, but they have been ignored in a number of key branches of the environmental sociology literature – such as the chronic technical disaster (CTD) paradigm, the sociology of technological risks and literature on the grassroots environmental movement. Each sheds light on a

particular facet of the phenomena of public responses to technological hazards, but all have shortcomings that understate the complexity of the social responses to risks / hazards from humanly-made disasters. An integrated understanding of these societal crises, therefore, is significant in order to capture the complexity of the public's responses to risks.

This dissertation employs the framework of social amplification of risk (Kasperson et al., 1988), which seeks to accomplish this broader view, in order to investigate the incident of Cobalt-60 radioactive contamination in residences in Taiwan. Though this framework is in its formative stage and receives criticism because of the non-testability of the framework in the positivist sense (Kasperson, 1992), its analytic strength and insights which complement other approaches is valuable in interpreting social responses to risk by taking social, cultural and institutional contexts into account.

This Taiwan case will serve to identify relevant micro and macro level factors that shaped risk perceptions and social responses to environmental insults associated with technological hazards. The following basic questions will be central concerns of the dissertation. First, what are the risks perceived by different social segments of the population and how are these varied risk perceptions constructed.[1] Second, which constituencies mobilized at the local and national level and what interests and concerns underlay their activism? Third, how do risk perceptions and collective responses interact with each other and with contextual factors, such as the ecological aspects of these disasters, and / or variations in the surrounding society, culture, or polity? These questions will be addressed through a qualitative extended case study that draws upon in-

[1] "Construction" here means the process in which varied attitudes and judgments regarding risks are formed / shaped. See further explanation in the following section on A Glossary of Key Concepts and Terms.

depth interviews and analysis of documentary data to reveal the logic of varied responses emerging from this incident.

A Glossary of Key Concepts and Terms Used in This Study

Concepts and terms have their specific meanings in different studies. In order to clarify the author's approach to the empirical study in the setting of Taiwan, an overview of key concepts and terms is provided.

Environmentalism / Environmental Movement

In the United States, Mitchell (1985) has conceptualized environmentalism into two generations. The conservation movement represents "first generation environmentalism" which emphasizes preserving the natural environment. The environmental movement represents "second generation environmentalism" which focuses broader protection and remediation of harms to the biosphere or human health. In this dissertation, I use "environmental movement" in relation to this conventional usage, which emphasizes both the continuity and the differences in these movements.

Grassroots Environmental Movement

The grassroots environmental movement or grassroots environmentalism, in the U.S. context, refers to a loosely structured movement emerging from direct local experiences of environmental insults associated with industrial wastes or technological hazards. It has evolved into three overlapping but distinct levels of organization: community-based groups, regional or statewide coalitions, and national organizations. Local organizations

have constituted the foundation of the movement (Freudenberg & Steinsapir, 1991). Regardless of the strategies used by these entities, their goals are to convince government or industry either to clean up, or shut down an industry, or to abandon plans to build a new facility. The initial objective is usually to correct an environmental problem, but as the activism evolves, goals effecting broader policy change often emerge, and foster organizational expansion beyond the local base.

NIMBYism

NIMBYism stands for a phenomenon, now known as the "Not-In-My-Backyard syndrome," in which groups or communities simply reject the construction of certain facilities, such as garbage incinerators or nuclear power plants in their locality. It has been characterized as a narrow, self-interested negativism that ignores obligations to the larger society (Freudenberg & Steinsapir, 1991). Edelstein (1988), however, points out the psychosocial and the rational bases for the NIMBY response. In this dissertation, NIMBYism is defined in reference to efforts that only seek to resolve pollution problems locally, but are not concerned with any broader / global environmental issues.

Public Responses

In this dissertation, I define "public responses" as reactions from the public[2] and / or actions taken by the public over certain environmental problems. I emphasize the broader range of responses extending from individual adaptation to the problem or individual petitions or requests for assistance from the involved institutions to collective

[2] Public, here, is used as its almost always used meaning to refer to the people as a whole without specific differentiation; c.f. Edelman (1988) on "constructing the public."

protests or advocacy of policy formation to protect environment and health. In addition, these individual and / or collective responses may or may not be driven by wider environmental concerns. Individual adaptation to the problem without any collective action is also included as a public response. In this dissertation, environmental concerns include two dimensions – damages to the biosphere and / or harms to human health resulting from damage to the built environment or biosphere.

Hazard(s) and Risk(s)

"Hazards" are defined as "threats to people and the things they value" (Kate et al., 1985). Risk includes the likelihood of a hazard developing into an actual adverse effect causing loss, injury or some other form of danger (Krimsky and Plough, 1988). In this dissertation, risk is viewed in part as an objective threat of harm to people and in part as a product of culture and social experiences (Kasperson, 1992:158).

Perception of Risk

The term is used here and in the literature (c.f. Slovic, 1992) to refer to various kinds of attitudes and judgments on risks that people hold. It is used interchangeably with the terms "risk perception" and "perceived risk" in this dissertation.

The Social Construction of Risk(s)

This term is rooted in social constructionism.[3] It is emphasized that risks are not simply objectively given, but are socially defined and arise from what people perceive.

[3] Constructionist arguments reject notions of objective reality, asserting fundamental ambiguity in social relations and meaning (Berger & Luckmann, 1967; Clarke & Short, 1993; Gamson & Modigliani, 1989).

In this dissertation, it is accepted that certain entities may be dangerous in an objective sense (e.g., PCB and nitroglycerin), however, explaining how social agents create and use boundaries to demarcate that which is dangerous from that which is benign is seen as the sociologists' central task

Research Approach and Dissertation Outline

As noted earlier, the local experiences of and responses to toxic contamination are presented in fragmentary ways in different branches of the environmental sociology literature. The formation of social experiences of risk and the context in which collective actions emerge deserve further investigation in order to address several theoretical gaps in the literature. This endeavor is initiated in Chapter Two with a review and critique of theory and literature, in which I present and discuss works relevant to studying the Taiwan-based radiation contamination case. This review includes four branches of literature. First, an integrated approach, the framework of social amplification of risk, is introduced as a vehicle for understanding the social experiences of risks and the emergence of collective actions in relation to the broader social and political contexts. Second, literature on communities confronting CTD is reviewed. The third branch focuses on the sociology of technological risk, which includes literature on social and organizational factors that shape risk experiences and the social construction of risks in relation to different social interests and cultural values. The fourth branch of literature examines grassroots activism emerging from immediate local environmental contamination in the United States context.

In Chapter Three, the methodological approach taken in this study and the evolution of the research design are discussed. The qualitative techniques which were employed to gather data, and the rationale for their selection, are presented. In addition, the recruitment procedures for subject selection and the limitations discovered in expectations about the numbers of available subjects representing specific segments of the affected population are described. The explanation of such a limitation will be linked to the question of why the grassroots collective actions did not emerge in a great scale. Lastly, the process of data analysis and issues emerging from language translation in a cross-cultural study are discussed.

Chapter Four documents the historical context of the Cobalt-60 contamination incident in Taiwan. The first part of this chapter presents the political and social context of Taiwan and the rise of environmentalism in Taiwan since the 1980's. An apprehension of the broader historical context of Taiwanese society provides understanding of the social forces that relate to the emergence of the public's responses to varied environmental crises. In addition, studying the history of the discovery of this specific radiation incident is essential to learning about what factors shaped the situation under study. These historical observations are incorporated into the analysis in later chapters. The investigation does not delineate the discovery of contamination at each of the affected apartment complexes, but presents some of the significant events in the initial stage of contamination revelation. These events set up the course of later development of people's risk experiences and interpretations of the hazard events, as well as their responses to the problems. Uncertainty about the sources of the contamination generated different reactions among key actors in this incident. The discussion also

covers how the governmental responses to this radiation contamination disaster and its remedy policies paralyzed the collective activism of the affected residents.

Chapter Five focuses on the process of risk construction and the analysis consists of two parts. First, interviews with the impacted residents, activists who had not been directly impacted, and governmental officials illuminate the major perceived risks from these varied groups of people. Second, factors, such as the characteristics of the contamination agent, and social trust or mistrust of the risk management institutions, that shape the risk perceptions are scrutinized.

In Chapter Six, based on historical documents and interview data, I investigate the emergence of collective actions arising from this radioactive contamination building (RCB) incident at local and national levels. The notion of NIMBYism, as well as grassroots activism and environmental mobilization as discussed in Chapter One and Two will be used to examine varied collective actions at the local and national levels. The rise of an environmental social movement organization (ESMO), the Radiation Safety and Protection Association in Taiwan (RSPAT), and its coalitions with other social activists is analyzed. In addition, an examination is undertaken of the reasons for the absence of solidarity among the affected residents in varied contaminated apartment complexes, as well as the lack of long-term environmental activism on the national level. The contextual factors presented in Chapter Four, including differential implementations of governmental policies, and other organizational and structural factors, are presented in order to explain observed outcomes of the contamination experiences.

Chapter Seven establishes a theoretical linkage between risk perceptions and environmental mobilization based on the approach of social amplification / attenuation of

risk. The analysis will examine how individuals, environmental groups, and governmental institutions select certain risk information, communicate with others and subsequently shape the public's ongoing interpretation and collective responses towards the event. The emerging secondary impacts in this case, such as social stigma and alienation from governmental agencies, and other contextual factors are presented in order to explain why, while people experience similar risk concerns, some have not taken collective actions for remedies. The discussion will be centered around what this Taiwan case suggests about filling gaps between the existing literature on social construction of risk and the dynamics of the emergence of environmental mobilization.

The final chapter, Conclusion, reiterates its contribution to the broader theory of the emergence of a grassroots environmental movement in response to technological hazards, in terms of its relation to the process of risk amplification or attenuation. The contextual variables in this case, including the effect of social stigma, constraints of the government's compensation policy, and social / political factors, which shape the emergence of the movement, will be used to expand the CTD paradigm in order to make it more inclusive in explaining these phenomena. Policy implications from the research findings and future research needs in this area will also be addressed briefly.

CHAPTER TWO

LITERATURE REVIEW

Introduction

Variations in public responses to the environmental hazards associated with humanly produced disaster agents revealed in the environmental sociology literature makes further investigation of theoretical gaps in the existing literature critical. These gaps include examination of micro and macro level factors that shape people's risk experiences of environmental insults, as well as their responses to such environmental grievances. The divergence of observations in varied branches of the literature arises in part from different central concerns reflected in each stream of the literature. For example, the literature on the grassroots environmental movement focuses on the solidarity emerging from the local collective actions driven by participants' direct experience of environmental grievances and the transformation it promises of the broader political, economic and social systems. The literature, based on studies in communities encountering chronic-technological disaster (CTD), focuses on social and psychological effects caused by toxic exposure and by the social response to exposure. An integrated framework is, therefore, essential in order to study the complex phenomena of public responses to toxic contamination experiences that may address gaps within and among the different bodies of literature in environmental sociology.

To this end, I will organize the material in this chapter to addresses substantive issues raised in chapter one in relation to the observed response variations, and how they can be explained. This review will begin by introducing an integrated framework – The

social amplification of risk. This conceptual framework is built on a holistic investigation of the dynamic of risk processing in relation to environmental responses by various participants and groups in the society. Subsequently, I review three other branches of the environmental sociology literature which, although they remain scattered and often fragmented, contribute an understanding of varied facets of the experiences of and public responses to toxic contamination. The first stream of literature emphasizes studies on communities confronting CTD. Secondly, I review the literature on the sociology of technological risks. This body of materials contains studies on how social and organizational factors shape people's risk experiences, and also discusses the social and cultural construction of risk. Finally, I review the literature on grassroots activism in response to the immediate experience of environmental contamination in U.S. communities.

The Framework of the Social Amplification of Risk

In this section, I outline an approach which systematically links the technical assessment of risk with psychological, sociological and cultural perspectives of risk perception and risk-related behavior (Kasperson et al., 1988) and seeks to explain why some risks are treated with great concerns while others are not. I will employ this framework to study the radiation contamination incident in Taiwan in Chapter Five and Chapter Seven.

The Concept of the Social Amplification of Risk

Kasperson and colleagues, in 1988, proposed a new framework called the "social amplification of risk" to analyze the social experience of risk. The concept of *social amplification of risk* is based on the thesis that events pertaining to hazards interact with psychological, social, institutional and cultural processes in ways that heighten or attenuate perceptions of risk and shape risk behavior. Behavioral responses then generate secondary social or economic consequences, which extend beyond primary direct harm to human health or the environment including significant indirect impacts, such as liability, insurance costs, loss of trust in institutions, or alienation from community affairs (Kasperson et al., 1988).

Such secondary effects often provoke demands for additional institutional responses and protective actions (in the case of risk amplification), or, contrarily, hinder the needed protective actions from being carried out (in the case of risk attenuation). "Amplification" is used here by Kasperson and his colleagues to include both intensifying and attenuating signals about risk. Thus, alleged "overreactions" of people and organizations receive the same attention as alleged "downplaying."

In this social amplification framework, risk is conceptualized partly as an objective threat of harm to people and partly as a product of social and cultural experience. To treat risk as both an objective property and a social construct avoids the problems of total relativism on one hand and of technological determinism on the other hand (Renn et al., 1992:140). The manifestations of risk, such as accidental releases of harmful substances, are called "hazardous events." Hazardous events remain largely irrelevant in the social context unless they are observed by human beings and communicated to people (Luhmann, 1986: 63). The consequences of these

communication efforts may lead to other physical transformations, such as changes in technologies and the composition of water, soil and air, or removal of the contaminants. Therefore, the experience of risk is not only an experience of physical harm, but also a result of social and cultural processes by which individuals or groups learn to acquire or create interpretations of hazards. These interpretations provide rules for how to select, order, and explain signals from the physical world (Kasperson et al., 1988).

The Process of Risk Amplification

The amplification process starts with either a physical event, such as an accident, or the recognition of an adverse effect on the environment or technology. Groups and individuals select specific characteristics of these events or aspects of the associated portrayal and interpret them according to their perceptions and mental schemes. They also communicate their interpretation of what happened to other individuals or groups and act as *"amplification stations"* through behavioral responses. Amplification stations can be individuals, groups, or institutions. The process of receiving and processing risk-related information by individuals is well investigated in the risk perception literature (Covello, 1983; Slovic, 1987).

Individuals, however, act also as members of larger social units that codetermine the dynamics and social processing of risks (Renn et al., 1992:141). These social units are called the *social stations of amplification* (Kasperson et al., 1988). Through their roles as members or employees of social groups or institutions, individuals do not just follow their personal values and interpretation patterns. They also process risk information according to the rules or cultural biases of the groups or organizations they

affiliate with (Johnson and Covello, 1987). The role-specific factors and cultural biases are internalized and reinforced through education and training, identification with the goals and functions of the institution, and belief in the importance and justification of positive rewards and negative punishments.

The information flow portraying the risk or risk event[1] and the associated behavioral and communicative responses by individuals and social amplification stations are likely to generate secondary effects that extend beyond the people directly affected by the original hazard event. Secondary impacts, in turn, are perceived by social groups and individuals so that another stage of amplification may occur to produce third-order impacts. The impacts may spread or "ripple" to other parties, distant locations, or other risk arenas. Each order of impact will not only disseminate social and political impacts, but may also trigger (in risk amplification) or hinder (in risk attenuation) positive changes for risk reduction (Kasperson et al., 1988).

Appraisal of the Framework of Social Amplification of Risk

A few critiques from scholars (Svenson, 1988; Rayner, 1988) arose after the framework of social amplification of risk was introduced. For example, Rayner (*ibid*) commented that the authors presented this framework as if it was a theory, but no predictive hypotheses were offered. In addition, it was suggested that there are no distinctive predictions that could be offered by this framework that are not available from existing paradigms (Rayner, 1988: 201). The authors' endeavor, however, should not be discredited by any means, since they indicated that the intention is to provide an

integrative conceptual framework that incorporates cultural process and institutional arrangements to account for human behavior toward environmental and technological risks. This framework provides a broader perspective in order to examine risk experiences by combining elements of different paradigms into one framework. Varied elements of this framework are actually different foci of the existing branches of the environmental sociology literature – a discussion of which follows. Therefore, in the effort to analyze the Taiwan case, this framework has its value of correction to other highly specialized approaches and provides an insightful perspective in order to examine how social experiences of risk interact with the wider social, cultural and institutional context and in turn shape public responses to the chronic radiation contamination disaster.

Communities Confronting Chronic Technical Disaster

Literature, based on studies in communities encountering CTD, suggests that because the toxic contamination lasts longer and is harder to detect and / or more difficult to assess, it produces more long-term consequences than other so called "natural" disasters, and generates more deviant interpretations in the local setting. Resulting from these conflicting interpretations, the CTD often gives rise to social and organizational corrosion (Freudenburg and Jones, 1991; Kroll-Smith & Couch, 1990). This perspective offers a model designed to examine the nature of risks involved in the environmental hazards associated with human technological involvement in its cause and abatement. It emphasizes that social ties may be at risk because of the inherent

[1] This term is used in the conceptual discussion and later empirical analysis, and refers to *manifestations of the risk*, the flow of discrete events that actualize the risk. It is used interchangeably with the term

ambiguity of the contamination agents. In other words, the invisible environmental contamination not only puts human health in danger, but also threatens to disrupt community relationships at all levels.

Edelstein (1988), addressing a Legler, New Jersey contamination case as well as some other incidents, has studied the effects of contamination on a wide range of human life experiences. Once the residents of a contaminated community have accepted the reality of toxic exposure, their worldview undergoes some changes. Perceptions of health are transformed and they begin to fear for their families' present and future well-being. They experience a loss of control over their lives. They find their homes transformed from havens of security into places of danger which they are often unable to leave because they cannot either sell them or afford to move to another residence. In addition, they lose their trust in government as a credible source of assistance when it fails to address their needs. Isolated from friends and relatives outside the contaminated area and unable to get help from officials, residents turn to each other. Unlike the phenomenon of social corrosion described by Freudenburg (Ibid) and Kroll-Smith and Couch (Ibid), Edelstein finds that a community-building and therapeutic grassroots activism often emerges. This local activism, however, remains focused on local issues, with few signs to suggest an eventual evolution towards more global ecological concerns. Only a couple of examples in the United States suggested such a transformation, such as activists from Love Canal (Gibbs, 1982; Levine, 1982) and Woburn, Massachusetts (Brown, 1993).

A study by Vyner (1988) discusses a great variety of approaches to describe how an individual may or may not adapt to exposure to invisible contamination agents. Vyner

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"hazardous event" in this dissertation.

introduces the concept of "institutional denial, whereby institutions often deny that exposure poses any threat towards the exposed individuals' health. It is shown that institutional denial may lead to hypervigilance and panic, which enhances the likely development of psychological traumas. Though Vyner intends to describe the various mechanisms which people use in order to try to adapt to the troubled contamination situation, a crucial question which remains unanswered is: which people will show which of the various types of adaptive behavior and under what circumstances? The formation of social and psychological effects of contamination and how people perceive them is a social process. This process will be examined further in the other branches of the literature.

In relation to the CTD literature, the characteristics of varied contamination agents in relation to the formation of risk perceptions, as well as to environmental responses, must be further investigated. The type of contamination agent needs to be studied systematically in relation to collective responses in order to produce a cumulative understanding of how the ecological aspects of these disasters interact with their human dimensions. Existing case studies document a variety of reactions in response to different types of contaminants. Thus, it is essential to examine more closely the association between types of contamination agents and variations in environmental response (Couch & Kroll-Smith, 1985). The nature of the hazard agent, such as its visibility to ordinary sensory perception (Vyner, 1988), its latency periods between exposures and health impacts (Gunter et al., 1999; Tesh, 1993), and whether it was generated naturally or humanly produced, need to be further studied in order to find

out how the presence of different contamination agents may be affecting environmental responses.

The four-fold typology of disasters represented by chronic vs. acute, and technological vs. natural (Kroll-Smith & Couch, 1990) needs to be further delineated and studied. For example, contamination incidents involving radiation, such as at Three Mile Island (TMI) versus residential radon contamination, revealed varied responses. TMI produced reactions similar to cases involving communities threatened with health and safety hazards from toxic wastes created by private industries. Local collective protests emerged and the respective social situations were defined as problematic (Cable and Walsh, 1991). Naturally generated radon gas, however, seems to have more individualized human health impacts (some quite serious), yet has not drawn much collective attention from impacted residents (e.g., Kennedy et al., 1991; Weinstein & Sandman, 1992), even though the setting is frequently in the home. The case of residential radiation contamination from Co-60 in Taiwan, a disaster clearly arising from human origins, seemingly has not given rise to widespread local responses – only seven out of two hundred territorially dispersed apartment / building complexes in the northern region of Taiwan manifested local collective actions (Kao, 1998).

What are the similarities and / or differences in social responses toward radiation-based contamination among TMI, radon gas exposure, and the radiation from Co-60? As indicated previously, the nature of the hazard agents is important for further investigation of the relationships between collective responses and the type of contamination agents implicated in the crisis. My research on residential exposure to Co-60 contamination in Taiwan will also serve to enhance the understanding of key

dimensions associated with variations in environmental mobilization in response to these technically-based disasters. In addition to further examination of the type of contamination agents, how the surrounding society, polity and / or culture shape the risk experiences for these diverse types of hazardous events is also critical to an understanding of environmental response variations. The body of literature in this area will be discussed in the next section.

Sociology of Technological Risks

The field of risk study grows out of the practical needs of industrialized societies to regulate technology and to protect citizens from technological hazards. Social scientists have increasingly turned their attention to the study of technological risks. Several issues emerge in this process, such as the argument over whether technological disasters are different from natural disasters; new scholarship on risk perceptions and trust, and the contribution of social constructionism to the studies of risk (Clarke and Short, 1993). Given the controversies and conflicts emerging from the uncertainty in technological risks, social scientists have studied how risks are constructed in social and cultural contexts, and how they are shaped by varied social and organizational factors.

Social and Cultural Constructions of Risks

Short (1984) suggests that the sociology of risks should focus on the social context of risks and he also argues that risks and their management may have the potential to put the social fabric itself at risk. Freudenburg (1993) contends that sociological work on risk perceptions should be growing in sophistication as well as in

scope, rather than only focusing on the characteristics of individual perceivers. He believes that it is necessary to broaden the focus on risks further by asking about the larger institutional context within which the risks are managed. How decisions are made regarding the acceptability of technological risks is also important for discussion of the discourse of construction of risks and risk perceptions.

In the book, *Risk and Culture: An Essay on the Selection of Technological and Environmental Dangers,* Douglas and Wildavsky (1982) asked two fundamental questions. One concerns why people emphasize some risks while ignoring others. A second question ponders why Americans had singled out industrial pollution as a principal source of concern. The authors argued that the selection of risks for societal attention was purely a social process with little or no linkage to objective risk or physical reality. They asserted that organizational self-maintenance provided the basis for environmental organizations' concern with technological risks. While this perspective has been critiqued on the grounds that it reflects a childish solipsism, it nonetheless emphasizes that it is important to begin the analysis of risk by including social context and experiences of the perceiver.

In addition, technological risks are not objective conditions "out there" simply waiting to be perceived by people. Rather, risks exist in and through the social fabric. The media, as part of the social fabric and transmitters of risk information, play a significant role in shaping the formation of the cognitive frame about risks. Several studies (Gamson & Modigliani, 1989; Spencer & Triche, 1994; Stallings, 1990) scrutinized how media discourse constructed risks. By examining newspaper stories about the 1987 Schoharie Creek, New York, bridge collapse that were published in the

New York Times, Stallings (Ibid) argued that the notions of risk and safety were socially constructed rather than objectively given. Thus, concepts of risk also entered into the public discourse through journalists' or other claim makers' selection of information. These arguments echo the thesis of social amplification of risk – that social experience of risk is a result of interactions between the risk event and broader social and cultural contexts.

Social and Organizational Factors That Shape Risk Perceptions

Sociological investigation of technological risks has provided insights on the social and organizational factors that shape risk experiences. Perrow's (1984) analysis of "normal accidents" demonstrates that industrial societies have produced a variety of high-risk technologies in which a main source of risk is part of the very system designed to ensure their safety. For these technological systems, the interaction of system components, including humans, makes accidents inevitable. Clarke's article (1988) posits and discusses the proposition that assessing risks is not free of politics and is, in fact, a social construction. Often, industry and other promoters of technologies seek to define risk policy conflicts as scientific or technical conflicts. They contend that controversies over risks should be resolved within the scientific domain and removed from the political process. Their opponents, contrarily, tend to define conflicts over risk as political issues (Dietz et al., 1990; Dietz et al., 1989) that demands openness to democratic procedure of public participation.

It is shown from studies done in the United States and in Europe regarding the general population's basic knowledge about gene technology (Durant, Bauer and

Gaskell, 1998) and general scientific questions (Miller, 1998) that most people do not possess intricate knowledge of technological risks. Therefore, it can be assumed that lacking such knowledge, most people may need to rely on information provided by experts, rather than directly assessing the risks according to their own awareness. As noted before, experts are not a homogeneous group; they often differ in their assessments of a technology and the risks involved (Clarke, 1988). In the absence of sufficient knowledge, decision and judgements are guided by social trust (Earle and Cvetkovich, 1995). In other words, instead of making rational judgements based on knowledge, social trust is used to select experts who are trustworthy and whose opinions can be believed as being accurate and in turn to shape people's perception of risks (Siegrist and Cvetkovich, 2000). Moreover, social influences in the formation and change of attitudes towards risk-bearing activities or public responses are also suggested in the literature (Gould et al., 1988; Mazur, 1987).

In contrast to the activism displayed at Love Canal, Woburn, and Times Beach, Fitchen, Heath and Fessenden-Raden (1987) studied several communities where although chemicals, such as Trichloroethylene (TCE) had contaminated groundwater used for drinking, people's complaints focused less on the health risks than on the nuisance of having to boil water, the off-color of the substitute water supply, the expense of filters, and the effect of water problems on property values. In addition, residents in these communities were not angrily blaming the firms or individuals that might have caused the contamination. The researchers asked a fundamental question about why so little public concern was expressed in some communities about health risks from toxic chemicals while so much concern was expressed in others. They argued that the answer

could not lie solely in the nature of the severity of the particular health risks, since even when the health risks were similar, public perception and reaction in different communities might be quite different. In other words, it is important to investigate the social and organizational contexts where risks are heightened or attenuated (c.f. Kasperson et al., 1988).

Based on a case study of TCE problems (Fitchen et al., 1987), the authors also found that risk perception had a temporal aspect. People's perception of a given risk was not always fixed and might undergo reinterpretation and change through time. In addition, risk perception was an interactive phenomenon. In the period after a health risk was discovered in a community, one or more overall public perceptions of the risk might emerge as the accepted interpretation (c.f. Kasperson et al., 1988). "The collective perception then acts as a filter through which individual members of the community perceive the risk" (P. 50). Furthermore, "local perceptions of a risk are affected by perceptions of the way the risk is being addressed" (P. 50). In their study, as governmental agencies and consulting firms carried out the process of investigation and remedy, the community's original concern over the health risk was altered and reduced. In other cases, however, the way a risk was presented and dealt with by state and federal agencies might have the opposite effect. In other words, the initial concern over the risk might be increased or decreased over time (c.f. Fowlkes & Miller, 1987).

The construction of risk at the local level was shaped by factors in the local context in which the risk was embedded. Fitchen, Heath and Fessenden-Raden (1987:50) had identified seven community context factors, which seemed significant in shaping residents' perceptions of the health risk. (1) Whether they perceived adverse

health effects; (2) whether they experienced minor or major nuisance or dislocation related to the contamination; (3) whether people were able to detect the contaminant through their own senses; (4) whether many residents were familiar with the chemical which contaminated their environment; (5) whether people perceived the origin of the contamination as internal to the community; (6) whether the community's leaders were concerned about other risks, such as further decline of the local manufacturing economy; and (7) whether citizens trusted their local officials as competent and effective in protecting their health and well being. Though their study conclusions were based on the US community context, I think their findings about contextual factors shaping local perceptions of health risk will provide a helpful orientation for my exploration of factors that shape risk perceptions of the activists in Taiwan where residents were dispersed over a wide area.

Grassroots Environmental Movement

The fundamental change in environmentalism in the United States since the late 1970's has been the rapid increase in the number and prominence of local grassroots organizations. These locally-based environmental groups are usually organized in response to a perceived public health threat resulting from exposure to local pollution problems (Brown, 1990; Edelstein, 1988; Gibbs, 1982; Levine, 1982) rather than from a more general notion of preserving the planet. By 1990, grassroots environmentalism had evolved into a loosely structured movement with three overlapping but distinct levels of organization: community-based groups, regional or statewide coalitions, and national organizations (Freudenberg and Steinsapir, 1992: 27). Local community organizations are the thrust of the movement. Although the Love Canal crisis was

typical of this grassroots environmental movement, many groups have emerged in reaction to a wide range of problems. Examples include toxic wastes, existing or proposed landfills and waste incinerators.

Beliefs and Interests Driving Collective Actions

This grassroots environmental movement is quite heterogeneous, but locally-based activists generally share certain principles and beliefs. First, grassroots environmentalists strongly believe in the right of citizens to participate in making environmental decisions. This emphasis on citizen participation in decision-making reflects a mistrust of government derived from direct experiences with public officials and agencies' dealing improperly with their problems (Masterson-Allen and Brown, 1990; Brown, 1987 & 1993; Levine, 1982).

Second, unlike the conservation movement that focuses on environmental esthetics, wilderness preservation, or other similar issues, grassroots environmentalists are more concerned with human health. Critics of the movement sometimes charge that the concerns about health are used as a smokescreen to cover fears that construction of facilities such as incinerators and hazardous waste dumps will decrease property values. The activism is criticized as solely motivated by self-interest to protect one's "backyard," rather than for a broad social good, such as to promote a toxic-free environment for all (Freudenberg and Steinsapir, 1992:31). This is true in some cases. However, there are other situations in which people constantly fight against environmental hazards in the face of corporate threats of job loss or opposition by neighbors who want to keep

evidence of pollution quiet in order to protect property values (Brown, 1990; Freudenberg, 1984; Levine, 1982).

In addition, even though toxic waste activists were not usually motivated by global concerns initially, they sometimes came to understand their local actions as part of a global phenomenon. The Woburn activists, for example, were reported to have become quite aware of this global context and other political-economic contexts (Brown, 1993). In some mobilization experiences, therefore, a more global concern and political solidarity emerged in place of narrowly defined problems (Hirsch, 1986) to offer a broader linkage of environment to economy and society, and to advocate a fundamental restructuring of production relationships (Szasz, 1994). Interestingly, such transformations have not been systematically studied in the existing literature. Therefore, it is important to investigate what social / organizational factors facilitate or hinder the transformation of citizens' responses to environmental hazards from motivations of self-interest to global environmental concern.

Third, grassroots environmentalists have an ambivalent attitude towards scientific and technical expertise. On the one hand, some studies (Brown, 1990; Freudenberg, 1984; Levine, 1982) show a close relationship between activists and scientists. On the other hand, both surveys and anecdotal reports suggest widespread mistrust of scientists and public health officials (Freudenberg & Steinsapir, 1991:240). This discrepancy comes from distinguishing between scientists employed by industry or government, whose jobs are to refute the claims of human health damage, and those who work with community groups to support their social goals (Clarke, 1988). Clarke (Ibid) indicates that expertise has become a highly prized resource in environmental controversies. This

is so because policy formulation and implementation are heavily dependent on scientific and technical evidence. Therefore, industry or government tends to define controversies as scientific or technical conflicts that will be resolved with formal methods and thereby removed from the political process. Grassroots environmentalists reject defining environmental problems as purely technical ones because they can confront their adversaries on the political terrain, where their skills and strengths can be used to maximum advantage (Dietz, et. al 1989; Freudenberg & Steinsapir, 1992).

Lastly, the grassroots groups have also questioned the basic assumptions underpinning the production and growth features of the economy (Morrison, 1989) and challenged the prevalent belief that economic growth is good and ultimately benefits everyone. They reexamine the assumptions of cost-benefit analysis by asking who pays the costs and who gets the benefits (Schnaiberg, 1980 & 1994). Also, they question the right of corporations to make decisions without community input, if those decisions will have health and social consequences.

Constituency

In the analysis of public reaction to toxic waste contamination, Masterson-Allen and Brown (1990) argued that unlike other contemporary health-related social movements (e.g., womens' and anti-nuclear movements) the grassroots movement against toxic waste was not composed primarily of highly educated, upper-middle-class people who were motivated by global concerns. They pointed out that toxic waste activists were typically working-class and lower-class people, because the communities they reside in were facing great toxic contamination problems. However, Chiro (1992)

pointed out that members of these local groups represented a wide cross-section of class and occupational categories. Women were heavily represented in both membership and leadership. Although many groups were founded by community or political activists, it was a distinguishing characteristic of these movements that new leaders were often housewives and mothers with no previous organizing experiences (Chiro, 1992; Levine, 1982; Gibbs, 1982). Phenomena such as these need to be further investigated. In Stone and Levine's (1985) comparison of activists and nonactivists, according to their involvement in trying to alter the circumstances of their sufferings, they generalized the social characteristic of the "activists." These activists were most likely to be drawn from among residents who lived in the community long enough to identity with it but who were not there so long that they became adapted to the dangers present (Ibid, 166).

Freudenberg's data (1984) suggested further that the leaders of these grassroots organizations were found to have professional careers, yet were drawn from a range along the socioeconomic spectrum. Shaw and Milbrath (1983) indicated that most leaders (at least at Love Canal) were women and they provided several interesting hypotheses regarding why women had emerged as leaders: (1) women spent more time at home, (2) men were more likely to be employed in the chemical industry, (3) men might feel they had failed in the role of protector of the home, (4) it was unmasculine to publicly admit fears and concerns over health and safety, and (5) the social networks previously established by women were most available for quick action. Stern, Dietz and Kalof (1993) found that women, apparently more than men, accepted messages that linked environmental conditions to potential harm to themselves, others, and other species or the biosphere. A further interesting question was whether the activism was

more necessary for the marginal victims who were less likely to receive government aid or compensation for damages than for those who were qualified to be assisted by the government? On the other hand, was it possible that some of those with the worst pollution were immobilized by defensive avoidance (c.f. Gould et al., 1996; Hatcher, 1982; Vyner, 1988)? These questions need to be further investigated and one must be cautious not to over generalize from findings that have been discovered in distinctly different societal contexts.

Though the literature documented that lower-class groups tended to be more impacted by technological hazards (Bullard, 1990 & 1992; Bryant and Mohai, 1992; Masterson-Allen and Brown, 1990; Taylor, 1992), Beck (1986) argued that in earlier class-based societies only the proletariat was victimized. In the emerging worldwide risk society, all groups including the rich were threatened. Indeed, the Co-60 contamination incident in Taiwan has randomly impacted various social classes, which seemingly supports Beck's argument. Nevertheless, when encountering similar risks from technological disasters, the extent of class variation in the constituencies mobilized in response to toxic chemical contamination versus incidents of radiation contamination has not been investigated empirically.

Macro Level Factors That Facilitate Environmental Mobilization

To capture the dynamic of how environmental mobilization emerges, Cable and Walsh (1991) compared Yellow Creek, Kentucky and Three Mile Island (TMI) where protest mobilization occurred in reaction to hazardous environmental situations created by private industry. They documented the importance of both the historical period and

structural interactions in explaining differences of mobilization in these two cases. They suggested several critical factors in the emergence of protest. The first factor concerned the response of public officials and the media. When local officials were themselves involved in creating the problem, they would attempt to defuse conflict by re-defining the issues and by responding slowly and grudgingly. On the other hand, if local / state officials were not part of the problem and were quick to define the incident as a serious emergency, they tended to be instrumental in initiating several protest organizations.

Cable and Cable (1995) indicated that governmental officials' attempts to defuse the impacts of environmental crises usually irritated the affected residents and fired the grassroots protests. Such a governmental response, however, may not necessarily provoke the anguish from the affected citizens if they trust that the officials are capable and effective in protecting their well-being (cf. Fitchen et al., 1987). This observation was embedded in the US political context and the historical development of democracy. Is the relation between the governmental reactions and the emergence of the grassroots activism varied in different political / national contexts? My research on the case in Taiwan will provide a further study on this dimension of mobilization. A second factor concerns the nature of social networks and interaction patterns. Resource mobilization (RM) perspectives on social movements had emphasized the importance of social networks in recruitment. For example, in their analysis of the TMI protest, Cable et al., (1988), found that social networks might sometimes enhance and sometimes impede mobilization but that only friendship networks were crucial in mobilization. The third factor was whether there were pre-existing social movement organizations (SMOs),

which shared similar concerns and could help to shape a collective definition of the problem as well as a collective response.

Comparing contamination arising from an explosion in the State Office Building (SOB) in the Binghamton, NY case with Love Canal and TMI, Clarke (1991) revealed some fundamental differences that helped to explain why the Binghamton Citizen Committee was not able to become an issue enterpreneur to shape policies regarding the SOB's risks. Due to the lack of a social infrastructure of association, it was not easy to develop the substantial sense of "them" versus "us" among members of the Citizens Committee. Consequently, the Binghamton Citizen Committee was not able to create a sustained image of the antagonist in its struggles. In addition, the Love Canal Homeowners Association (LCHA) members had their own office, which provided them with a common ground where their grievances could be collectively voiced and where they could plan strategies together. Therefore, "as mechanisms of information transmission, networks help to transform private complaints into public grievances" (Ibid. 105). Three other influential factors that were identified by Clarke were "national media attention, timing of intervention, and location of threat" (Ibid. 108).

Applying Jasper's finding from his study of public opinion against / for nuclear power, Clarke (Ibid.) suggested that it was in the early stages – "when roles are not set and when there is no hierarchy of authority" – that local groups were most likely to establish their voices as legitimate in technical disputes. The other factor that potentially facilitated local mobilization in response to toxic chemical contamination was whether the contamination happened in the home (Edelstein, 1988). Clarke (Ibid.) argued that home was considered as sacrosanct for American culture and its people who thought it

was extremely inappropriate for harm to enter the home uninvited. On the other hand, the work place had such symbolic meaning only for owners of private enterprises. Thus the location of the threat happening in the workplace versus the home particularly accounted for failure of the mobilization in the Binghamton case in contrast to the collective activism in the residential setting of Love Canal.

Finally, Clarke (1991) suggested that national media attention was one factor in deciding whether local protest groups failed or succeeded in the mobilization (cf. Cable & Walsh, 1991; Szasz, 1994). The media served as bridges between organizations, and also between organizations and the public in risk controversies and risk construction. The media worked as information filters and contributed to "the creation of a political and moral context" (Clarke, 1991:104). The media creating symbolic meaning of the toxic contaminants became a resource that was used to mobilize people.

CHAPTER THREE

METHODOLOGY AND DATA COLLECTION

In this chapter, I discuss the methodology of this dissertation research and how various data were collected in order to support the inquiry. This chapter consists of four parts. Part one presents the methodological approach and discusses the centrality of the relationship between the qualitative analytic perspective and a range of concerns. I also explain why I employed a qualitative approach and the extended case study method in order to investigate the social construction of risks in relation to the emergence of environmental mobilization in this Taiwan case. Part two reviews the evolution of the research design. Part three depicts the range of methods employed in data collection. The final part of this chapter explains how template analysis is used to interpret the data. In addition, issues, such as the validity and accuracy of translating interview questions and concepts from English to Mandarin and / or Taiwanese and vice versa are discussed.

The Methodological Approach

Existing research linking the micro and macro level variables that shape public responses to technological disasters is sparse and derives in large part from research in western contexts. My aim is to provide an analysis of environmental mobilization in response to residential Co-60 contamination in Taiwan. To examine and analyze the character, organization, and logic of people's responses to this incident, a qualitative investigation is proposed that draws on extended case study methodology and multiple-theory approaches. To this end, a range of data collection methods are employed.

The Qualitative / Quantitative Difference

Social science research tends to dichotomize research methods into quantitative variable analysis research and qualitative case study research. The most striking difference between the methods is the way in which each tradition treats its analytic categories. The quantitative approach isolates and defines categories as precisely as possible prior to conducting the study. Its goal is to determine the relationship between the categories with great precision. The qualitative approach isolates and defines categories during the research process (McCracken, 1988). Qualitative researchers expect the nature and definition of analytic categories to change in the course of a project (Glaser and Strauss, 1967).

Qualitative methods seek to discover patterns of interrelationship between many categories rather than the sharply delineated relationships between a limited set of variables. "This difference can be characterized as the trade-off between the precision of quantitative methods and the complexity-capturing ability of qualitative ones." (McCracken, 1988:16) Thus, closed questions and quantitative methods are used when the questions for which data are collected allow the respondent to answer unambiguously. On the other hand, when the questions for which data are sought tend to be more difficult for the respondent to answer, the qualitative technique is appropriate.

Another difference between the two approaches involves the number of respondents recruited for research purposes. The quantitative project requires a large sample size in order to generalize to the larger population. Generalizability, however, is not the driving issue of the qualitative case (McCracken, 1988). Thus, in the qualitative approach, which aims instead to discover how many people and what kinds of people hold these categories and assumptions, it is essential "to gain access

to the cultural categories and assumptions according to which one culture construes the world" (McCracken, 1988:17). In my study, the qualitative approach will be employed in order to explore the dynamics of people's perceptions of the radiation contamination incident and its relation to factors such as social stigma and mistrust of risk management institutions that shaped the emergence of the radiation safety movement in Taiwan.

The Extended Case Study

Burawoy (1991) described the extended case study method as the "reconstruction of existing theories." Unlike grounded theory which "represses the specificity of each situation" (Ibid. 275), the extended case study method focuses on the particularities of each situation. Instead of examining different situations for similarities, the researcher uses the extended case study method when seeking to study similar situations and find out what is different about them. Its intent is not to reject or disprove existing theories, but to improve and reconstruct them. This approach is compatible with my research intention because I would like to extend the study of how people respond to technological incidents beyond its current western context and to integrate the discrete emphases of micro, macro and constructionist theoretical perspectives into my analysis / interpretation of the experience.

Evolution of the Research Design

In 1997, when I became interested in studying this case, I was a graduate student in the U.S. and my only source of data was the Internet. Browsing on the Internet, I found the web site of the Taipei branch of the Taiwan Environmental Protection Union (TEPU), which recorded electronic news and brief introductions to

this radioactive contamination incident. The site enabled me to communicate with the general secretary of the Radiation Safety and Protection Association at Taiwan (RSPAT) and I started corresponding with him via email, inquiring for information about the contamination incident, as well as the group. Through such correspondence, I was also introduced to a medical researcher in National Yang-Ming University, who has been involved in various medical studies on health effects of impacted people. In the course of this correspondence I proposed an exploratory field study in Taiwan in order to learn of this incident further and generate a dissertation proposal afterwards.

I undertook a two-month exploratory field research project in Taiwan in summer 1998. During this period, I met the chair of the RSPAT and the medical researcher and was introduced by them to a small numbers of impacted residents. During the exploratory field study, I interviewed twelve persons with a semi-structured interview protocol for 1.5 to 2.5 hours. These twelve people included three officials from the Taiwan Atomic Energy Council (TAEC), one medical researcher, the chair of the RSPAT and six impacted residents from six different geographically dispersed apartment complexes which had short-term local protest activities and one environmental activist from the Taipei branch of the Taiwan Environmental Protection Union (TEPU). In addition to individual interviews, on one occasion I observed at a forum for impacted residents' representatives, the TAEC officials, and the medical researchers from the Academia Sinaca. In addition, various historical records and documentary materials were collected to provide background information.

Glimpsing some of the logic and organization of people's responses towards this radioactive contamination incident after transcribing and analyzing the interview data and field notes, as well as the archival materials, I developed the dissertation

proposal with specific research objectives. The following basic questions emerged as central concerns of the dissertation. First, what are the varied risk perceptions and concerns from key actors of the Taiwan case and how do various interpretations of the hazard event provide rules for individuals and / or social groups to focus on certain risks while ignoring others? Second, which constituencies mobilized at the local and national level and what interests and concerns underlay their activism? Third, how do social stigma and other contextual factors affect amplification or reduction of risk perceptions and their influences in shaping the emergence of the collective activism in response to chronic radiation contamination?

To investigate the above questions, the second field study was carried out for seven months in Taiwan during the year 2000. Additional archival and documentary materials were collected during this period and another twenty-eight individual interviews were conducted with a range of parties who have been involved in the incident. Each interview took from 1.5 to 2.5 hours. Since I had not been able to obtain a listing of all impacted residents from the TAEC[1] during my exploratory study, it was not feasible to select a random sample of impacted residents consisting of both activists and non-activists to interview. For this reason, I employed a snowball sampling strategy beginning with individuals who were impacted residents in different apartment complexes and had been interviewed in the 1998 field study, as well as the individuals who are core leaders and / or current members of the RSPAT. I also volunteered twice a week over a two-month period to coordinate physical

[1] The officials in the TAEC have never been willing to release the information about the impacted residents, such as the exact addresses of RCBs and the impacted people's phone numbers. The given reason is to protect the privacy of the RCB residents. I proposed to send letters to the RCB residents first to notify them about my research purpose and assure them about the issue of privacy before I called. This suggestion, however, was not accepted by the TAEC. Therefore, I ended up failing to get information on RCB residents from the TAEC, which is the only governmental agency with all the information about RCB residents.

examination schedules for impacted residents in Taipei Municipal Jen-Ai Hospital. Through this experience I became acquainted with a number of impacted residents who had never been involved in collective actions and was able to conduct interviews with them. I also attended two RSPAT-sponsored activities, a seminar on radiation safety and health, and one annual meeting of the RSPAT, which allowed me to learn more about issues and concerns of the impacted residents and of the broader public as well as to observe dynamics among them in a group setting.

Range of Methods Employed

To investigate the complex phenomena of people's responses toward this Cobalt-60 contamination incident in Taiwan, I employed a range of methods to collect data. The advantage of combining several data collection methods is to reduce biases by overcoming the limitation of any single technique. In the discussion that follows I discuss my experience with these data collection methods – – a telephone survey, individual in-depth interviews, and documentary research. I also provide further detail on the snowball sampling procedure utilized in this study.

Pre-Interview Telephone Survey

The informants were drawn randomly from the RSPAT membership roster of 2000. Since I was interested in the impacted residents and the general public's points of view regarding this incident, I excluded most of the political elite from this list and employed random sampling to recruit informants. Among 102 members whose telephone numbers were listed, I drew a total of 51 members (50 %) to be interviewed by telephone in order to obtain structured demographic information regarding details of the radiation contamination experience, as well as other questions, such as their

perceptions of this incident and their activism in the RSPAT. These 51 members included 17 impacted residents (33.3%) and 34 environmental activists who had never been directly impacted by the radiation contamination (66.7%). The research sample attributes are presented in Table One.

The data from this pre-interview telephone survey was also used to initiate the subsequent snowball sampling for the individual long interviews. At the conclusion of the telephone interview, I asked each informant whether s/he would be willing to participate in an in-person interview to allow more time to talk about her/his experiences and viewpoints. Twenty-one of the 51 informants agreed to participate in individual in-depth interviews.

Table One:

The Attributes of the Research Subjects: Pre-Interview Telephone Survey on Members of the RSPAT

The following table breaks down the impacted and non-impacted activists according to their sex, age range, education level, political party affiliation, NGO membership.

	Impacted Members / Activists (N = 17; 33.3%)	Non-impacted Members / Activists (N =34; 66.7%)
Sex	Male: 8 (15.6%) Female: 9 (17.6%)	Male: 27 (53%) Female: 7 (13.7%)
Age Range	20-30: 0 (0%) 31-40: 1 (1.9%) 41-50: 8 (15.7%) 51-60: 6 (11.8%) 61-80: 2 (3.9%)	20-30: 2 (3.9%) 31-40: 13 (25.5%) 41-50: 11 (21.6%) 51-60: 4 (7.8%) 61-80: 4 (7.8%)
Educational Level	None: 1 (1.9%) Elementary School: 5 (9.8%) Junior High School: 2 (3.9%) Senior High School: 4 (7.8%) Bachelor : 5 (9.8%) Master: 0 (0%) Ph. D.: 0 (0%)	None: 1 (1.9%) Elementary School: 3 (5.9%) Junior High School: 4 (7.8%) Senior High School: 8 (15.7%) Bachelor: 13 (25.5%) Master: 3 (5.9%) Ph. D.: 2 (3.9%)
Political Party Affiliation*	KMT: 0 (0%) DPP: 4 (0%) NCP: 0 (0%) PFP: 0 (0%) GP: 0 (0%) No Preference: 10 (19.6%) Reject to answer: 3 (5.9%)	KMT: 3 (5.9%) DPP: 15 (29.4%) NCP: 0 (0%) PFP: 0 (0%) GP: 0 (0%) No Preference: 16 (31.4%) Reject to answer: 0 (0%)
NGO Membership	Yes: 1 (1.9%) No:16 (31.4%)	Yes: 19 (37.2%) No: 15 (29.4%)

* Acronyms of political parties: KMT – Kuomingtang Party; DPP – Democratic Progressive Party; NCP – New China Party; PFP – People First Party; GP – Green Party.

Individual in-depth Interviews

The individual long interview serves better than other methods to provide an in-depth understanding of a person's opinions and experiences and to learn about each informant in detail. It provides the researcher with an "opportunity to step into the mind of another person, to see and experience the world as they do themselves" (McCracken, 1988). Since the goal of the study is to understand and inquire into the logic and organization of a wide range of social responses towards the contamination incident, it is essential to interview three groups of people: (1) impacted residents who have or had involvement in collective actions; (2) impacted residents who have never participated in any collective protest; (3) members of the RSPAT, who had not been directly impacted and became long-term activists, and (4) the TAEC officials.

Because of the difficulty encountered in gaining a full roster of impacted residents from the TAEC, snowball sampling replaced random sampling as a means to recruit the informants. In locating the impacted residents who had been involved in collective actions, I began with the individuals interviewed in the exploratory field study, leaders and current members of the RSPAT on the list included in the 2000 membership directory (total: 167 members). Through them I subsequently located additional activist residents as informants.

I approached the segment of impacted residents who had never participated in any collective actions in two ways. First, in addition to my initial personal encounter at the hospital during their physical examinations in the morning, I called impacted residents at home in the evening to invite them to participate in this research. I only successfully recruited one impacted resident to be interviewed through this strategy. This led me to a second approach to find more informants. With the medial researchers' suggestion of a number of impacted residents who might be willing to be

interviewed, I was able to interview another three informants who had never been involved in activism.

The goal of this snowball sampling selection is to conduct interviews with impacted residents who experienced low, medium and high levels of varied radiation contamination in relation to whether or not they had responded with collective actions by participating in the RSPAT, and / or in other activities, as well as other activists represented by RSPAT members who had not been directly impacted as residents of the contaminated complexes. In total, I conducted twenty-eight individual long interviews in the second field study. Because of the difficulty of obtaining RCB residents' information from the TAEC, and because none of the impacted activist residents released information to me about their neighbors (those who had been impacted but had no activism), and because most people, whose information I got through the hospital setting, refused to be interviewed, I was able to complete only four individual interviews with the impacted residents who had never participated in collective actions. In the hospital while I volunteered to assist residents to go through various health examination processes, however, I had several short conversations with additional four impacted residents who had never been involved in collective actions. The breakdown of all these categories and demographic characteristics of informants is presented in Table Two.

Table Two:

The Composition of the Research Subjects for Individual In-depth Interviews:

The following table breaks down the varied groups of informants according to sex (M – Male; F – Female). Also, among the impacted residents, the informants' distribution is broken down according to the radiation levels presented at their households.

	Impacted with activism	Impacted without activism	Non-impacted activists	Gov. officials
High	7 (M) 3 (F)	1 (F)		
Medium	2 (M) 1 (F)	2 (F)		
Low	1 (M) 3 (F)	1 (M) 4 (F – informal*)		
			12 (M) 1 (F)	4 (M) 1 (F)
Total	17	8	13	5

* While I volunteered in assisting impacted residents to have medical examinations in the hospital, I had four short informal conversation exchanges with impacted residents who indicated that they never took collective actions.

To understand the RSPAT's organizational characteristics and the mobilization's resource-building process as well as its limitation on the activism, I also interviewed core leaders and long-term active members in the RSPAT. These informants were able to relate the organization's history, its changing structure over time, and also to explain goals and agendas of the organization and its activism. They also were able to articulate the strategies for recruitment, and to explain the mobilization process in different time periods as well as the interaction among the RSPAT, the government and the impacted residents in different apartment complexes over the years.

Interviewing more recent and veteran members, who are no longer active, may also provide more precise information on how they were brought into the organization, why they joined this group, why they later became inactive, what were their perceptions of this incident, what remedies they demanded, and what their goals were for participation. Interviewing members may give the researcher insights into how each individual constructed his/her own reality and perception on this incident. It captures the complexity of people's perceptions of this incident and the environment. Interviews with impacted residents who have never become activists may help the researcher to find out the possible reasons why, in facing similar environmental insults, some people do not respond with collective actions.

To protect the informants' privacy and make them comfortable in answering questions, several procedures were undertaken. Prior to the interview, the informants were assured that they would not be identified with the comments they made; their names would not be used in the research final report; that they might stop the interview process at anytime, and that they did not have to answer the questions which they felt uncomfortable about.

In approaching impacted residents, who had never participated in collective actions, the issue of privacy was often confronted when I first called them. This segment of the population is especially sensitive about privacy and often uncomfortable to be identified as RCB residents. Two informants from this segment were offended initially when I called them to explain my intention. They raised questions about how I had obtained their personal information and were upset about not being informed first. Such a reaction is definitely legitimate and it is a drawback that due to time constraint and limitation of the research resources at my disposal, I was not able to approach these potential informants in a more sensitive way to reassure them on the issue of privacy in the first place. Facing such a confrontation from the impacted residents, I always sincerely apologized and listened to whatever they were mad at and their complaint. In these two cases, after pouring out upset expressions, they calmed down and apologized for their reactions. I started from there and then invited them to talk about their experiences from this incident if they were still willing to participate in this research to help me to understand this incident as well as the impacts towards them.

Often, even such an initial unpleasant encounter over the phone was rich as a source of data to learn of the voice of the invisible among the invisible. Four interviews with the impacted residents without activism were conducted by telephone because they were not willing to meet in person for various reasons, such as no time to meet later, or their preference to talk over the phone, instead of meeting in person. Therefore, I went through the consent process to assure them on the issue of privacy and then started interviewing using a tape-recorder, with their consent. For several impacted people I exchanged conversations in the hospital during the health examination process, I always told them that I was a graduate student in sociology

and interested in learning of this incident and how it had impacted various people and that was the reason why I had volunteered in the hospital. If they felt comfortable with me, they usually would carry out further conversations with me during the health examinations.

Archival and Documentary Materials

Newspaper accounts and documentary texts were used as background information in order to understand how different parties became involved in this incident and constructed the incident and the risks that concerned them. This material provided essential information on the factors which shaped the situation under study, including the history of this radiation contamination incident and the formation of the environmental responses. In a grassroots environmental movement, historical data helps us to understand the shifts and developments of the movement and how this process becomes part of what we see happening now. The movement is not static, but rather a dynamic process. Therefore, we may discover how the radiation safety movement interacts with the Taiwanese social structure by studying the history of this radioactive contamination incident and the environmental group, RSPAT. Historical information on agenda setting and goals of activism, strategies of recruitment / mobilization and protest, and membership that shifts over the years helps the researcher to comprehend the current social processes s/he finds during the period of the study.

Approaches to Analyzing Data

Process of Data Analysis

The pre-interview telephone survey was also analyzed in terms of frequency distribution of the demographic and social characteristics of the members of the RSPAT and its relation to participants' levels of activism and their perceptions of the incident, as well as attitudes towards the establishment of the fourth nuclear power plant.

I employed the approach of template analysis (Crabtree and Miller, 1992) to analyzing various qualitative data that I collected. Template analysis is often referred to by other terms such as "codebook analysis" or "thematic coding." The reasons I chose to use template analysis as the approach to analyzing the data were twofold. First, compared to content analysis, where the researcher first constructs a coding scheme, and then applies it to the texts to generate the quantitative data for statistical analysis, the initial template of qualitative template analysis is employed in order to analyze the text through the coding process, but it is itself revised in the light of the ongoing analysis (King, 1998:122). Second, compared with the grounded theory approach (Strauss & Corbin, 1990), template analysis may be also preferred by "those who are not inimical to the assumptions of grounded theory, but find it too prescriptive in that it specifies procedures for data gathering and analysis which must be followed" (King, 1998: 119). In other words, the whole technique is more flexible with fewer specified procedures and permits the researcher to tailor it to match the research purpose.

The essence of the approach is that the researcher produces a list of codes (a 'template') consisting of a number of categories or themes relevant to the research questions (King, 1994). Template techniques vary in the extent to which the codebook is built upon existing literature and content of the research question (a priori) or is developed from initial analysis of the textual data (a posteriori). In both

cases, however, the codebook will be modified and added to as the researcher reads and interprets the texts (King, 1998). Two elements are involved in producing a list of codes for the template analysis. The first element is to define codes. Codes, such as "radiation contamination level," which are descriptive, require little judgement by the researcher of what the informants mean. Some codes, involving more interpretation, such as the impacted residents' perceptions of the contamination incident, may need to be defined in a more sophisticated way. The second element is to organize codes hierarchically, 'with groups of similar codes clustered together to produce more general higher-order codes" (King, 1998:119). For example, the essential issues that the impacted residents thought about initially when they realized their residences had been contaminated, different codes relating to "property value declines" and "income loss of the rent from the contaminated apartment" that may be incorporated into a single higher-order code: "economic loss from the incident."

In my research, I used the existing literature, interview questions guide, the field notes and initial analysis of my interview data to construct the initial template for studying the radiation contamination incident in Taiwan. Then, I revised the template by reading systematically through the full set of transcriptions and textual data a number of times, identifying sections of texts which are relevant to the research aims, and making them into one or more appropriate codes from the initial template. The final version of the template is constructed through the following process: repeated reading of the textual data, inserting new codes for issue in the texts of relevance to the research question but not covered by an existing code, deleting codes which were found to overlap substantially with other codes as a result of redefinition or its lack of relevance to the study, changing the scope of the code by redefining it at a lower or higher level, and changing the higher-order classification. Eventually, by identifying

the emerging themes and drawing illustrative examples from each transcript or other texts, an account of the findings of this study can be developed. The following chapters present these findings.

Concerns of Language Translation

Because of the nature of my study, the issue of language translation drew my attention. Since I conducted the individual interviews with Mandarin and Taiwanese, the validity and accuracy of translating interview questions and concepts from English to Mandarin and Taiwanese, and translating back to the sociological concepts in English, such as environmental risks, environmental consciousness, and mobilization, needs to be considered carefully. My strategy for dealing with this translation issue was to compile an appendix with lists of sociological concepts and their Mandarin / Taiwanese translations and operational definitions. I used the identical translations for interview questions and concepts across each interviewing process. If, later in the interview process, I found that the informants employed different words in Mandarin and Taiwanese, which might be similar to my original operational definitions of concepts in translation, I would clarify what they meant for those words. If they meant the same concept, I would include these words in my Mandarin / Taiwanese operational definitions. If the phrase meant something different, then I would try to find another English word to describe it when I translate back to English research reports.

Some terms in Mandarin / Taiwanese may not be exactly translated back to English words. When there are consistent differences in the use and meanings of these terms among the informants in another culture, such as Taiwan, it does have its own validity and it is necessary to further investigate what is conveyed regarding the

phenomena underlying the language differences. This investigation will enhance the researcher's insight for the research questions in a cross-cultural study. The concern with issues of translation was not only employed during the interviewing but also throughout the data collection and analysis process. In addition, the findings from the translation issues regarding the different ways that Taiwanese people perceive various environmental concepts, such as environmental risks, radiation contamination, are presented in the chapters reporting the data analysis that follow.

CHAPTER FOUR

HISTORICAL CONTEXT OF THE COBALT-60 CONTAMINATION INCIDENT IN TAIWAN

It is essential to examine the historical context during the 1980's and 1990's in which the Cobalt-60 (Co-60) contamination occurred and the history of the discovery of the Co-60 contamination incident in Taiwan in order to learn about the factors that shaped the situation under study. The first part of this chapter documents the broader political and social contexts in Taiwan since the 1980's, which provide an understanding of the social forces that shape responses from a number of key actors. Part two provides a historical overview of the discovery of the radiation contamination incident in Taiwan. Part three reviews accounts concerning the possible sources of the Co-60 contamination. The last part presents an account of the governmental responses to the contamination and the constraints of its remedy policies.

The Political and Social Contexts in Taiwan

A brief review of the political development of Taiwan and its relation to the emergence of environmentalism is in order. The Kuomintang party (KMT) established the Republic of China (ROC) on the mainland in 1911 after displacing the emperor. Almost four decades later, its leadership was challenged by the Communist Party in a civil war. Defeated in the civil war, in 1949 the KMT fled to Taiwan, where it reestablished the ROC. Since then, the KMT vigorously pursued economic growth to legitimize its political regime in Taiwan and this endeavor did lead to sharp economic growth in the 1980s, which was praised by many as an "economic miracle."

The KMT, however, did not recognize the legality of any other political party until the mid-1980s. It also discouraged citizens' participation in policy making. The democratization process in Taiwan began in the mid-1980s when the KMT took steps to introduce democratic institutions and processes to the island. The year 1986 was an important year in terms of democratization of the country. The Democratic Progressive Party (DPP), as an opposition political party, was allowed to be founded on September 28, 1986. The DPP pushed forth major constitutional reforms, including the abolition of martial law in 1987, open elections of the entire National Assembly and Legislative Yuan in 1991 and 1992, and the direct elections of the provincial governor in 1995 and president in 1996 (Kim, 2000; Tang and Tang, 1999). During this period, the KMT also lifted most of its control on the media. Therefore, diverse voices regarding social issues, such as women's rights, economic equality and environmental degradation, began to be noticed in the society. Nevertheless, up to the time of this study, 2000, the KMT still is the major party in control.

Environmental Problems and Rise of Environmentalism in Taiwan

Taiwan's economic miracle was not achieved without social costs. Air pollution from cars and motorcycles is heavy and the countryside is dotted with factories emitting air and water pollutants, many of them toxic. The petrochemical industry is one of the largest industries on the island. It fails either to prevent or to clean up its emissions so several communities have suffered from pollution. Since the petrochemical industry was considered by then governmental leaders as essential to prosperity, they encouraged its growth regardless of serious pollution of local communities (Hsiao et al., 1995). In addition, nuclear wastes from medical

applications and the three nuclear power plants were shipped to Orchid Island[1]. This action was protested and criticized as an environmental injustice by the local people.

In the 1970s, some Taiwanese scientists and intellectuals started warning the public about environmental degradation, but their voices were largely unheard (Hsiao, 1987). It was not until the 1980s, when ordinary people began to suffer pain and loss from environmental insults, that the public began to recognize the problem. Public responses to environmental problems emerged in Taiwan in the early 1980s and they took three forms: local anti-pollution protests, emergence of a nature conservation movement and an anti-nuclear movement (Hsiao, 1999). Next, I briefly present these three types of environmental activism in Taiwan and describe the composition of activists for each type.

Local anti-pollution protests

In the early 1980s, some people from contaminated communities banded together to protest because of the personal harm that they suffered. This citizen participation in environmental issues in Taiwan generally takes the form of victims' protests, derived from immediate or perceived victimization by pollution. One of the significant features of these local protests was to demand compensation from the polluters. Collective actions often ceased after compensation had been obtained. Though becoming a victim turns some people into instant "environmentalists," once goal is successfully achieved through action, many go back to their passive ways. Some of these victims, however, maintain their awareness and activism (e.g. Hsu, 1995). In addition, the growing preventive or preemptive protests in the post-martial

[1] Orchid Island is located off the southeastern coast of Taiwan. The dwellers of this island are Dawu People, one of the ethnic groups in Taiwan.

law era reveal that citizens feel a lack of confidence in state and business control of pollution as well as being a consequence of the NIMBY syndrome (Hsiao et al., 1995).

The participants in this type of activism were the local victims who resided in affected villages, townships or cities. New middle-class intellectuals and university professors and students as well as a younger generation of media reporters share their sympathy and support the victims' collective actions against industrial pollution.

The nature conservation movement

A nature conservation movement also emerged in Taiwan in the early 1980s. The Society for Wildlife and Nature (SWAN) was founded in 1982 by a group of scholars, legislators, businessmen, and students for the purpose of protecting and preserving the island's unique ecosystem. SWAN drafted a comprehensive wildlife conservation law and lobbied for its passage. It supported the five national parks, which were established in the 1980s and early 1990s.

It is important to note that women make up much of the membership of several national conservation groups. Women are not usually the public leaders of local anti-pollution protests, but in the conservation movement, they have played more important roles (Hsiao, 1999). Among the women's environmental conservation groups, the Homemaker's Union and Foundation, consisting of middle-class housewives, is the most famous example. In recent years, the conservation movement has also emphasized the need to protect varied coastal wetlands, which draws many local residents into activism (e.g., Hou, 2000). As a result, this movement has become more locally based and decentralized in character (Hsiao, 1999).

The anti-nuclear movement

The third type of environmental activism in Taiwan focuses on one goal: fighting the construction of the fourth nuclear power plant proposed by the powerful state-owned Taiwan Power Company. The new middle-class liberal intellectuals and concerned environmental groups were the main constituency of this movement before the late 1980s. From 1988 onward, the local residents of the proposed site of the fourth nuclear power plant actively joined the movement. Since then, this anti-nuclear movement has become a social movement consisting of new middle-class intellectuals, civil society organizations and local residents. The main force behind the anti-nuclear movement has been the Taiwan Environmental Protection Union (TEPU), which has coordinated varied social and organizational resources to combat the proposed nuclear power plant since the mid-1980s. Over the years, the anti-nuclear movement has been transformed into a nationwide no-nukes movement to challenge the state's energy development policy and the pro-growth myths behind it. At the same time, the public learned of criticism from scholars who challenged Taiwan's nuclear power program from a wide range of alternative media since the late 1980s and their awareness and knowledge about the danger of nuclear plants and nuclear waste rose.[2]

In the late 1980's and early 1990's, the anti-nuclear movement had developed a coalition with the major opposition political party, then the Democratic Progressive Party (DPP). In other words, conflicts over nuclear power generation have merged into a political conflict between the pro-nuclear KMT and the anti-nuclear DPP, the

[2] This was revealed in 1983 and 1986 surveys of the Taiwanese public with an island-wide stratified sample of more than 1,000 subjects. In 1983, about 30 percent believed that nuclear plants and nuclear waste were dangerous; by 1986, these percentages had risen to 63 percent for nuclear plants and to 58 percent for nuclear wastes. A fire in Taiwan's third nuclear power plant in 1985 elevated such awareness as well (Hsiao et al., 1995).

New China Party (NCP), and the most recently formed Green Party (GP) (Hsiao, 1999). After the DPP won the presidential election in 2000, the campaign for alternative programs other than nuclear power was presented in the major media, such as television, during the prime time slots for the very first time in the history.

During June and September 2000, the Department of Economics of the Taiwanese Government hosted an open debate from both sides to discuss the issue of whether to halt the construction of the fourth nuclear power, and the series of debates was broadcast live on public television. These allowed the public to learn more information about the pros and cons of the nuclear power plant and issues such as nuclear waste management (Kao, 2000). At the end of October 2000, the Executive Yuan of the Taiwanese Government, after evaluating the information presented by both sides, decided to halt the construction of the forth nuclear power plant. Since then, the opposition political party, the KMT, mobilized[3] in the Legislative Yuan and the civil society to oppose this decision, arguing that it was unconstitutional. The issue of whether this decision was unconstitutional was discussed among judges and the construction plan was recently resumed in early 2002.

Historical Overview of the Radioactive Contamination Incident in Taiwan

The discovery of the radioactive contamination incident first came to light in late 1992 via headlines and coverage in the mass media outlet, *Liberty News* (Peng, 1992). Through a reporter's investigation, it was found that between 1982 and 1984, Co-60 contaminated steel rods had been widely used in construction beams for residential and school buildings throughout Taiwan (Chang et al., 1997a). The

[3] The KMT has majority seats in the Legislative Yuan and the DPP Legislative representatives constitute minority.

consequence of this contamination incident was massive civilian exposure to excessive radiation in homes, schools, and / or workplaces. By the end of 2000, more than 200 residential / commercial building complexes[4] (equated to about 1,500 households and school classrooms) were confirmed to be contaminated[5] with gamma radiation (Interview #21). It was estimated that a total of more than 15,000 territorially dispersed adults and school children were being exposed to daily excessive low-dose rates of radiation exposure over the past 4-17 years, however, cumulatively, had suffered exposure to high doses of ionizing radiation (Hwang et al., 2001).

This massive radioactive contamination incident could be traced as far back as 1983. Several geographically dispersed risk events had been uncovered (Figure 1), but they were not the focus of public inquiry at that time. In the following section, I highlight key risk events discovered in this RCB incident in order to understand the historical context that shaped the later developments of the RCB incident and the ongoing process of interactions among the radiation safety movement representatives, the government, and the wider Taiwanese society.

1983 ICBC Event

In 1983 the TAEC discovered that the steel construction rods for an office building of the International Commercial Bank of China (ICBC) had been contaminated by Cobalt-60 and that the radiation level was highly in excess of the

[4] Most of these contaminated building complexes were discovered in the northern Taiwan area. They were randomly distributed among affluent neighborhoods as well as working class neighborhoods. Most of these buildings are four to seven-story building complexes with a mixture of private residences and businesses, which are usually on the first floor.

[5] The contamination patterns in these building complexes were random, however. In some complexes, the contamination occurred in households of the same floor. The radiation contamination levels varied in the same complex.

regulatory safety level. The TAEC suggested that this building be torn down and re-constructed in order to remove the contaminated rods. These contaminated steel rods, along with the remaining contaminated rods, which had not been used previously, were buried at the steel factory's waste storage site under the supervision of the TAEC (Bi, 1994). In an effort to avoid widespread societal panic, the TAEC did not conduct further investigation of other possible contamination areas. It closed the case with a report that concluded:

> This is an independent incident without other steel manufacturing companies involved. If it was publicized, it might cause rumors and influence the export of the steel rods, as well as stir up unnecessary social fears on the security of construction steel rods. Therefore, this case should be solved confidentially and peacefully between parties involved, who especially should avoid blaming and conflict between parties in order to avoid being targets of the media, and lead to a worse consequence. (Sato, 1993: 83)

1985 Chih-Yuan Dental Clinic Event

In March 1985, during a routine inspection of a dental clinic in Min-Sheng Villa (MSV) in Taipei, following the installation of an X-ray machine, the TAEC found that areas of the clinic had been contaminated with high levels of gamma-irradiation even when the X-ray machine was not in operation. After further investigation, the TAEC found that the high radioactivity (reaching 1,000 *u* Sv/h, compared with the 0.1 *u* Sv/h of general background radiation in most Taiwanese buildings) came from the walls of the building (Interview #1). Before it would issue a license, the TAEC required the dental clinic to shield the walls with lead in order to decrease the level of radioactivity exposure. The TAEC did not notify either the owner of the dental clinic or the other occupants of the building complex about the

excessive radioactivity. Instead, it informed the dental clinic's owner that no one but the dentists, staff workers and patients should stay in the X-ray room (Bi, 1994: 10).

During this time, no further actions were taken publicly by the TAEC to trace the origins of the problem or locate other buildings. According to an investigative report of the TAEC (Bi, 1994), the agency had once intended to trace the origins of the contaminated steel rods and the TAEC investigators believed that the source of these contaminated steel rods might be the same as those contaminated ones in the case of ICBC (Sato, 1993: 83; Wang, 1996: 34). The TAEC, however, did not publicly trace the contamination source but instead shielded this incident from the public's awareness. Thus, the owner of the dental clinic and other residents in MSV continued to live in an environment with high radioactive contamination, without any knowledge of their exposure to radioactive materials.

1988 Outbreak of ICBC Event in the Media

In April 1988, a local newspaper, *Liberty News*, reported on the front page that several tons of Co-60 contaminated metal scraps were circulating in the Taiwan construction market and appealed for the TAEC's attention to this issue (*Liberty News* 04/07/1988; 04/09/1988; 04/10/1988; 04/12/1988; 04/13/1988; 04/14/1988). This issue was not, however, further reported and it was paid no further attention at that time. On the contrary, the TAEC responded to the media by stressing that: "according to the data, all the contaminated steel rods should have been already collected back" (*Liberty News* 04/13/1988). This act of the TAEC once again hindered an opportunity to prevent the further dissemination of the contamination incident, and it thereby prolonged the unnecessary and involuntary civilian radiation exposures.

1992 Discovery of Min-Sheng Villa Event

In August 1992, K. Peng, the *Liberty News* reporter, who had reported the possible contamination in construction materials in Taipei in 1988, received a further anonymous tip from an employee of the TAEC. Based on this, he, therefore, checked a few blocks along Long-Chiang Street in downtown Taipei, in MSV, in the same apartment complex the dental clinic with high-radioactivity was located, with a Geiger-Mueller meter (Chang et al., 1997a). He found spots of contamination on the stairways and entrance to the MSV. *Liberty News* reported this information on 22 August 1992 (*Liberty News* 08/22/1992), resulting in the disclosure of the news concerning the radiation contamination to the public.

This news was a shock to the residents of the MSV. The residents therefore requested the TAEC to conduct a thorough investigation and thirty-four among seventy households were identified with Co-60 contamination in their residences. The highest radiation level of contamination was 7.1 Rem/yr. (Wang, 1996: 147). Residents urged the TAEC to relocate them by employing the standard of evacuation used in the Chernobyl hazard. The TAEC rejected this suggestion, arguing that there was no urgent need to relocate people. The TAEC reasoned that the MSV incident represented chronic exposure with low levels of radiation, and was thus unlike the case of Chernobyl, which was an accidental rapid exposure to high levels of radiation (Interview #1). Not having received the desired assistance and being frustrated at the passive responses of the TAEC, the residents of the MSV organized a self-help committee in September. They appealed to various governmental agencies in order to get physical examinations, and compensation for relocation as well as the reconstruction of their contaminated apartments.

Following the MSV event, the revelation of the news of the Co-60 contamination in the residential areas became widespread in Taiwan. The existence of many contaminated buildings was gradually uncovered. Most of them are located in Taipei City and Taipei County. More than 80% of the contaminated buildings employed construction steel rods that had been supplied directly or indirectly by a single source, the Shin-Long Steel Factory (SLSF), during the period from October 1982 to April 1983 (Chang et al., 1997a: 469). At this stage, a number of congressmen began paying attention to this massive residential radioactive contamination incident. They were involved in facilitating opportunities for impacted citizens to have public hearings and press coverage. They also urged the Executive Yuan to use its fiscal budget to help the impacted residents to move out of the contaminated apartments and to obtain the physical examinations. In spite of the congressional representatives' involvement, initially impacted residents in the MSV and other apartment complexes experienced difficulty in obtaining subsidies from the government for moving out of their apartments. Some of the impacted citizens who were under financial constraints have never been able to move out and still continue to live in the contaminated apartments (Interview #1, #23, #24, #25, #28, and #34).

The First Collective Civil Action

By the end of 1992, uncertainty had risen about the physical impact of the previous eight or nine years of radiation exposure, and there was prolonged frustration from the passive responses of the TAEC to MSV's residents. Therefore, with encouragement from members of the Taiwan Environmental Protection Union (TEPU), these residents formed a local citizen protest group, the Radiation Victims

Association in Taiwan (RVAT).[6] The group approached various governmental agencies for assistance with their health examination, re-construction of their apartments, and compensation for a number of harms, including impacts on property loss, physical health and mental stress.

On May 13 1994, residents of the MSV sent a letter to the TAEC to demand compensation in accordance with the *State Tort Compensation Law* (STCL)[7]. On July 20, the TAEC rejected this demand. After receiving this reply, fifty-seven residents of the MSV brought a collective civil action against the TAEC before the Taipei District Court, seeking compensation totaling about US$3,400,000 under the STCL. On October 14, 1997, the judgement was handed down in partial favor of the plaintiffs. Both parties soon appealed against this judgement to the Taiwan Appellate Court (Hwang et al., 2001). This case was pending for more than four years. The judgement was not handed down until early 2002 when the ruling favored the MSV residents.

Other Local Protests and Its Transformation

In the growing discovery of radioactive contamination in apartment building complexes other than MSV, in 1992 and 1993, short-term local protests were conducted in six territorially dispersed apartment complexes. The RSPAT initially played a role in organizing the impacted residents from territorially dispersed apartment complexes to mobilize together to deal with mass civilian radiation

[6] The Radiation Victims Association in Taiwan (RVAT) was renamed to the Radiation Safety and Protection Association in Taiwan in the year 1994 when it registered with the Interior Department of the Taiwan Government as a non-governmental organization. On the ground that there were no radiation victims in Taiwan, ROC, the government demanded its name to be changed in order to have it legally registered as a NGO (Interview #1).

[7] Article 10 of the STCL requires each victim initiate a negotiation process with the government authorities concerned for a possible agreement on compensation before going to court.

exposure. In 1992 and 1993, the RSPAT had more than 300 members, mostly consisting of impacted residents from these territorially dispersed contaminated apartment complexes. Later in 1993, however, a transformation in what seemed to be a relatively familiar grassroots environmental response appeared. Impacted resident activists decreased their involvement and were replaced by activists whose residences had not been contaminated by Co-60. Increasingly, the members of the RSPAT were dominated by a constituency representing volunteers, and the legal, medical and other professions, who were driven by goals that emphasized a legalization of radiation safety management and policy and systematic medical examinations for all impacted residents, as well as reconstruction of the contaminated apartment complexes, in which radiation levels are over 0.5rem/yr. in order to remove the contaminant. These goals replaced the earlier emphasis on monetary compensation to cover the costs of relocation.

Figure 1: Chronological events (*) related to RCB incident in Taiwan, 1982-2002

Time	Event
Oct 1982-Apr 1983	Shih-Long Steel Factory bought contaminated steel rods, resmelted and sold them. Approximately 20,000 tons of steel were produced during this period.
Jan 1983	Co-60 contaminated steel was detected in the first nuclear power plant in Taipei County.
Feb 1983	Tai-Yang Co. in Taipei County exported contaminated plumbing fitting to CA, U.S.
Mar 1983	The Taiwan Atomic Energy Council (TAEC) found contaminated steels in the International Commercial Bank of China (ICBC) building in Taipei City.
Apr 1983	Chih-Yuan dental clinic moved into the Ming-Sheen Villa (MSV), which was constructed from Jan 1983 to Dec 1983 in downtown Taipei.
Aug 1984	GA Technology in CA, U.S., first identified contaminated plumbing fitting imported from Tai-Yang Co. in Taiwan.
Sep 1984	Nuclear Regulatory Commission (NRC), U.S., notified the TAEC to examine the contaminants.
Mar 1985	The TAEC confirmed elevated radiation levels in Chih-Yuan dental clinic in MSV. The notification was neither made to the dentist, residents in MSV, nor to the media or the public.
Apr 1988	Liberty News in Taiwan reported suspicious Co-60 contamination in buildings in Taipei. It was not paid attention to by the public. No further follow-up was carried out by the government.
Dec 1988	U.S. naval submarine identified contaminated shower kits, also possibly imported from Taiwan.
Jul 1992	Contamination was found in TaiPower Employee's Dormitory in Taipei.
Aug 1992	Elevated levels of radiation were measured in the MSV by Reporter Peng of Liberty News.
May 1994	The TAEC issued the *Regulation for Prevention and Handling of Radiation Contaminated Buildings* that sets standards for regulations governing and monitoring construction materials, As well as guidelines for assistance that impacted residents may receive from the government.
May 1994	MSV sent a letter to the TAEC to demand compensation in accordance with the State Tort Compensation Law (STCL).
Jul 1994	The TAEC rejected the demand from MSV residents. Fifty-seven residents in MSV brought a collective civil action against the TAEC before the Taipei District Court seeking compensation totaling about US $ 3,400,000 under the STCL.
Jul 1994	The Executive Yuan of Taiwan Government announced a management plan for around 1,000 residents and school students who received doses exceeding 5mSv in any year since 1983.
May 1995	The Taipei City Government provided a relief and assistance plan, the *Regulation in the Management and Assistance for Residents in Residences with Excessive Radiation Contamination*, for those with 1-5 mSv exposure during any one year from 1983-1995.
Oct 1997	The judgment for the collective civil action against the TAEC was handed down in partial favor of the plaintiffs. Both MSV residents and the TAEC appealed against this judgment. This case had been pending for more than four years.
May 2000	The TAEC proposed the *Regulation for Protection Against Ionizing Radiation* and sent it to the Executive Yuan of the Taiwan Government.
Oct 2001	The Executive Yuan of Taiwan Government agreed that RCB residents could receive loans with low APR as those residents in the earthquake-damaged areas did in order to reconstruct their apartment complexes as soon as possible.
Feb 2002	The judgment for the collective civil action against the TAEC was handed down by the Taiwan Appellate Court to favor of the MSV residents.

(*) Data on Figure 1 before May 1995 are derived from Figure 2 of Chang et al. (1997). Chronological events between 1995 and 2002 are compiled by the author.

Possible Contamination Sources

This residential radiation contamination in Taiwan has affected many people's lives economically, emotionally and physically in a range of degrees. Where the sources of the contamination agent, namely, Co-60, came from is an intriguing question for the public. How was Co-60 mixed into the manufacturing process for the construction steel? A number of perspectives exist for addressing these questions. One explanation was provided by the TAEC[8] based on an analysis of some contaminated steel rods from a few buildings. It was found that the construction steel produced by the SLSF from December 1982 to January 1983 had a much higher radioactivity, up to 6,142 Bq g –1, than the steel produced between October and November 1982 or between February and April 1983, which contained no more than 11 Bq g –1. The production of contaminated steel spanned at least seven months and the concentration of Co-60 varied by several orders of magnitude. Since the contaminated steel from the earliest period was not the most radioactive, this suggested that more than one Co-60 source might be involved (Chang et al., 1997a: 469). According to previous experiences in similar Co-60 contamination incidents (Lubenau & Nussbaumer, 1986; Lubenau & Yusko, 1995), it is unlikely that a single dismantled Co-60 radiotherapy unit would generate steel with a much higher Co-60 content over a shorter production period. Only multiple radiotherapy units mixed in the furnace could possibly generate a similar contamination pattern in the construction steel. Since the distribution of medical and technological sources of Co-60 is limited and strictly maintained in Taiwan, such an episode seems very unlikely.

Another possible radiation contamination source was through the loss of a sealed Co-60 gauge from the steel melting furnace itself (Chang et al., 1997a). These

gauges, usually, contain only a small quantity of Co-60 (less than 2 Ci), which would not have produced such a large quantity of contaminated steel rods. In addition, the SLSF employed a traditional melting furnace that did not use a Co-60 gauge for content measurement during 1982-1983. Therefore, this possibility was ruled out as well. Several hypotheses have been proposed to explain the complex distribution of contaminated steel within the construction market (Chang et al., 1997a). However, because many factors were involved, it has been difficult to determine the exact supply and distribution pattern of the contaminated materials years later.

The TAEC and the RSPAT provided different accounts regarding what the sources of Co-60 were. The investigation report of the Co-60 contamination incident by the TAEC suggested that the source of Co-60 might come from the grain of Co-60, which had been lost by the Army Chemistry College (ACC)[9] (Interview #31). This suggestion was based on three pieces of evidence. First, the time of occurrence of the two events was quite close, since the Army Chemistry College lost one of its Co-60 grains in September 1982 and the contaminated steel rods were produced in October 1982. Second, evidence was based on geographical proximity. It was only about ten kilometers between the SLSF and the Army Chemistry College. Third, the sum of radioactivity from analysis of contamination samples of the MSV and a few other apartment complexes was close to 23.8 Ci, the radioactivity of the lost grain.

Based on further inquiry with the ACC that revealed a couple of discrepancies, the RSPAT did not accept these explanations. One of the inconsistencies was that the

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[8] Radioactivity analysis from the Institute of Nuclear Energy Research, TAEC, Taiwan, 1994.
[9] In September, 1982, the ACC found that one Co-60 grain, which was stored in the No. 120 buried site, had disappeared. The radioactivity of this lost Co-60 grain was 23.8 Ci. Later, one Co-60 grain, with radioactivity of 5 Ci, was discovered in the burial site. It was, however, different from the one which was lost. Therefore, officials in the TAEC suspected that the ACC lost more than one Co-60 grain. The TAEC estimated 3-5 Co-60 grains were lost from the ACC's buried site, not only one as the ACC reported.

estimated amount of the contaminated construction bars from the RCBs was about fifty times the amount which could be generated from the lost Co-60 grain (Wang, 1996:59). Instead, using the transaction records between the SLSF and the Taipower as evidence, the RSPAT stated (Wang, 1996: 60-66) that the source of Co-60 was contaminated wastes and scraps of the nuclear power plants facilities, which Taipower did not manage and / or store properly but sold to scrap collectors for market reuse. Taipower and the TAEC denied this explanation. Taipower emphasized that it had never sold scraps from the nuclear power plants to the scrap market. Additional controversies emerged between the RSPAT and the TAEC over whether other nuclides, such as Strontium and Cesium, also would be found in the analysis of the contamination samples, if the scraps were from nuclear power plants (Interview #1, #21 and #31). Therefore, questions regarding the cause of this contamination and who should be responsible for it have never been answered definitively.

Governmental Remedy Actions

The National Surveys

At the time of initial discovery of the radiation contamination incident in Tien-Mu, Taipei (ICBC event), in 1983, the TAEC investigated and supervised the steel rod manufacturing company's collection of the contaminated steel rods and their subsequent burial at the waste storage site. On the grounds of avoiding societal panic, the TAEC avoided investigating other possible contamination areas, even after finding that the source of the contaminated steel rods in the cases of ICBC and MSV might be identical. This TAEC decision blocked the opportunity to prevent further dissemination of this contamination incident, and also caused the MSV residents to be exposed to excessive radiation unnecessarily.

It was not until the end of 1992, after the discovery of the MSV event, that the TAEC responded to the crisis and conducted a nation-wide survey by offering domestically produced LiF thermoluminescence dosimeters (TLDs) to those who owned apartments constructed during 1982 and 1984 in Taiwan. The TAEC also sent staff workers to conduct further detection at those households, where TLD had recorded measures that exceeded the background level of radiation. A second survey was conducted later to trace those households not investigated in the first inquiry (Interview #36, #37, #38). In addition, in order to enhance public awareness of all the buildings with elevated levels of radiation, after buildings and apartments were identified as contaminated, the TAEC informed the local governmental offices so that the buildings were registered and posted.

Arrangement of Physical Examinations

In response to the impacted residents' health concerns, the TAEC arranged for about 200 residents in MSV to have physical examinations in November 1992. Reports of these examinations did not support a link between chronic radiation exposure and development of cancer, and estimated that the probability of cancer evidence would be only slightly higher than that for persons who had experienced chronic radiation exposure. The residents of the MSV disagreed with this conclusion and sought external medical assistance. In October 1993, thirteen of the residents visited the Mazda Hospital in Hiroshima, Japan, and received a comprehensive medical examination similar to that provided for the atomic bomb survivors in Japan (Yumi-Vli News 1993). Five children were found to have lymphatic disorders, one child had cataracts in both eyes, one adult had hypothyroidism (Chang et al., 1997b) and eleven had chromosome abnormality, four of whom also had chromosome

dislocation (Bi, 1994). This attracted the medical community's attention, and its members urged the government to pay more attention to this warning signal and respond to the increasing discovery of RCBs.

In May 1994, the Executive Yuan of the Taiwanese government announced a management plan for Co-60 exposure victims. According to the plan, all those who resided in apartments or studied in classrooms in identified contaminated buildings who had received a dose of more than 5 mSv above natural background in any year since 1984 would be eligible for a government-sponsored comprehensive medical examination (Chang, 1997a: 471). The medical examinations were coordinated by the Department of Health and the Medical Professionals Alliance in Taiwan (MPAT) and all the major hospitals in Taiwan were asked to provide medical services. About 2,000 impacted people have received physical examinations. Since 1995, the TAEC took charge of coordinating this medical study in relation to the governmental budget.[10] This decision, however, has been criticized by the RSPAT. In light of the past actions of the TAEC, the RSPAT does not consider the TAEC as the appropriate governmental agency to arrange for the impacted people's health examinations. Instead, the RSPAT emphasizes that the agency in charge should be the Department of Health.

Changes in Risk Monitoring and Regulation

In response to the Co-60 incident, two regulations were passed at the central and local government levels. In May 1994, the TAEC issued the *Regulation for Prevention and Handling of Radiation Contaminated Buildings* that sets standards for

[10] According to TAEC officials' accounts (Interview #36, #37 and # 38), some people (relative or in-law of RCB residents), who did not live in the RCBs, abused the resources of the health examination

regulations governing and monitoring construction materials, as well as guidelines for assistance that impacted residents may receive from the government. Based on these regulations, all publicly-contracted or private construction companies should provide certification that radioactive steel is not used during the construction. The documents can only be granted to qualified steel factories that install a radiation detector to monitor all products before shipping to a construction site. This seeks to prevent further incidents and protect future consumers. Impacted households are divided into three categories – high, medium or low levels of radiation in impacted apartments. These three contamination levels were set up in order to legitimate whether impacted households would be eligible to receive monetary compensation, a subsidy, or be eligible to sell their apartments to the TAEC.

The second regulation was passed on the local government level in 1995 – the *Regulation in the Management and Assistance for Residents in Residences with Excessive Radiation Contamination.* This regulation adopted the standard of International Commision on Radiological Protection (ICRP-30), taking 1mSv as the standard for handling the Radioactive Contmaniation Building (RCB) cases in Taipei City, and arranging for impacted residents in Taipei City to have a systematic health examination and regular check-ups. This second local-level regulation functioned to promote public awareness of radiation protection. At the same time, the RSPAT urged the central government's risk management institution, namely the TAEC, to adopt the international standard, just as the local government had, in order to better protect the public from radiation risks. In addition, the *Regulation for Protection Against Ionizing Radiation* has been proposed and it was sent by the TAEC to the

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by registering for health examination. Therefore, it is necessary to monitor the legitimacy of an individual's participation in health examinations in order to wisely use the governmental budget.

Executive Yuan of the Taiwanese government in May 2000. Hopefully it will be adopted in the near future in order to protect the public from unnecessary exposure by better regulating ionizing radiation.

Constraints of Policy Implementations

Even though the *Regulation for Prevention and Handling of Radiation Contaminated Buildings* provided guidelines of assistance that impacted residents might receive from the government, it did not accomplish the removal of the contamination sources from the affected apartment complexes. Several constraints embedded in this regulation hindered the clean up of the contaminant. The regulation defines impacted residents only as those whose households have been contaminated with Co-60 and limits availability of subsidies or compensation only to these persons. Controversies over issues of fairness have therefore arisen among residents in several contaminated apartment complexes. While some impacted residents in the contaminated apartment complex desired that the entire building complex be reconstructed in order to remove the contaminants absolutely, some of the residents in the same complex whose households were not identified as RCBs either opposed the reconstruction, or demanded that they receive an extra apartment after the reconstruction in order to compensate them for their economic losses. Because of the controversy over this issue of equitable treatment for all affected residents of the contaminated complexes, up to the present, most of the RCBs with elevated radioactivity could not be torn down in order to remove the contaminants.

In addition, in several complexes which were identified with high levels of radioactive contamination, some of the households, with high background radioactivity but without contaminated "hot spots" in the households, were not qualified to receive either subsidies or compensation for relocating. Residents in such

households were trapped and not assisted by the regulation. Moreover, if a case manifested a radioactivity below 15 Rem/ yr., the standard for the TAEC to purchase the contaminated apartment, it could not be sold to the TAEC. In some cases, there were so many contaminated hot spots in an apartment that it became too dangerous to undertake the project of replacing the contaminated rods with non-contaminated ones. In such a situation, it was also undesirable to place lead shields on the contaminated spots because too much lead might result in lead poisoning. Under the circumstance of the regulatory constraints and financial limitations, many people could neither move away nor detoxify the contamination in the household.

By defining the impacted RCB residents and dividing them into three groups, the regulation automatically separated people in the contaminated apartment complexes from one another. Setting standards for three levels of radiation contamination with associated criteria for varied assistance levels, the regulation caused those people who received low or no subsidies to feel that they were being treated unfairly in spite of their experience of varied degrees of impact from the contamination. Impacts, such as economic loss deriving from the social stigma of the contaminated neighborhood, affected them as well. Nevertheless, since some residents in the contaminated complexes consider the risks to physical health emerging from this incident to be bounded only in those households officially identified as RCBs, they tend to see the incident as exclusively their RCB neighbors' problems. Therefore non-RCB residents oppose the proposal of tearing down and rebuilding the contaminated complex. Constraints of remedy policies have indirectly caused social corrosion among neighbors in the contaminated complex and hinder the detoxification process in those complexes in which high levels of radiation were manifest. The following account reveals such social corrosion.

> After we fought with varied governmental agencies to assist us to reconstruct our complex, the irony is we [all the residents in the complex] cannot reach consensus regarding this matter among us [to have all the residents agree to reconstruct the complex]. To tell you the truth, people are selfish ... several neighbors said that there was no contamination in their households so why should they agree to reconstruct the complex if they cannot get an extra apartment. What can we [the impacted residents] say about this to them? It is not me who caused this problem and I am the victim ... why can they not be understanding our situation? ... (Interview #9)

An additional drawback of the governmental remedy policy was responsible for further community corrosion. The regulation designates that the recipient of the compensation / subsidies for relocation must be the person whose household is registered at the address of the RCB. In Taiwan, many renters do not register their households at the location of their rental residence. Instead, the owner's household members are registered as residents of the apartment. As a consequence, social corrosion arose from the fact that landlords were legitimately entitled to receive the compensation and they excluded the renters, who had actually resided in the RCB and needed to move out, from sharing the compensation for relocation. An account from a local activist revealed this tension between the landlord and the renters.

> ... in the beginning when the contamination was discovered, the landlord wanted us to entrust him with authority to negotiate with governmental officials. We did, but see what he has done? Nothing ... He just wanted power, but did not do anything for our good. Gradually, many of us [the residents in the complex, renters and / or owners of the apartments] were upset with him. ... We, then decided to take actions by ourselves ... in the process of our organizing to protest to varied governmental agencies, we also found out some secrets about the landlord's selfish acts in the past ... Later on, some [residents who were renters] were really upset because they were excluded by the landlord from receiving compensation for relocation ... (Interview #28)

Summary

The residential radiation contamination incident in Taiwan occurred in the early 1980's, the era when the country was still under an authoritarian regime. The fact of contamination was played down by then officials of the risk management institution in the name of avoiding provoking societal hysteria and negatively impacting the competitiveness of domestic construction steels in the global market. Government's failure to publicly investigate the incident attenuated the risk signals and unnecessarily prolonged the exposures of many citizens to radiation contamination in their households. Following the lifting of martial law in 1987, social control of the media was also lifted. News of the circulation of Co-60 contaminated construction bars in the construction market was reported in 1988 in an effort to provoke governmental attention but it did not draw much response from either the government or the public.

This mass civilian exposure to residential Co-60 radiation contamination finally came to light in 1992. It later caught the public's attention when the intensive media coverage revealed relatively high levels of contamination in the MSV, an affluent neighborhood in downtown Taipei City whose residents protested the incident to varied governmental agencies. With local activists from the MSV as catalysts, these activities facilitated other collective actions designed to seek governmental assistance in several other geographically dispersed apartment complexes during 1992 and 1993. Beginning in later 1992 the government conducted national surveys to locate other contaminated apartment complexes in Taiwan.

A report on the medical study for the first physical examination that the government had arranged for about 200 residents in the MSV was rejected by MSV

impacted residents. These affected citizens sought external assistance from Japanese medical researchers whose studies concluded that varied medical problems had occurred among affected adults and children from the MSV. This resulted in the Taiwanese medical community urging governmental attention in order to respond effectively to the increasing discovery of RCBs. In May 1994, the government issued the *Regulation for Preventing and Handling of Radiation Contamination Buildings* for governing and managing the contamination and at the same time it announced a management plan to arrange for Co-60 impacted people to receive health examinations. This management plan excluded any impacted citizens who had received a dose above 1mSv/yr. but less than 5mSv/yr. Later in 1995, a local regulation, *Regulation in the Management and Assistance for Resident in Residences with Excessive Radiation Contamination*, was passed by the Taipei City Government which was ruled by the then opposition party, the DPP. This regulation adopted the international standard, regarding anyone whose household revealed a radiation level of more than 1mSv/yr as qualifying to receive health examinations and subsidies for detoxification projects.

Since the remedy policy from the central government had categorized the impacted citizens into three separate groups in terms of differential access to subsided treatments, it inevitably divided the residents of the same contaminated complex from one another and weakened the solidarity of their identity as impacted residents of the RCBs. In addition, differentiated remedy policies between the central and local governments split the impacted residents of the Taipei City and Taipei County. Except for a few apartments with extremely high levels of radiation contamination which the TAEC purchased from the owners and detoxified, many of the RCBs with excessive radiation contamination have not undergone detoxification aside from the

natural attenuation of the radiation level over time. The reconstruction plans for several complexes with high levels of radiation contamination have never achieved consensus among all the residents, which results in the continuing contamination of many of these households.

CHAPTER FIVE

SOCIAL CONSTRUCTION OF RISK: VARIED PERCEPTIONS OF KEY ACTORS

The chronic technological disaster (CTD) literature shows that the inherent ambiguity of toxic contamination makes it particularly common for social groups to develop a range of risk perceptions for these crises. In other words, because of CTD's long duration and the high level of human / technological involvements in CTDs that result in different interpretations of problems and varied demands for remedies, it appears that these technological disasters tend to produce conflicts among affected people and / or other key actors involved in the disaster. While sharing similar phenomena to those depicted in the CTD literature, this in-depth case study of the RCB incident in Taiwan serves to further clarify the process of social construction of risks with specific reference to responses of the various parties involved in this incident. In this chapter, the analysis of how varied risk perceptions are constructed is presented in two parts. First, I present perceived risks from different parties involved in this RCB incident, including the impacted residents, activists who have not been directly impacted, and finally the governmental officials from the TAEC. Second, factors that shape the risk perceptions are scrutinized.

The Perceived Risks and Concerns from Different Parties Involved in This Incident?

The Impacted Residents

The impacted residents in this study are defined as people whose apartments were identified by the TAEC as RCBs because of the presence of Co-60 in their households. Among these residents, there are two groups. The first group consists of

people who have / had responded to this incident with collective actions. The other group is composed of the majority of RCB residents who have never participated in any activism. I had planned to interview at least ten representatives from each group to secure a representative sample, however, because of technical difficulty,[1] I was only able to interview four impacted residents who had no record of activism. The following analysis is based on the accounts of seventeen impacted residents who participated in activism and the other four impacted residents who have never taken collective action.

In responding to the question of how would s/he describe the Co-60 incident that had been impacting some Taiwanese residents, several of the impacted residents said their first reaction was shock and the question, why me? (Interview #2, #10, #20, #23, #24, #25, #28, #30, #33). In addition, it was reported that some impacted residents were concerned about being identified as RCB residents because that meant they could not sell the apartment or rent it out to get rid of the hot potato.

> My neighbor found out that several apartments, including hers, in this complex were contaminated and she was afraid that other people knew her apartment was a RCB (laughing) ... She was concerned that she could not sell the apartment any more .... (Interview #30)

> My neighbor hid the fact of the contamination ... then he rented one of his apartments in this complex to a renter, who had no idea that the apartment was contaminated by radiation ... My neighbor even asked me not to let others know .... (Interview #26)

[1] When I asked the informants to provide their neighbors' names and phone numbers to me, none of them released any. The reasons included that they did not know who their neighbors were or their neighbors would not be interested in meeting with me. After I probed for why they thought so, I found that conflicts had occurred among them regarding the issue of fairness for the allocation of new apartments if the building complex would be reconstructed.

After recognizing the contamination of their residence, some affected residents started suspecting that their illness or neighbors' cancers might be associated with chronic radiation exposure.

> After I knew there was radiation in my home, I wondered whether my diarrhea and frequent vomiting problems related to this radiation. Also, my daughter got an ovary tumor in her twenties. Wasn't that unusual for such a young woman? (Interview #20)

> From reading the brochure left by the TAEC, I started realizing that my two miscarriages in previous years might have relation with this radiation ... then three neighbors died from cancers in their thirties and that also became suspicious to me. (Interview #28)

Further, fear and worry for unknown physical harms from the radiation exposure, especially at the time of initial discovery, were reported (Interview #1, #2, #7, #8, #9, #10, #16, #18, #19, #20, #23, #24, #25, #26, #27, #28, #30, #33). Some of the accounts are as follows:

> I had lots of thought on this ... In May, 1996, my wife had surgery. After surgery, she lived in the apartment for about ten months and then she died. She was getting weaker physically during that time ... If I knew our apartment was contaminated then, I would not have let her go back to the apartment after surgery. You know ... She had worked at home for prolonged hours each day with her bare feet without slippers on ... After she died, I experienced more concern about my children's health, so since then I have taken them to have physical examination each year. (Interview #33)

> Of course I am concerned about health ... so far nothing wrong happened but it's the fear of the unknown ... I and my wife, we are old and we don't have many years to live. But children still have a long way to go and you don't know what will happen to them ... (Interview #19)

As time goes by, however, and the results of physical examinations do not show something severely negative, such fear and worry declines.

Economic loss is a dominant concern for many impacted residents. It was said (telephone interview #29, Interview #14) that once the contamination was confirmed and publicized, the property value declined. Then the impacted people could not get a loan from the bank anymore. In addition, since relocation does cost a certain amount of money, which is an especially big challenge to working class people, in facing economic hardship, some people ended up staying at their contaminated homes. Here are some accounts of the impacted residents who have stayed at their contaminated apartments since the discovery of the contamination:

> Well, this grocery store has been my income source. If I don't stay here to keep this business, I have no income. The new apartment that the National Housing Office assigned to me was much smaller and I cannot have a grocery store over there. Why should I still stay here? I cannot survive if I do not keep my business going on. Therefore, I made a decision to give up moving into a new apartment and continued keeping my grocery business and living in this apartment. (Interview #9)

> At the beginning, the TAEC offered NT$4,000,000 [equivalent to $ 121,212] to buy our apartment ... The offer was less than the value that this apartment should have. We spent our life-long savings on this apartment and felt it's a great loss if it was sold to the TAEC at such a price. In addition, we would need to have a loan if we decided to sell this apartment to the TAEC and moved to another place ... Therefore, we didn't respond to this offer initially ... Later on, after thinking and discussion with family members, we decided to sell this apartment to the TAEC, but it was too late ... The deadline of the TAEC's offer passed. (Interview #24)

> Since there is no physical manifestation of illness so far ... though you have the fear of the unknown, when under economic constraints, you just have no choices, so you've got to keep staying here to gamble ... When facing economic hardship, to die seems not too bad ... (laughing) It's a gamble ... a chronic suicide ... (Interview #19)

Several affected residents thought of the radiation contamination in their households as a result of bad luck (Interview #1, #2, #23, #25, #26, #30).

Nevertheless, they also considered that the government should be held accountable for failures in monitoring and risk management (Interview #1, #2, #25, #26). As one of them indicated:

> Yeah, it's bad luck to have the presence of radiation in my apartment ... Later, I felt it's unfair for me to be put into this situation [in such a huge loss]. Neither should I be responsible for this incident, nor should the construction company be ... the construction company did not know the construction bars had been contaminated, either. You just cannot tell whether the construction bars are contaminated or not by your eyes. It's not the citizens' fault for the contaminated construction bars flowing into the market, but it is the fault of the government ... it should have monitored and prevented it from happening in the first place ... (Interview #26).

Though the affected residents shared the view of bad luck as the reason for the contamination of their households, they thought that it was the government's responsibility to prevent the contamination from happening. There is a difference in this mentality between those who had participated in collective actions and those who had no history of activism. People who participated in collective actions reported that even though they were unlucky, they would like this bad luck to cease. They believed that by speaking out and pushing the government to deal with this incident in a more effective way, they would help the public to be protected from further unnecessary radiation exposure (Interview #1, #2, #26). People who took no collective action often indicated that they wanted to forget such bad luck. It was as if it never happened if they did not think about it (Interview #23, #25). Given the fact that people consider that the government should be held accountable in dealing with this incident, some of them do take actions to appeal to the government, but some do not. Further investigation to scrutinize this differentiation will be presented in the next chapter's analysis of collective action.

In contrast to residents who did not display activism, the affected residents who participated in collective actions were all more articulate in their knowledge of radiation, the measurement of radiation levels, and how radiation exposure relates to health. One of the affected residents has become a lay-expert on health physics and published two books (Wang, 1996 & 2000) to advocate for increased public awareness of radiation's harm to human health. In contrast, non-activist impacted residents, when asked about the level of radiation in their households, were not able to tell what the radiation levels were in their apartment and often indicated that they did not have much knowledge about radiation (Interview #23, #24).

Some other observations about the non-activist impacted residents indicate that they do not think much about this incident because it helps them to function in their normal life in the midst of economic constraints and anxiety caused by the unknown. In other words, cognitive readjustment has been developed to rationalize their actions and keep their lives going. In addition, people who have stayed at their contaminated home often indicated that they were not fearful and concerned about children's health as long as no manifestation of physical harms happened (Interview #19, #23, #24, #25). I probed this answer by asking, "Are you saying that since the child was born healthy, you thus don't worry much about the impact on their health from the radiation exposure?" In response, they further explained that the economic constraints put them into a position where they had to think about it in a positive way. As one of them said:

> It's not just because the child looked healthy ... Instead, ... it's impossible to buy or rent another apartment to move out ... economically, we just cannot afford to do so ... (Interview #23)

The Non-Impacted Activists

Here I define non-impacted activists as people who did not live in any of the contaminated building complexes and have or had membership in the RSPAT as well as had participated in various activities initiated by the RSPAT. In response to the question asking how would s/he describe the Co-60 incident that had been impacting some Taiwanese residents, the non-impacted activists tended to emphasize that the health impacts from radiation exposure to people are huge (Interview #4, #5, #11, #15). One such respondent noted:

> For those who got pregnant in the RCBs, their fetus could be badly damaged. Once the fetus was irradiated, the cells would be abnormal. Since genes were damaged, the next generation of these kids is also possibly born with defects. So, the effect on health is prolonged ... (Interview #15)

Also, they are more articulate in expressing their understanding of radiation knowledge and the association between cumulated doses of radiation from RCB and physical harms (Interview #3, #11, #15, #34, #35). One medical researcher stated:

> From our studies of people who are affected with chronic low level radiation exposure, the research findings did indicate some medical impacts ... previous research done in other countries revealed some effects manifested for a short time in adults. Now we found also that such an effect is prolonged if it happened to the younger children. Also, in the past, some effects only happened until the radiation levels were up to a certain point, but now the effect manifested in the younger children in a lower level. (Interview #35)

Similar to the impacted residents, they pointed out economic aspects of this incident. However, they also saw other areas of impact, which were related to environmental concerns. Several of the non-impacted activists (Interview #1, #4, #29) considered this RCB issue as a "public safety" issue. They thought those contaminated building complexes should be listed and publicized as "dangerous

buildings." RCB residents and their neighbors, who live in the contaminated building complex and received excessive radiation doses, must be assisted to relocate as soon as possible. One of the activists considered that everyone in Taiwan actually is more or less at risk from radiation exposure from contaminated buildings and sees himself or his offspring as possibly being affected. He said:

> Now people move more than they did in the past. The number of contaminated radioactive buildings is way larger than the government told us. In a way, I think everyone, including our offspring, all have a risk living in a RCB. (Interview #4)

Another non-impacted activist saw this incident representing the ecological cost from technological development -- "The entire ecosystem is in danger now ... life is not easy at all ... now the environment is so badly polluted " (Interview #11) and suggested the only solution to this problem is *fan-ho* (anti-nuke[2]) including eliminating radioactive treatments in medical practice. In addition, non-impacted activists also challenged the definition of high, medium and low levels of radiation based on the standard that the government set. The following conversation shows such a reframing:

> Researcher: what was the level of radiation of the contaminated apartment you went in to detect? Was it high, medium or low level?
> Informant #11: It should not be distinguished in this way. The cumulated dose is high ... and the international standard has been lowered. The level, which was low, now may become a high level.

Moreover, non-impacted activists revealed a preventive mentality to avoid physical damage from radiation and considered that any amount of radiation exposure was no good for human beings regardless of how low the radiation levels were and / or how

[2] This is a notion originally used by environmental groups in Taiwan to refer to disagreement with the establishment of the fourth national nuclear power plant. Here it means no usage of nuclear energy as well as the elimination of radiation treatment in medical practice.

briefly people were exposed with it. As one of them said "even though it's uncertain regarding how bad the radiation impacts are toward the human body, the point is it's unnecessary to take such a risk to be exposed with radiation in the first place." (Interview #4) Therefore, some of these activists (Interview #4, #11) were unhappy with the claim made by the TAEC that "it was not bad to be exposed with small doses of low-level radiation, and instead, it's good for human health."

A broader scope of risks was mentioned by these non-impacted activists. Issues such as food irradiation (Interview #5), usage of nuclear energy and radioactive waste management (Interview #3, #4, #12, #17, #22, #29) and physical harm from high energy electronic waves (Interview #1, #11, #12, #21) were mentioned while they talked about their concerns on this RCB incident. The accounts below show their perspectives on these issues:

> Well, of course, radiation can be used in curing cancers, but in my opinion, I do not think it's a good cure at all. Numerous cancer patients are receiving radiation treatments but their illnesses are not healed. After all, it's not an ultimate cure ... Oh, oh, I am also against the radiation to be used in food production ... Many products, such as banana, papaya and garlic, were irradiated in Taiwan in order to prevent them from ripening and rotting before they were sold. ... Many people are ignorant about the negative impact of food irradiation and just think it's great ... I think the government should have a policy to set the standard of food irradiation. It's a risk existing there, which worries me a lot. (Interview #6)

> People should have the understanding that radiation is harmful and affects our offspring's health, such as gene defects ... These RCBs should be listed as dangerous buildings ... people should not be allowed to live there ... the reason why the TAEC is so reluctant to deal with this RCB incident is it is afraid that the public will connect the negative image of radiation between this RCB incident and the national nuclear energy policy... In addition, the radioactive waste from the nuclear power plants in Taiwan has not been well managed ... it was just dumped to Orchid Island and the

> Dawu people paid the environmental price that they were not supposed to pay .... (Interview #29)

> I was a science major, I knew the relation between the Theory of Relativity and the details of nuclear engineering ... I knew the danger of radiation to a human body, especially the so-called "safe dose" which is controversial. Then, I studied electricity converting facility and high-volt electronic tower ... the issue of 60 Hz electromagnetic waves then came to my attention ... I concerned myself with the issue and whether the electromagnetic waves harm human health as I saw so many electronic products in our lives ... Whether using a cell phone will cause brain tumor? Does listening to the Walkman cause brain tumor? I was not sure at the beginning ... Then, I realized that maybe those were not that harmful but something else was, which I did not know before. Then, the incident of RCB happened .... (Interview #12)

Governmental Officials in the TAEC

Regarding risk perceptions, the governmental officials from the TAEC presented different viewpoints from those of the activists and the impacted residents. They often emphasized that from their professional and scientific perspective, the risk of physical harm from the radiation exposure was extremely low compared with risks of other kinds. In responding to the question of how s/he would describe the Co-60 incident that had been affecting some Taiwanese residents, one of the officers in the TAEC pointed out that the impacts were in two main areas. One was psychological and the other was economic loss from the property. He attributed these psychological and economic impacts as a consequence of fears about unknown physical harms. He put in this way.

> Radiation, this stuff is invisible and physically people cannot sense it. Therefore, people, psychologically, have huge senses of fear on it ... wondering how it impacts them, especially on health. Based on our experiences, people have high psychological stresses. Especially, the fear for their children to be a "radioactive person". In school, kids were called a "radioactive person" because they lived in a

> RCB (complex / apartment). Secondly, the loss of property value ... It's big. The apartment, purchased with one's life-long saving, cannot be sold after the RCB incident. Sometimes, it can be sold but the price is very low. Some people with a better economic status and having another apartment, they can move out from the contaminated apartment and move into the other one. But, for those who have economic difficulties, they are not able to move out, so they are forced to stay in the RCB. Many face the pressure from a bank requesting them to pay for the mortgage because the value of the apartment hugely decline suddenly over one night ... So, we think the impacts on people are in the psychological aspect of worrying about health, and property value loss ... the property value at least declines 50% ... the loss is huge. This is my thought .... (Interview #37)

The other officer of the TAEC emphasized that there was no physical harm from radiation but because of psychological stress from the unknown, physical health was impacted. He attributed such fears and stress as a result of mass media portraying the nuclear power plants as dangerous, as well as from the characteristics of invisibility and insensibility of radiation.

> I think, of course, it impacts people in a big way ... 'why then such an impact?' [Informant #36 asked the question, then he answered his question with the following comment.] There is a perspective to view it ... Recently, there is a tendency of anti-nuclear energy movement all over the world. Those who are against nuclear power have done some analysis ... Well, those who are for nuclear power also have done some analysis. They found that nuclear application ... such as nuclear power plant, medical treatment with radiation ... From the empirical studies, they found that the harm / risk from the application of nuclear energy is not bigger than those from other industries. The risk of application of nuclear energy is not bigger than the risk of walking, driving and taking a flight. However, radiation ... it's not visible and sensible ... People are not familiar with it ... In addition, the character I mentioned above, the use of nuclear energy is like you are taking an airplane ...you may feel it's risky. Why? You are not the pilot. You put your life in the hands of the pilot. The use of nuclear power is similar to that situation ... someone else operates it and you are not familiar with what they operate. Another reason, ... messages from the media or the state portray the harm of nuclear power is dangerous. In the newspaper and movies, you may find the message on this area is all like that nuclear power plant is dangerous ... Therefore, after receiving these messages, people perceive the nuclear energy is dangerous ... Also, after the atom bombing, such a perception is

> aggravated. Of course, people have rights to be anti-nuclear energy even the risk is not as big as people perceive. They don't like it and with the fear we just mentioned above, the consequences are impacts which informant #37 pointed out previously. When one's apartment was identified as a RCB, the apartment value declined suddenly. Plus the fear ... they worry ... there shouldn't be physical harm but due to the fact that they worry so much, their health is impacted. The mental and physical suffering is a big impact to the impacted residents. It's important to educate people to have the correct view. However, it's not easy at all. Otherwise, the anti-nuclear power plant movement may not be so popular. (Interview #36)

Officials in the TAEC don't consider that physical harms exist at all and emphasize that there is no empirical study in Taiwan that indicates a causal relation between physical harm and radiation exposure from RCB. They consider that the public is hysterical and such a social hysteria on radiation harm is pathological. This is reflected in another official's account, indicating, "Often the radiation does not harm people but the anxiety from the fear does ... " (Interview #38).

Another variation in perception toward this incident is that the officers from the TEAC did not view it as an environmental problem. While being asked to compare the severity of this incident with other environmental problems in Taiwan, one of the officials responded like this

> Researcher: I wonder whether you view this RCB incident as an environmental problem ... Well, here I have a question ... in comparison with other contamination incidents in Taiwan, such as ground water contamination, how do you evaluate this Co-60 contamination incident's severity?
> Informant #38: I guess they are supposed to be quite similar ... because many people are involved ... However, ...
> Researcher: So, you think the severity of this incident is similar to other environmental problems ...?
> Informant #38: There is a difference ...
> Researcher: What's the difference?
> Informant #38: Usually when we talk about environmental problems, we refer to air pollution, water pollution or ecological pollution ... etc. These various kinds of

pollution are transmittable. For example, water pollution in the upper stream remains in the lower stream and moreover, it will diffuse. The contaminated radioactive steel is not transmittable. They exist in a certain space (a building). When they are taken out from the building, they are gone forever. There is no problem like diffusion to be concerned in the case of RCB. It's easier to control it. Secondly, the radiation level is quite low. In comparison to transmission of other bacteria diseases or other environmental nuisance, this problem is quite different. If you want to view it as an environmental problem ... it's because radiation activates. The radiation level you receive is related to the distance you are close to it. It is not transmitted from spot A to spot B. I think it's the main difference ... one is transmittable and diffused, the other is not.

Researcher: I see ...

Informant #38: Like a big chimney belched out smog and the smog polluted the air and the pollution may diffuse to a far place. But, the radiation is not ... well, we should say the source of radiation is fixed there ...

Researcher: So the impact is within a certain distance ...

Informant #38: But the radiation level is not very high in this case... compared with the radiation source in a usual case, it's not very high. So, the impact is also smaller than the usual transmitted problems are. Well, if you want to consider it as an environmental problem, I think this is the major difference.

From accounts above, it was emphasized that the contamination sources were fixed, and the radiation levels were very low in spite of the radiation activated. In addition, officials viewed it as "an incident of radiation abnormality," which only happened once but not like other kinds of frequently occurring pollution.

It's just an incident of radiation abnormality. That's the way to view it. Even though it is dispersed in many places, basically it gathers in the northern area ... only a few cities and counties have it. So, it's only an incident of radiation abnormality. It should not be viewed as a big environmental issue ... or exaggerate it as dangerous and diffusive ... actually, it's easily to be controlled compared with other problems. (Interview #38)

I don't think it's an issue of environmental nuisance ... in terms of environmental nuisance, you know who caused the problem. In the RCB case, there is no polluter identified, so it's just an accidental random incident. (Interview #31)

Since officials of the TAEC considered that the source of the contamination was not traceable and it was an incident that happened only one time during a certain period, they disagreed with the view that it was an environmental issue. It appears that viewpoints between the governmental officials and the activists contrast in several ways. As the governmental agency tends to minimize the various impacts of this incident, the activists seem to emphasize the universal risk emerging from this incident. These two key groups each communicate their perspective with the impacted residents and the public. In Chapter Seven, the dynamic of how these varied groups interact with one another, and influence the public's risk perceptions and risk behaviors, as well as shape the emergence of collective activism will be further investigated. In the following section, factors that shape varied risk perceptions are presented.

Factors That Shape the Risk Perceptions

Since Cobalt-60 radioactivity is invisible, intangible and insensible and most lay people in Taiwan do not have much knowledge about it, it tends to generate various perceptions from hysteria to indifference as well as conerns in between. In this section, I presents factors that are associated with people's varied risk perceptions.

Sources of Initial Information Flows about the Incident

It was discovered that for people who did not know much about radiation contamination, the very first information they received tended to dominate their varied perceptions. These information flows included materials from the TAEC (Interview #23, #24, #25, #28), media portrayal of the incident (Interview #7, #20,

#28), and information from the environmental groups (Interview #2, #20, #26, #33). The following accounts from different informants illustrate how the initial source of information shapes the variation of perceptions

> That day after detection, the staff from the TAEC told us that it's better for elderly, women and children to be evacuated as soon as possible ... My father asked a ridiculous question ... 'Really? It's that urgent? Where can we go in such a short time?' The staff said 'If you don't want to leave, that's ok.' They left us a brochure, which indicated varied physical problems related to radiation exposures. They [the TAEC staff] thought we probably knew nothing about it [radiation] ... What did not come to their mind was that I read through the whole brochure that evening right away... and I realized that all the physical problems, indicated in the brochure, actually all happened to neighbors in this complex ... I thought it's too dangerous ... (Interview #28).

> I knew nothing about radiation before I noticed the contamination in MSV from the newspaper. It was said [in the newspaper] that radiation was dangerous ... This caught my attention and I was anxious because my apartment was also built in the same period ... (Interview #20).

As another impacted resident who had never taken any collective action indicated:

> I guess it's not that dangerous now ... in fact, when we discovered [the contamination], the TAEC told us that the radiation level was not very high and it [the radiation level] would decrease ... Well, by now what the radiation level is, I don't know? We have been living here [after discovering the contamination and having never moved out]. The physical examination results have not shown much difference so far ... And, it's not [contaminated] in the whole apartment, but only in one wall .... (Interview #25)

Another impacted resident living in a relatively low-level radiation contaminated apartment said:

> Of course, I feel scared. Initially, I was ignorant about this issue ... But, I learned a few strange diseases happened, such as leukemia and thyroid gland cancer according to what Chair Wang [the leader of the RSPAT] told us. At the beginning, we were so ignorant about the radiation issue, but learned many things from Chair Wang gradually. (Interview #26)

Extent of the Contamination Area and Level of Radiation Contamination

It was discovered, from the accounts of some impacted residents without activism (Interview #23, #24, #25), that when contamination occurred in one specific area in the household, such as a portion of a specific wall, or concentrated in certain spaces (e.g., bedrooms, dining room), the impacted resident emphasized that only a spot or certain area was contaminated, but not the whole apartment, so they were not highly concerned. By changes of space usage, they avoid the contamination area. In addition, they reported that the radiation level has been decreasing and up to now, they believe the radiation level should be down to the normal level.

In contrast, one account from a person with similar low levels of radiation in one spot of the household indicated anxiety and worry for a long time and a number of actions, such as a renovation project to install lead on the spot along with appeals to various governmental agencies (Interview #26). The four informants (Informant #23, #24, #25 and #26) shared several demographic characteristics. They were in their late thirties to early forties, female, and Taiwanese. Nevertheless, they occupied different positions in the socioeconomic strata. Informants #23, #24 and #25 are all blue-collar workers. They cannot afford to move away or renovate their contaminated apartments. When a person is on a higher rung of the socioeconomic strata, s/he has more resources at her/his disposal. Therefore, it allows her/him to react in a way to legitimate how s/he perceives. On the other hand, when people do not have extra resources at their disposal, they may have to rationalize their responses to match their

perceptions. In addition, this contrast is associated with knowledge about radiation safety. As one of the impacted residents who never participated in activism reports:

> Well, I don't know much about this matter [radiation] ... for RCB, some people know better [about radiation], they may feel it's dangerous more strongly ... We know it [radiation] is not good, but we don't know exactly how dangerous it is. So, we ... [embarrassedly laughing] keep living here with 'an ignorant boldness.' Well, this is my thought ... (Interview #24)

As it was indicated previously, the source of the information people receive regarding the knowledge also accounts for this variation.

Time and its Interplay with the Manifestation of Significant Physical Effects

Those impacted residents who reported being highly concerned about physical health at the initial discovery stage, as time went by, due to no evidence suggesting that their health was in danger (Interview #7, #18, #28, #30), the perception of harm and worry decreased. Also, for some impacted residents who were initially indifferent, they did not perceive that their physical health was at risk until manifestation of physical effects happened (Interview #16). Many impacted people indicated that they were concerned more about phyical impacts to their children more than to themselves (Interview #1, #2, #7, #18, #19, #20, #21, #30, #34, #35). After five / six years of physical examinations, however, due to no significant finding of physical problems with their children, some started to be at peace with this concern (Interview #7, #18, #20, #21, #30).

An additional factor arises because the half-life period of Cobalt-60 is five years and three months, meaning that the level of radioactivity decreases over time. This results in the impacted residents who are from the medium and low level contamination enclaves feeling more at ease with the passage of time (Interview #23,

#24). Since the latency period between exposure and manifestation of health impacts takes ten to fifteen years, however, the risk perception for health may rise again later when some manifestations of physical effects occur. This is beyond the scope of this dissertation research but represents an important question on risk perception to be scrutinized further in the future.

Ambiguity of Physical Damage from Radiation Exposure

The other factor that shapes people's perceptions is controversy over the scientific evidence supporting a link between physical damage and radiation exposure. Because of the ambiguity of such a linkage, it tends to generate varied perceptions. Many affected people reported that they were worried and fearful because of the unknown consequences of their chronic exposure to radiation resulting from conflicting data regarding health and environmental assessment from the TAEC and the RSPAT. Nevertheless, some people indicated that the health concerns were not immediate priorities for them after a couple of years of physical examinations showed no evidence of significant changes. This analysis was documented in the first part of this chapter. This factor also interacts with the manifestation of significant physical effects and the sources of the information flows that shape people's risk perceptions.

Bounded Threats versus Diffused Threats

One of the sources of polar perceptions on the level of risks posed by the RCB incident for residents of contaminated complexes, as well as to the public, arises from activists and the TAEC officials' different understandings of whether the radioactive threats from the contaminated steel bars in the RCBs are bounded or diffused. The

TAEC officials emphasize "the source of radiation is fixed there" (within the walls of households) (Interview #38) and stress that "the radiation level is not very high." On this boundedness, they argue that the physical health of residents is not at risk and therefore there is no notion of environmental risk involved in this case. On the other hand, environmental activists see the threat as diffused because of radiation activation. The threat is not only within the contaminated household, but also spread to the whole apartment complex / neighborhood. This puts any member of the public, who gets into this neighborhood, at risk for unnecessary radiation exposures.

In addition, some residents in those contaminated complexes, whose apartments have not been identified as RCBs, tend to see this incident as the problem of their neighbors, whose apartments are contaminated. They viewed the contamination as existing in their neighbors' homes, but do not consider that they may also receive radiation exposure from the radiation activated from their neighbors' home. This echoes Edelstein's finding (1998), from the study of residential radon contamination, that "the idea that everybody may be at considerable, unknown, and invisible risk is much harder for us to accept." This is also one of the reasons why residents in the contaminated complexes have never reached consensus about the reconstruction of the high-level radiation building complexes and that raises question of fairness of the share they would have to pay in order to have reconstruction take place.

Managerial Failure in Risk Management

Finally, it was discovered that when the risk management institution, namely the TAEC, failed to monitor, or adequately manage the source of radioactive wastes, and failed to inform MSV's residents regarding the mass residential radiation

contamination in their complexes at the beginning of the radiation contamination, mistrust was built up. Thus, people from the MSV did not trust whatever information the TAEC provided to them later on. As secondary impacts from the managerial failure of the TAEC, MSV's residents and those who have contact with them have tended to seek out other sources of information, which are provided by the environmental groups, such as the TEPU and the RSPAT. This generates the other cycle of the risk amplification or attenuation process through which people's risk perceptions are formed. A further discussion of this secondary impact will be presented in Chapter Seven.

Summary

The concerns and risks perceived by the impacted residents, regardless of whether or not they participated in collective actions, reveal a wide range of positions. These concerns include shock, fear, worry, being stigmatized, anxiety over the unknown physical effects from radiation exposures, suspicion that the causes of their varied illnesses may relate to the radiation exposure, and varied economic losses from this incident. This study reveals that the economic losses / hardship resulting from this contamination incident have had immediate impacts on the working class informants. Economic impacts have been so significant for these residents that they would not prioritize uncertain future physical effects from the radiation exposure as primary risk concerns even though they had worried about such outcomes at the time of the initial discovery of the contamination. For this category of respondents, since no significant physical problems had been manifested personally so far, their worries tended to decline, as reflected in their claim that they seldom think about the contamination incident any longer.

The thoughts of "why me?" and "it is a bad luck" were revealed among the impacted residents, however, different outlooks deriving from these thoughts led to two contrasting responses. For those impacted residents who had participated in activism, they would like this "bad luck" to cease through their collective actions to push the government to deal with the incident more effectively and to protect the public from future radiation exposure. For the impacted residents who never took any collective actions, they often mentioned that they would rather forget this incident as if it had never happened. It was also discovered that among the impacted residents, those who joined the collective actions were more articulate in their knowledge of radiation and health related issues than those who did not participate activism. The author argues that under the economic constraints and uncertainty of physical harms from the radiation exposures, some impacted residents have developed a defensive avoidance and a cognitive readjustment to rationalize their actions and keep their daily lives going.

The activists, who had not been directly impacted by this incident, tended to emphasize its physical impacts, especially impacts on the genetic defects in offspring of the impacted residents. They consider this radiation contamination incident as a public safety issue and also see this incident representing the ecological costs of technological development. Some of these environmental activists are inclined to view excessive radiation levels, which are more than the normal background level, as highly dangerous. In addition, they stress a preventive position which proposes that it is unnecessary to take a risk of radiation exposure in the first place, regardless of whether there is any demonstrated risk to human health from radiation exposure. Furthermore, a broader scope of radiation risks is brought up by the non-impacted activists. These issues include concern over food irradiation, usage of nuclear energy,

radioactive waste management and physical harm from high energy electronic waves from electronic products.

The governmental officials from the TAEC indicated that, for the impacted residents, the economic losses from this RCB incident were a greater concern, just as the impacted residents and the activists had pointed out. These officials, however, emphasized that the risk of physical harm from the radiation exposure is extremely low compared with risks of other kinds. They tend to see the harm as psychological stress from the unknown, but do not consider that objective evidence of physical harm could be found.

In addition to rejecting perceptions of physical harms from radiation exposure, the TAEC officials did not consider this incident as an environmental problem. They emphasized that the contamination sources were fixed (not transmittable), and that the radiation levels were very low in spite of the radiation that was activated. Moreover, officials viewed it as "an incident of radiation abnormality," which happened as a one-time event, unlike other kinds of pollutions which might occur more frequently.

The following factors were revealed in this study to account for the variation of risk perceptions. (1) Sources of initial information flows about the incident. (2) Extent of the contamination area and level of radiation contamination. (3) Time and its interplay with the manifestation of significant physical effects. (4) Ambiguity of physical harms from radiation exposure. (5) The bounded threats versus the diffused threats. (6) Managerial failure in risk management.

CHAPTER SIX

ANALYSIS OF COLLECTIVE ACTIONS IN THE RCB INCIDENT

Introduction

Although the radioactive contamination building (RCB) incident was disclosed to the public in the early 1990s, residents inhabiting those buildings had been exposed to radioactivity unknowingly for almost ten years. During 1992-1994, in the early phases of discovering the contamination, responses arose largely among the impacted residents in the MSV. In addition, six other territorially dispersed apartment complexes produced short-term local protests. The Radiation Victims Association (RVAT),[1] initially played a role in organizing the impacted residents from territorially dispersed apartment complexes to mobilize collectively to deal with mass civilian radiation exposure.

In 1992 and 1993, the RVAT had more than 300 members, mostly consisting of impacted residents from these territorially dispersed contaminated apartment complexes. Later in 1993, however, impacted resident activists decreased their involvement and were replaced by activists who had never resided in the enclaves contaminated by Co-60. In 1994, the RSPAT membership was dominated increasingly by a constituency representing the legal, medical and other professions, and additional volunteers. They were driven by a broad range of goals and concerns that went beyond the earlier emphasis on compensation for the costs of relocation, detoxification, or reconstruction of the contaminated apartments.

In this chapter, the emergence and transformation of popular environmental activism in this radiation contamination incident is scrutinized. The analysis consists of

[1] As it was noted in Chapter Four, the RVAT was renamed to the RSPAT in 1994.

three parts. Part one analyzes local protests from three[2] geographically dispersed contaminated complexes. The process of their collective actions, goals of the activism and conflicting interests are described. Part two depicts the historical context of the emergence of the environmental social movement organization (ESMO), the RSPAT, and its alliance with other social activists. The transformation of membership and activism goals in relation to interests driving collective actions at the local and national levels are analyzed. The last part of this chapter presents several key organizational and social factors emerging from the observation of this RCB incident that account for the lack of mass environmental grassroots mobilization in the Taiwan case.

Local Responses to the Radiation Contamination

From 1992 to 1994, when the radiation contamination incident was initially discovered in different territorially dispersed building complexes, seven apartment complexes had produced varied degrees of local protest. In this section, data on local collective actions from three apartment complexes, Min-Sheng Villa, Tai-Fei Civilian Housing and Hsin-Chuang Chiung-Lin, and the coalition that they formed is presented. In addition, the reason why such a coalition was only short-lived is discussed. Since the contamination discovery and collective actions of MSV were presented in Chapter Four, they will not be repeated in the next section.

Tai-Fei Civilian Housing (TFCH)

Radiation contamination was found in Tai-Fei Civilian Housing in May 1993. TFCH is located in southeastern Taipei City. These apartment complexes had been

[2] The reason for analyzing local protests by choosing these three complexes is that there are more than 20 contaminated households in each of complexes and most of the impacted residents in these three complexes participated in collective actions only during the initial discovery of the contamination. The

constructed by the National Housing Bureau around 1982 and 1983. Many residents in TFCH were working class people and / or retirees of the Taiwan Fertilizer Corporation.

The presence of radiation was discovered unintentionally by a resident's daughter, who was a college student majoring in nuclear engineering. One day, she brought home the radiation detector, which she had purchased for a class assignment, and found that there was an excessive radiation level in her parents' residence (Interview #27). The situation was reported to the TEAC, which conducted an inspection in July and later confirmed that low levels of radiation contamination (between 1mSv/yr and 5 mSv/yr) were presented in twenty-three out of about two hundred households in TFCH.

A local group, Dong-Ming Community Development Association (DMCDA), was established in the TFCH in March 1993, a little bit earlier than the discovery of radiation contamination in this complex. This group originally aimed to facilitate community development affairs among the residents in the TFCH. Following the discovery of the radiation contamination, the chair of DMCDA played a role in mobilizing the local residents to appeal and protest to the varied local and national governmental agencies during 1993 and 1994.

The leader of the RSPAT had contacted the impacted people in the TFCH in the initial discovery stage and had worked with DMCDA in informing local people about radiation exposure and the health impacts. The RPSAT also assisted core leaders of DMCDA to mobilize local protests to appeal for governmental attention for compensation and reconstruction of the complex. In 1993, about two hundred people from the TFCH joined the membership of the RSPAT, but most of these memberships were not renewed in 1994. Some, who were not RCB impacted residents, joined the RSPAT because they thought that the RCB incident and the activism of the RSPAT

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remaining four enclaves had fewer contaminated households.

might lead to the reconstruction of their apartment complexes (Interview #1).

Since the radiation levels in the TFCH were in the category of low-level threats, residents in the TFCH were not legitimately entitled to free health examination according to the regulation set by the TAEC. In addition, at these lower levels, the TAEC did not subsidize or compensate for either detoxification or relocation of residences. Encountering the TFCH residents' protests, the TAEC directed the protesters to another governmental agency, the National Housing Bureau (NHB). Because the TFCH was a national housing project under the NHB, that agency later became the target of local residents' demands for compensation and relocation as well as reconstruction of the TFCH complexes.

As a consequence of these protests, in 1995, the NHB assigned new apartments from other national housing projects for each of the contaminated households to move into. Some of the impacted residents moved to the new apartments, some did not for varied reasons. The reasons included that the new apartment was too small to be used for a commercial purpose (Interview #9), or that the residents could not afford to pay for their share of the moving costs (Interview #19).

In addition, the *Regulation in the Management and Assistance for Residents in Residences with Excessive Radiation Contamination*, taking 1mSv as the standard for handling the Radioactive Contmaniation Building (RCB) cases, was passed in 1995. This regulation allowed the impacted residents in the TFCH to receive compensation / subsidy from the Taipei City Government and to have a systematic health examination and regular check-ups.

Hsin-Chuang Chiung-Lin (HCCL)

The radiation contamination in the thirty-five household building complex of

Hsin-Chuang Chiung-Lin Road, Taipei County, was discovered in November 1994. This complex was built jointly by the landowner and the construction company. Residents were predominantly working class people. There were about ten households, who rented apartments from the landowner.

At the time the contamination in the MSV was a media icon that drew the public's attention. A HCCL resident noticed the MSV case coverage and became concerned about her apartment. Therefore, when the TAEC sent a RCB survey letter[3] to her household, she replied and requested to have TLDs in order to detect whether the presence of radiation existed in her household. After receiving TLDs, she attached it to her wall for a few days and sent it back to the TAEC. A few days later, the TAEC staff workers informed her that further inspection was necessary because the TLD measure indicated a very high level of radiation in her household. In addition, the staff workers asked her to inform all the households in the complex to have at least one person stay at home when the staff workers came to detect the next day. Of the thirty-five households in this complex most of them had been neighbors since the complex was built. They soon shared information with one another and helped each other to ensure that every household would be inspected[4] by the TAEC. Subsequently, it was confirmed that thirty-three of the thirty-five households had excessively high levels of radiation in their apartments, and in the stairways of the building as well.

The staff workers told the residents of HCCL complex that the radiation level was high in this complex and that it was better for children, women, and elderly people to leave as soon as possible. At that point, however, most people in this complex still had

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[3] The TAEC sent letters to the residents of building complexes in Taiwan, which were constructed during 1982-1984, to ask them whether they would like to receive TLD to attach in their households to detect the presence of the radiation. This procedure was part of the national survey to discover where the RCBs were.

[4] People who needed to work and could not stay at home to wait for the TAEC's detection gave the key of their apartments to their neighbors who would stay at home.

no idea about radiation and the physical impacts from exposure. One elderly resident asked the staff worker "is it really that urgent to move out? How come we can suddenly move out without any help." Then, one of the TAEC staff workers told him "if you don't want to move out, that's fine." (Interview #28) Staff workers then gave the residents the brochure about radiation safety and protection and left the complex.

One woman read through the brochure and realized that all the symptoms related to radiation exposure listed on the brochure were manifested among the residents in this complex (Interview #28). Another female neighbor approached her to share flyers she had gotten from the RSPAT and together they decided to contact the RSPAT. The secretary of the RSPAT came to meet with the impacted residents and help them to organize a local protest group at the end of December 1994. It was recommended that local residents conduct a survey on varied cancers, diseases and miscarriages found in the complex, and distribute the results to the media. In 1994 and 1995, one of the residents (Interview #28) coordinated impacted residents in organizing several large scale protests to the local Hsin-Chuang City Government, Taipei County Government, and to the TAEC. They requested subsidies to assist them to relocate and re-construct the contaminated complex. These protests drew the participation of almost all of the impacted residents (about one hundred people). Each household had all their family members participate in the protest rallys, including several elderly people who were over eighty years old. Parents brought their babies and young children to join the protests and attend negotiation meetings with various governmental officials. This mass local response was presented in the media and drew some legislators' attention. Only two households[5] did not participate in these protests.

At the end of 1994, it was the time for re-election of the legislators and local city

[5] Contamination was not present in one of the households. The other household, although contaminated,

council representatives. The media representation of the contamination in the HCCL complex attracted the attention of various legislative candidates and council representatives for the coming election at the end of the year. Because this contamination incident had become an avenue for varied candidates to get the vote of the impacted residents in the Hsin-Chuan City, Taipei County, pressures were placed on the local city government and the Taipei County Government. Therefore, subsidies and compensation from different levels of government were allocated to the impacted residents in the HCCL complex. With the help of subsidies / compensation from varied local governmental agencies, the impacted residents from the thirty-two contaminated apartments moved out. Only one family living in a contaminated apartment did not move out because of economic constraints. In 1995, the collective actions were halted after the impacted residents moved out of the contaminated apartments with subsidy and compensation.

Coalitions and Conflicting Interests Among and Within Different Contaminated Apartment Complexes

In the initial discovery of the radiation contamination, residents from complexes other than MSV considered the RSPAT as a resource for learning about radiation knowledge and protection, detoxifying projects, and strategies for collective actions (Interview #2, #8, #16, #19, #20, #27, #28, and #33). At this time, people from different complexes had joined together as RCB victims in a couple of large-scale protests to seek governmental attention and assistance in solving the problems that the impacted residents had encountered. Such a coalition took place during 1993 and 1994 among the varied contaminated complexes, such as MSV, HCCL, the TFCH and others.

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did not join the collective actions due to an existing bad relationship with the landowner. (Interview #28)

People supported other impacted residents by joining protests from other's complexes (Interview #9 and #28) in order to make the protest look bigger and draw the government's attention.

In 1995, the *Regulation in the Management and Assistance for Residents in Residences with Excessive Radiation Contamination,* taking 1mSv as the standard for handling the RCB cases, was passed in Taipei City. This regulation helped the impacted people from the low-level contamination complexes in Taipei City. It benefited many impacted residents who were not considered by the TAEC as legitimate to receive subsidies and compensation, as well as free health examinations. The creation of a new policy in Taipei City, however, indirectly caused a bitter feeling to emerge among people in the contaminated complexes in Taipei County, such as the HCCL complex. Some impacted residents of contaminated complexes in Taipei County felt that their collaborative actions with the RSPAT were just for the benefit of people in Taipei City, but not for those, like themselves who resided in Taipei County (Interview #28). In addition, the goals of the RSPAT were criticized by the impacted residents for only focusing on the benefit of the apartment owners but not the renters (Interview #7).

In addition to conflicting interests among people from different complexes, tension also emerged within the contaminated complexes. In the HCCL complex, when all the impacted residents, including apartment owners and renters, gathered together to protest to varied governmental agencies, different concerns emerged and some residents' concerns were not allowed to be voiced during the protests. One of the renters in the HCCL expressed such a conflict during the protest:

> We all gathered at the City Hall to protest. The owners of the apartments sought reconstruction, but the renters, we were concerned about our health. Everyone had different interests in mind. When we went to protest, the governmental agencies

> agreed to give the owner the subsidy for relocation. We [the renters] felt it's unfair ... it is us who need to move out and our health was affected by the radiation exposure ... so, we said 'why does the owner get the subsidy for relocation, but we, the renter, cannot get some?' Then, the owners wanted us to shut up .... (Interview #7)

Therefore, such conflicting interests between the owners and the renters eliminated further collective actions among residents in the HCCL complex. As another resident inidicated:

> We had been neighbors for more than ten years. To protest for this ... with different interests ... it easily offends those who have different interests. It just damaged our previous good relationship. To protest is useless .... (Interview #39)

Moreover, contaminated complexes, like the TFCH, which was a public housing project, usually targeted governmental agencies, such as the NHB and Taipei City Government, instead of the TAEC. As one impacted resident stated:

> We all sought for the goal of reconstruction ... but they [MSV] targeted the TAEC and we targeted the National Housing Bureau and Taipei City Government. It's different ... so later [laughing] we separated ... working hard for our own goals. The needs are different so now I only attended annual meetings [of the RSPAT] when I was invited. (Interview #9)

Perceiving a different goal and seeking a different means to achieve it, people from various contaminated complexes with varied extents of contamination, in reality, were not able to create alliances with the RSPAT. Although the RSPAT tried to bridge these differences by calling people from varied complexes to dialogue and discuss, this intention failed due to the limited resources at RSPAT's disposal.

Emergence of the Environmental Social Movement Organization

In this section, the evolution of the RSPAT as an ESMO, is presented in historical context. Its coalitions with varied individuals and groups in different contaminated complexes, as well as its ties to other social movement organizations are discussed. The

transformation of the RSPAT's membership and goals of activism in relation to interests driving collective actions at the local and national levels are analyzed.

The Evolution of the RSPAT: From a Local Protest Group to a National Environmental Social Movemenet Organization

The RVAT/RSPAT emerged in 1992 originally as a self-help committee in MSV to facilitate residents' seeking governmental assistance for relocation, by obtaining compensation or subsidies, as well as by receiving free health examinations. In 1993, the RVAT was established with the encouragement from activists in the TEPU, based on the MSV self-help committee. During 1992 and 1994, in the expanding discovery of radioactive contamination in apartment building complexes other than MSV, the RVAT initially played a role in providing strategies for local mobilization in six other territorially dispersed building complexes. The RVAT sent people to join the local protests and shared information on radiation protection and detoxification projects.

When the RVAT was established in 1993, it had about 300 members. At that time, the membership fee was NT$200 (US$6). Members consisted of residents from the MSV, the TFCH and a few individuals from other contaminated complexes. The leader of the RVAT hosted a radio program to educate the public about radiation protection and to encourage impacted residents and the public to contact the group. At this time, the medical and legal professionals as well as social movement activists and legislators were not members, but served as consultant committees of the RVAT (Interview #1). Regarding the goals of the activism of the RSPAT, they can be summarized in the statement presented to the TAEC by the leader of the RVAT on behalf of the residents of RCBs at the press meeting on December 27, 1993. They are:

> All households in which radiation levels exceed 0.5 rem/yr must be moved to safe

housing.

Any area within which radiation levels exceed 1.5 rems/yr should be classified as a restricted area, and should be provided with appropriate signs and equipment.

Any apartment units which are exposed to radiation between 0.1 rem/yr and 0.5 rem/yr and whose radioactivity will naturally decay within a seven year period to under 0.1 rem/yr should have lead panels installed to bring the radioactivity immediately down to under 0.1rem/yr. Financial responsibility should belong to the TAEC, the steel company, which supplied the structural steel, and the construction company which built the building.

Buildings with radiation levels over 0.5 rem/yr should be torn down and rebuilt. Buildings can be rebuilt higher than the originals, and the top floors can be sold off to help cover the cost of the entire building. All other financial responsibility will belong to the TAEC.

The government has the responsibility to provide residents with free medical checks, and must guarantee free medical care for the residents' children and grandchildren in the event that they develop diseases as a result of radiation exposure. Long term medical checks and follow-up treatment should be the responsibility of the Health Department. If residents develop cancers or other radiation-linked diseases, the TAEC must cover all medical fees.

The strain of knowing that we are living in a building which has given us medical problems such as miscarriages, cataracts, and lymph disorders has had serious consequences for our emotional health. We request that a committee of relevant experts – lawyers, sociologists, and psychologists – be called together to arrive at a reasonable figure of compensation for these effects. This compensation should come from the TAEC, the steel company which supplied the structural steel, and the construction company which built the building." (ANCT, 1994)

These requests were not taken seriously by either the governmental agencies, namely the TAEC, or by the steel and construction companies. Therefore, the sources of the contamination still remained in most of the residences and public areas. After protests, a few contaminated complexes got compensation and subsidy for residents to move out of their contaminated apartments. At the end of 1994 and the beginning of

1995, the local protests from these different complexes started fading.

In 1994, when the RVAT was renamed the RSPAT, the membership fee was also raised to NT$1,500 (US$45). The membership from the impacted residents dropped to about forty people. Therefore, the leader of the RSPAT invited people from consultant committees to join the RSPAT as members. At this time, among 130 members, about 90 were non-impacted members, representing volunteers, and the legal, medical and other professions (about 70% of the membership), and 40 were victims (about 30% of the membership). According to the leader (Interview #1), in 1998, only 60 people paid the membership fee. In 2000, only one third of the total 167 members paid the membership fee (Interview #21). The momentum of the activism from the directly impacted people was gone after 1994. The thrust of the environmental social movement then came from non-impacted activists. In the next section, the characteristics of these non-impacted activists is described and the motivation and interests driving their collective actions are presented.

The Social Composition of Non-impacted Activists and the Interests Driving their Collective Actions

Who are the non-impacted activists?

From the analysis of demographic characteristics of the thirty-four non-impacted activists of the RSPAT, it is shown that about fifty-six percent of them (19 activists) have at least one NGO membership other than the one with the RSPAT (see Table One). These NGO memberships include membership from TEPU, Bird-Watching Association, Labor Union, Teachers Alliance, Pigeon Racing Association, business club, foundation for children who have cancer, and human rights movement. The class

composition of these non-impacted members ranged from working class to upper-middle class people. In addition, several persons from the power elite have been long-term members. The educational level of this category ranges from those with no school education to those holding doctoral degrees (Table One).

In terms of how members were brought into the RSPAT, almost half of them (n =15) indicated that they had learned of the RSPAT from listening to the radio program hosted by the leader, and they contacted the group. Some of them were introduced to this group through their friends (n =3). A couple of them were invited to join the RSPAT by the leader of the group (n =2). The rest of them either met the leader in the anti-fourth nuclear power plant rally (n = 6), or through the connection of the TEPU (n = 7), or other ESMO, such as the Home Maker Union (n = 1).

Motivations and interests driving their activism in the RSPAT

When these activists were asked what drew them to participate in the collective actions in the RSPAT, reasons for their activism ranged from "would like to learn more about radiation knowledge and protection" (telephone interview # 6, #11, #25, #42, #43), to "to let more people to learn of this contamination incident" (telephone interview # 4, #15, #21). One of them expressed it like this:

> ... This is such a social injustice. Mr. Wang [the leader of the RSPAT] gave all of himself in dealing with the radiation contamination problem in Taiwan. [He has] not much funding and has been oppressed ... the goal [of the RSPAT] is good, so whenever I have time, I participated to help out. In addition, I also told my friends and relatives about this group and encouraged them to participate it [the RSPAT] .... (telephone interview #15)

Further, several people considered this incident to be a consequence of social injustice and a mismanagement of the national nuclear policy, and they would like to help the suffering impacted residents (telephone interview #28, #34) and contribute to the

society as citizens. As another activist said:

> I am very unhappy about how the government treated the impacted residents and the way it dealt with this incident. To put myself into the impacted people's shoes, I would never like to have any radiation exposure like this ... As a Taiwanese citizen, I hope I can do something to fight for this social injustice .... (telephone interview #26)

Some of the activists have been involved in other social movements, such as the environmental movement, political democracy movement and anti-nuclear movement, prior to learning of this contamination incident. They cared about various kinds of environmental issues and the oppression of minority groups (telephone interviews #35, #36), so they joined to support the RSPAT when they learned of this incident. Some of their accounts are:

> I have paid attention to varied environmental issues and then noticed this contamination incident ... The environmental degradation is harmful to human healthy in a significant way. This is our environment ... if we don't care about the degradation of the environment, it is we, eventually, who will be harmed. To prevent the problem is better than the remedy. I hope through the activism in this group, the public will be more aware of this issue .... (telephone interview #33)

> I always sympathize with the minority groups and despise all kinds of social injustice they have encountered. I have been upset and felt, indeed, it's terribly unjust [for the impacted people] since I knew about what happened in the MSV. Therefore, I took initiative to contact Mr. Wang [the leader of the RSPAT] and help to detect where the other RCBs were. (Telephone interview #35)

> We [the leader of the RSPAT and the informant] met in the anti-fourth nuclear power plant rally and then became friends. Later, when he [the leader of the RSPAT] planned to establish the RSPAT, of course, I volunteered to help out. In fact, I was one of the coordinators to give birth of this group. (Telephone interview #32)

> I think what the RSPAT is doing is a human rights movement ... As an attorney, I have been involved in several groups to fight for human rights at this transitional stage in Taiwanese society. A couple of colleagues of mine and I have worked together to assist the impacted residents from the MSV to file the lawsuit against the TAEC

> according to the State Tort Compensation Law. Though we are not quite confident that we will win the lawsuit, however, this act is important and symbolic to the Taiwanese society. (Telephone interview #34)

Some activists with training in physics or who were working in related areas were connected to the RSPAT through the TEPU, and had helped out by speaking in the seminars regarding radiation protections and health effects from the exposure (telephone interviewed #23, #39). Physicians were also involved in providing knowledge of health physics to the leader of this group and explaining varied health-related questions raised by the impacted residents. One of the physicians has been involved in arranging health examinations for the impacted residents since the beginning of the contamination's discovery. He thought that it was essential for a scientific purpose to explore what the biological effects would be from chronic radiation exposure in this incident (Interview #34). Therefore, he has been coordinating various medical resources to help the impacted residents to have health examinations since 1993. One activist expressed that "since I am a Buddhist, I would like to do good things and help people as well as Mr. Wang [the leader of the RSPAT]" (telephone interview #5). Moreover, most of the activists indicated that they agreed with the goals of this group and thought that the government should take responsibility to deal with this mass civilian radiation contamination.

From the telephone interviews, a wide range of variation in the non-impacted activists' participation levels was found. The variation ranges from attending a couple of seminars in the RSPAT to volunteering to do various tasks daily in the RSPAT after getting off from work for about one year. For various reasons, the participation levels of all these non-impacted activists, however, last for less than three years. In the following section, these reasons are described to account for why long-term

environmental activism did not occur.

Explaining the Lack of Grassroots Environmental Mobilization

Although the majority of the affected population did not take collective action on the local and national levels, it was found that a couple of individuals with personal experiences of radiation contamination did engage in grassroots mobilization and extended this local activism to the national level in order to promote radiation safety to the public (Interview #1 and #21). In addition, I discovered that informants (Interview #23, #24 and #25) from a working-class neighborhood who did not take any collective actions to seek solutions assumed that the government would not respond to their petitions even before they took any actions to promote such an appeal. It is like a self-fulfilling prophecy that working-class people's voices will not be heard, and when they hold this view, they yield themselves to the reality they are confined within.

Also, comparing this neighborhood with the MSV and another two working-class neighborhoods which displayed activism, I discovered that people from the neighborhood that lacked activism do not have personal friendships with their neighbors – they hardly know who their neighbors are (Interview #24). Moreover, in response to the question why she thought some contaminated neighborhoods did not have any collective actions, one resident, who was not an activist, indicated that no one knew how to mobilize the collective actions (Interview #24). On the contrary, it was discovered that among the MSV and the other two working-class contaminated complexes, when factors, such as a pre-existing local organization which shares similar concerns and could help to shape the definition of problem and solutions, or persons who are already familiar with strategies of mobilization, or who have knowledge about radiation are present, local collective actions tend to occur.

Although local activism tends to take place when the above factors exist, most of the local collective responses did not extend beyond two years. After receiving compensation and subsidy, the momentum of most local protests was eliminated. Moreover, such a short-lived activism also occurred in the participation of the non-impacted activists in the RSPAT – their activisms lasted less than three years. Thus, the question arises: Why didn't a long-term environmental mobilization occur? What factors shape these phenomena? In the last part of this chapter, I review factors presented in order to explain these phenomena.

Personal Troubles vs. Public Problems

According to a number of local activists (Interview #9, #20, #27, #30, #32), some impacted residents in their neighborhood indicated that this was a personal trouble and must be overcome by oneself. Not only did they fail to participate in local collective actions, but also they complained about their neighbors' activism. One account reveals such a mentality:

> You know some people have children. If they go to protest, who takes care of their children? There are always some barriers to participate in the protests ... One of my neighbors downstairs complained about our protests ... and said, "This matter [the contamination] ... you got to overcome it by yourself...." He never participated in the activism anyway. I have never had an idea what's in his mind ... (Interview #30)

Besides seeing the contamination incident as a personal trouble, rather than as a public problem demanding remedies from the related governmental agencies, some residents viewed this contamination incident as a consequence of bad luck. The account from an impacted resident who had never participated in collective activism reveals this perspective:

> I guess most of the RCB residents who don't take collective actions consider this

> [contamination] as a result of bad luck. Therefore, we may not actively appeal [to the government] or request assistances. (Interview #25)

However, as was suggested before, even among people who saw the contamination as bad luck, the responses differed in two ways – some wanted to participate in activism in order to stop this bad luck and prevent its further spread to others, while others sought to forget about this incident by not thinking about it, which resulted in their failure to join the collective actions.

The Mentality of Free Riders

When the question was asked why people do not take collective actions in response to the contamination problems, many of the informants indicated that people were selfish (Interview #9, #11, #14, #16, #20, #27, #30) and thought it was enough that some other people took actions. In the words of the two local activists:

> To be honest, people more or less are all selfish ... Some people never joined the protests but just waited to get the compensation ... what can we do? You cannot force them to join you, right? Well, each person has his/her own reasoning. Like our complexes, after the problems were solved, we did not join protests of other complexes to support them any more ... (laughing with embarrassment) Selfishness is the problem .... (Interview #30)

> The neighbor who lives upstairs never joined us when we protested to the TAEC or Legislative Yuan. She always said to me, "There is no problem in my household!" ... you know what? She was the first one to go to get the compensation. (Interview #20)

According to the leader of the RSPAT (Interview #1), some impacted residents did not want to take any risk or work together in fighting with the TAEC, but just waited to get the fruits of the RSPAT's activism. He indicated that some of the impacted residents thought that the membership of the RSPAT meant to get everything they wanted. For example, about twenty impacted residents publicly requested to withdraw their membership and wanted a refund of their membership fee on the ground of "You [the

leader] cannot solve the problem for us and I have to prioritize earning my living first ...I cannot participate in the activism" (Interview #1). It seems that some of the impacted residents sought immediate gratification and solution for their problems. When the problems could not be solved or their own problem was solved, the activism in the RSPAT became redundant and unnecessary.

Sense of Powerlessness and Alienation

It was revealed that a sense of powerlessness is commonly demonstrated in the accounts of the impacted residents who have never participated in any collective actions (Interview #23, #25). They consider themselves as "ordinary citizens" without any power to alter their current situation. One of the accounts reveals such a sense of powerlessness:

> Informant #23: "We, the ordinary citizen, facing this RCB problem ... what can we do? There is no way for us to appeal or to do whatever ... don't you think so?"
> Researcher: "There is no way ...?"
> Informant #23: "Right, no way out ... Unless, you have some connection with people who have power ..."

The sense of powerlessness makes these impacted residents disbelieve that the government will do anything to help them. Therefore, it is useless and a waste time of to be involved in activism.

> Researcher: "Have you ever thought to take any action to appeal to the government?"
> Informant #25: "No. Several reasons ... First, if you want to protest, you must mobilize many people. I don't know much about [how to mobilize] this kind of social activity [social activism] ... in fact, I don't agree to involve in this large-scale [activism] or protests because I think it's useless. ... In addition, I have to work in order to make a living, so I don't have time to wrestle with it [the government]. Actually, it [the government] can discard your petition or appeal easily. ... This is a common phenomenon in Taiwan. I don't find any [governmental officials or

governmental agencies] trustworthy ..."

Exhaustion and Frustration

Though the goals of the RSPAT appealed to the impacted residents on the abstract and collective levels, in reality, when resources at their disposal were limited or did not exist, or people did not see any hope in addressing these problems, the impacted people tended to feel sarcastic and cynical about the activism. One of the impacted residents in the MSV complained about the collective civil action against the TAEC, revealing frustration about activism that produced no concrete result:

> The State Tort Compensation Law ... yeah, yeah, we were told how much we could get for compensation ... yeah, a big chunk of money ... my name was on the list of receivers of compensation and it told you how much money you could get on the list. But, so far, nothing! I have not got one cent yet, and never heard about the money has been handing down. Once he [the leader of the RSPAT] told each one of us how much we can get from the compensation according to the State Tort Compensation Law, in fact, we have got nothing ... what's the use? (Telephone interview #45)

Such exhaustion and frustration was not only revealed in the impacted people but also happened among activists who have not been directly impacted. One non-impacted activist explained why he did not continuously involve himself in the activism like this:

> .... When this [the activism] has been taking such a long time, exhaustion of the movement momentum becomes an unavoidable consequence ... I need to make a living, right? It's impossible that I put my work aside and engage myself into this activism. Previously, when I participated in the RSPAT, I did it during my free time. Now, due to exhaustion ... I still involve when I have time, but it's much less. (Interview #11)

Differential Remedy Policies Divide the Impacted Residents

In response to contamination in different complexes, different local governments developed different reactions along with differential compensation and remediation policies. This led to a divergence that undermined a national coalition among varied

contaminated complexes. In other words, each contaminated complex developed its own strategies to deal with its own contamination and sought for assistance from different governmental agencies that they thought could help them. Sometimes differential resources at the structural level could lead to a differentiation among the impacted residents. As one impacted resident from Taipei County expressed:

> It's necessary for people [the impacted residents from varied complexes] to help one another ... after all, we are all victims! Say, if we have protests in our complex, people [from other contaminated complex] come to join us. Or vice versa ... It should be like that ... But you know? Later, the treatment and remedy policy between Taipei City and Taipei County were so different! Well ... I felt... mmh... people in Taipei City received more attention and it seemed they were more worthy to be cared for .... Some of my neighbors even said, "We got no reward by strongly supporting Mr. Wang [the leader of the RSPAT], why do we want to keep participating?" (Interview #30)

Impacted residents in Taipei County see the RSPAT as a group representing the interests of the MSV or the impacted residents in Taipei City rather than the interests of Taipei County residents.

Organizational Factors

No permanent office

A permanent office for an ESMO is essential. It serves to provide a space to build up the solidarity for people who share the same grievance to interact among themselves (Clarke, 1991). Unfortunately, the RSPAT has never had a permanent office since it was established. From time to time, it used different places as its office, which made it inconvenient for various people to contact the group, or continually participate in activities of the organization. As one member indicated: "... After the office moved again, this time I could not find it, so I stopped going" (telephone interview #25). From the data of the telephone interviews on the RSPAT's current and ex-members, a couple

of members indicated that one of the reasons of ceasing their involvement in the RSPAT was because the office moved from time to time, and it was not convenient for them to go to the new office (telephone interview #25, #47).

The leadership style

Several activists (Interview #15, #29, #35) expressed the view that perhaps because the leader of the RSPAT comes from a background as an owner of a small to middle-scale family business,[6] the decisional process in the RSPAT often was one-way, arbitrarily handed down without enough communication among the varied participants. This made it especially difficult for people from various contaminated complexes to work together in solving the problems. This factor also accounts for the reason why the RSPAT failed to bridge different interests among varied contaminated complexes. As one ex-member of the RSPAT indicated:

> ... The way he [the leader of the RSPAT] did it was a cliché. He only took care of the issue of physical health but not on the psychological needs. There should be many ways to take care of psychological needs, unfortunately, he failed to do so. In addition, he did not listen to different ideas from others ... just did things the way he wanted. (Interview #15)

Organizational structure

Relating to the leadership style, the organizational structure is centered in the core leader of the RSPAT without other different levels of horizontal networks. In other words, the core leader is the one who knows and takes charge of everything throughout the whole activism. In different times, different people joined the group to help as activists. As time went on, some people withdrew and new people joined. Though the

[6] In Taiwan, the small to middle-scale family business is the typical kind of enterprise. The organization of such a business is hierarchical and decision-making process is from top to the bottom without much communication horizontally.

group can keep running, however, few experiences have been exchanged among other activists in this group. As one of the non-impacted activist's observation indicated:

> I have never known people who have or had been involved in this group since I joined it. It's a pity that we [the activists in the RSPAT] don't know one another. I think it would be very helpful if we know one another, we can share our varied experiences with others. (Interview #11)

As a result, this makes the workload of the core leader especially heavy and obviously the leader is burnt out in the long term (Interview #21).

Summary

There are several findings regarding local collective actions and the emergence of a national radiation safety movement in this Taiwan case. First, on the local level, it was discovered that local collective actions tended to emerge only when there were persons who were familiar with strategies of mobilization in the local neighborhood (HCCL case), or in the presence of a pre-existing social group, which shared similar concerns and could help to shape a collective definition of the problem (TFCH case) (Cable and Walsh, 1991), or in the presence of persons who know of radiation knowledge in the local communities (MSV case).

Second, since the nature of problems in varied complexes differs, impacted residents from different complexes perceive different goals and seek different means to achieve them. Therefore, in this contamination context in Taiwan, long-term alliances were not very feasible among complexes in which local protests occurred. Though the

RSPAT tried to bridge these differences, being perceived as representing impacted residents in Taipei City and being criticized for focusing only on the interests of the owners of the apartments, the RSPAT inevitably failed to draw other local activists into its national movement.

Third, on the national level, the composition of activists extends across class lines. About fifty percent of these activists held membership in varied NGOs in addition to the one from the RSPAT, and several of these organizations / groups were associated with environmental concerns. In addition, it was revealed that these activists were connected to the RSPAT through social networks, such as friends or other EMSO, such as the TEPU or the Home Maker Union. Their motivations for participation in the activism included (1) a desire to learn more about this contamination incident (2) help the suffering impacted people to overcome this social injustice, or because (3) they consider the RCB incident to be an environmental issue, which involves biospheric contamination and / or human health impacts resulting from environmental contamination; and would like to support the goal of the RSPAT to urge the government to take responsibility to deal with this civilian radiation contamination.

Overall, a number of factors account for the particular patterning of public responses to the contamination in this RCB incident, and particularly the absence of the kind of long-term environmental mobilization of grassroots activists that has been

reported in other settings. These factors include (1) seeing the residential radiation contamination as a personal trouble that must be overcome by oneself, (2) the mentality of free riders, (3) sense of powerlessness and alienation from the government, (4) exhaustion and frustration from the fruitlessness of activism, (5) differential remedy policies that undermine the coalition potential for impacted residents among varied contaminated complexes, and (6) several organizational factors, such as having no permanent office to provide a space for common grievance to be collectively voiced and where participants could plan strategies and cumulate their activist experiences. The other organizational factors include a leadership style and an organizational structure that do not allow horizontal networking and sharing of ideas and experiences among the impacted residents and volunteer activists who were drawn into this ESMO at different periods of time.

CHAPTER SEVEN

THEORETICAL LINKAGE BETWEEN RISK PERCEPTIONS AND ENVIRONMENTAL MOBILIZATION

Introduction

The purpose of Chapter Seven is twofold. First, I employ the framework of "social amplification of risk" in order to analyze the social experiences of risk in this RCB case. I seek to discover how various interpretations of this RCB incident provide rules for individuals and / or social groups to select certain risks or to ignore them in response to this incident, and in turn to shape the emergence of environmental collective action. Also addressed are the ways in which secondary impacts (social or economic consequences), perceived by social groups and individuals, spread to other parties and produce third-order impacts, which either facilitate or hinder the emergence of the environmental mobilization. Moreover, how the societal contexts in Taiwan, through their effects on risk assessors, alter the focus and scope of risk assessment and in turn shape the collective actions will be discussed. Finally, an analysis is presented to demonstrate what the findings from this Taiwan case suggest to fill theoretical gaps between the existing literatures on the sociology of risk and the findings on grassroots environmentalism.

Analysis of Social Amplification / Attenuation of Risk in the RCB Incident

The Responses of the TAEC as a Mechanism of Risk Attenuation

After investigating and supervising the steel rod manufacturing companies collection of the contaminated steel rods and their burial in the waste storage site in 1983, the TAEC closed the case. In a report it concluded:

> This is an independent incident without other steel manufacturing companies involved. If it was publicized, it might cause rumors and influence the export of the steel rods, as well as stir up unnecessary social fears on the security of construction steel rods. Therefore, this case should be solved confidentially and peacefully between parties involved, [we] especially should avoid blaming and conflict between parties in order to avoid being targets of the media, and lead to a worse consequence. (Sato, 1993:83)

To avoid societal panic, the TAEC did not continually investigate other possible contamination areas even after finding that the source of the contaminated steel rods in the cases of ICBC and MSV might be the same. In addition, while the media sought the TAEC's attention regarding contaminated metal scraps circulated in the construction market, the agency not only failed to investigate these incidents publicly, but responded to the media that "according to the data, all the contaminated steel rods should have been already collected back" (*Liberty News* 04/13/1988). Thus, the TAEC blocked the opportunity to prevent further dissemination of knowledge about this contamination incident and prolonged the unnecessary and involuntary radiation exposure of the residents in the MSV.

It was not until the end of 1992, after the MSV contamination became public knowledge and demands increased for governmental intervention, that the TAEC responded to the crisis and conducted a nation-wide survey by offering domestically produced LiF thermoluminescence dosimeters (TLDs) to those who owned apartments constructed in Taiwan between 1982 and 1984. The TAEC also sent staff workers to do further detection in households where TLD reflected results that exceeded background levels of radiation. A second survey was conducted later to trace those households that failed to be investigated in the first inquiry (Kao, 2000).

As stated in Chapter Four, in 1994, the TAEC issued the *Regulation for Prevention and Handling of Radiation Contamination Buildings* in order to set a guideline for assistance that impacted residents might receive from the government. This regulation, however, was based on an earlier standard from the International Commission on Radiological Protection (ICRP), which had set 5mSv as the standard for handling the RCB cases in Taiwan. This regulation reveals that the risk management institution, the TAEC, does not consider that risk is involved in those impacted residents whose households reveal the presence of radiation between 1mSv to 5mSv, which is currently deemed to be risky by the ICRP.

Conflicts Resulting from Uncertainty about the Physical Effects of Radiation Exposure

Since impacted residents in the MSV were highly concerned about how they had been impacted physically by the chronic radiation exposure, the TAEC arranged for about 200 residents in MSV to have physical examinations in November 1992. Later, the report of this medical examination concluded that the causality between chronic radiation exposure and the development of cancers did not necessarily exist, and the probability of having cancers was only slightly higher for those who had chronic radiation exposure. Because the residents disagreed with this conclusion, they sought external medical assistance. In October 1993, thirteen of the residents visited the Mazda Hospital in Hiroshima, Japan, and received a comprehensive medical examination similar to that provided for atomic bomb survivors in Japan (*Yumi-Vli News,* 1993).

Five children were found to have lymphatic disorders, one child had cataracts in both eyes, and one adult had hypothyroidism, and eleven had chromosome abnormality and four among these eleven had chromosome dislocation (Bi, 1994). This attracted the attention of the medical community in Taiwan which urged the government to pay more heed to this warning signal by increasing efforts to identify RCBs. The Department of Health considered that it was dangerous for the residents to stay in households contaminated with elevated radiation and suggested that residents relocate. Because of scientific uncertainty about what kinds of physical effects might ensue,[1] however, and based on the very low probability of physical harm, as well as concern about stirring up unnecessary social turmoil, the TAEC declined to act. Its position rejected the view that there was an urgent need to relocate the residents of contaminated households that exhibited an excessive radiation burden.

Conflicts also emerged from disagreements between the risk management institution and the impacted residents on how to evaluate the cumulated doses that the impacted residents had received. Using scientific/technical language, the TAEC emphasized that the probable association between radiation exposure and physical injuries was low and that causal linkage between them had not been proven (Kao, 2000). In the estimated radiation cumulated doses for the impacted residents of the MSV, the TAEC employed a standardized model, assuming that all the impacted residents

[1] Since no such case had happened in the past, no medical research was available to inform the medical professionals and the public as well as the TAEC officials what the danger might involve. According to a medical researcher, all the medical studies were done with cases of short-term exposures with extremely high radiation level such as an accidental nuclear reactor explosion, or cases of geographical radiation in Brazil or residential radon in the United States, where radiation was somewhat higher than the normal background level. A case, like the RCB incident in Taiwan, with radiation levels over ten times to several hundred times more than the normal background level and with chronic exposure, has not been investigated systematically.

experienced the same lifestyle in a general usage of the space in their residences. The impacted residents in the MSV criticized the TAEC for underestimating the potential harm to babies, women, and elderly people who usually spent more time at home (Bi, 1994). In addition, the two radiation detection reports sent to the residents from the TAEC showed two different results of radiation levels at each household, which also aggravated the mistrust of the impacted residents. Later, the TAEC explained that the second report indicating a lower radiation level was the one measured with the background level; and the first report with a higher level was based on detector readings close to the contaminated spots.

Evaluation reports of radiation levels at households and at schools from the TAEC, however, were usually lower than the reports from the researcher of National Yang-Ming University, and the results from detection by NGO volunteers, such as the RSPAT and the TEPU. These discrepancies increased people's mistrust. In the interviews some impacted residents and parents expressed their mistrust:

> The TAEC told the parents that such a radiation level could not kill people. They said, "The radiation you received while you took an airplane was much higher than this one." But, the radiation level that the TAEC told us was ten times less than the radiation level Prof. Chang [the medical researcher in National Yang-Ming University] evaluated. (Telephone interview #49)

> Let me tell you ... letters sent to us from the TAEC are not logical ... the statements of the letters contradict each other. One letter told us the radiation level in my apartment was very low, so no need to detoxify. In other words, it says ... you just keep living here, no problem at all. Then, the other letter followed and told us that if we wanted to sell or rent out this apartment to others, we have to inform them ...Here is the contradiction ... if the radiation level is really low and no harm to human, why bother to tell the buyers or renters? Tell you what, I am very mad at the TAEC and don't trust what they say at all ....(Interview #2)

While the risk management institution (the TAEC) downplayed the risks involved in this incident, some researchers in the medical community and environmental activists, as other social stations of risk amplification, emerged simultaneously to speak out about the radiation hazard. Conflicts, therefore, among various parties involved in this incident happened as a consequence of different interpretations of what physical effects would be caused by chronic excessive radiation exposure.

Physicians and Environmentalists' Responses to Amplifying Risks

As the TAEC attenuated the risk signals in those cases which presented higher levels of radiation, some medical researchers in Taiwan and from Japan, on the contrary, played a role in warning the public about the risk concerns.

> We invited a Japanese expert, Sato, who had worked with survivors after the atom bombing in Hiroshima, to come to detect and evaluate the problem. He said, "Your government does not care about people's life at all." Sato also went to detect the other enclave. He found one building on Kuang-Fu North Road was contaminated with the level above 0.6, 0.7 or so and he asked how come people still live in the apartment with that kind of level of radiation presence. The residents must be relocated right away. He felt the government was not concerned about people's lives. Then, we went to protest to the TAEC. (Interview #9)

In addition to some of the medical professionals, environmental activists, have also been social stations of amplification as they communicated risks involved in this incident to the public. In the initial stage of discovery in 1992 and 1993, knowledge was lacking about of how human beings would be impacted physically in this specific case of radiation exposure. Thus, activists and researchers' risk perceptions were shaped by their

first hand experiences in the impacted residents' households. One medical researcher put in this way:

> In 1992, I just came back to Taiwan from U.S. and I met the impacted residents of the MSV in a seminar hosted by the TEPU. That was the time this incident was just discovered and not many people knew what's going on, including me. After all, all of my knowledge on this matter was from the textbook. The impacted residents invited me to go to their apartments to evaluate the problem, so I brought the detector I just purchased to the MSV. I turned on the detector when I got into the apartment and a high-frequency beeping sound went on right away. I quickly turned it off because I thought it was broken. Then we went into the other household and I tried the detector again. A high-frequency beeping sound went on again ... I apologized to them embarrassedly because I thought I brought a detector which didn't work.

Recalling the experience, he continued:

> That night when I went home I kept thinking what's wrong with the detector and what happened in the MSV ... then I realized the radiation level in the MSV actually was extremely high, too high ..., which already was beyond the detecting range of the detector. I was not worried much for exposure in such a high radiation level there because it was just for a short period. However, if I were invited to stay there overnight for free, I probably would not go. Later, I thought it would be dangerous for them to keep staying in those apartments. So, I told them "It's too dangerous to be there, you'd better leave." (Interview #34)

The message of "it's too dangerous to live in the RCBs" was conveyed by medical researchers. It was based on their experiences in the contaminated households and then personal intuitions and judgments, and was subsequently conveyed to the residents in the MSV and other contaminated enclaves. Some of these impacted residents, as members of the RSPAT, communicated such a message to the wider pubic through radio programs, which was one of the ways news of the incident was spread. Various non-impacted people were brought into the RSPAT to be members. By listening to the

radio program that the chair of the RSPAT hosted, they learned about the RCB incident, and about radiation protection and health, as well as related issues, such as the controversy over the fourth nuclear power plant.

For some of these activitsts, their understanding of the subject matter changed and their perspectives on the nuclear power issues were shaped through their participation in the RSPAT. The RSPAT's position on the issue of radiation safety became their belief which often excluded different perspectives on the problem. An interview with one of the non-impacted activists shows such a selection of information in relation to their perception of radiation effects on health.

> Informant #11: I did not know anything about it (radiation knowledge) at the beginning until Mr. Wang [the leader of the RSPAT] educated us ... Well, the impact of the radiation to you is the whole body, from your head to your feet.
> Researcher: Besides information from Mr. Wang, were there any other sources you learned about radiation knowledge?
> Informant #11: Newspaper, information from the TEPU, radio and TV program ... such as Chung-Tien Channel. It had many documentaries about this matter [radioactive hazards]. Were those invalid? Impossible!
> Researcher: Did it come from physicians or professors in Ching-Hua University[2]?
> Informant #11: No, it's impossible for them to tell you the radiation is bad to you because that's what they make a living for.

It appears that information provided by the environmental groups and some physicians also generated secondary effects that were beyond what they had intended to communicate in the first place. Reflecting on their participation in communication and interactions with the public for a few years, some environmentalists and medical researchers realized that what they initially expressed to the impacted residents about the presence of the radiation at the households should be refined in a way that could convey

[2] Professors in Ching-Hua University are usually considered as *Yeon-ho* (Pro-nuke).

the risk message in relation to varied levels of elevated radiation, but without stimulating unnecessary social panic.

> Some people who went to detect the presence of radiation told the residents straight out that the level was high and dangerous. I did talk in this way at the beginning, but later I thought it's bad to tell them like that. Later, I explained to them, "Due to your lifestyle in this household and the time you stay in it is varied, I need to calculate the exposure level and will tell you more later. Meanwhile, it'd be better to keep away from the spots. (Interview #15)

> Well, definitely now I would have a better way to tell the residents about radiation impacts than nine years ago. Previously, without enough knowledge about what impacts would happen, I expressed in a simple, rough way based on my intuition and judgment – tell them it's dangerous, it's better to leave. But, now we have had some research findings do tell us the impact will happen to children who are younger under certain age and the interaction among physical impact, children's age and the exposure period ... Also now we have more resources, such as systematic health examination and citizen medical insurance ... Therefore, now I can put it in a better way which tells people what risks could be involved, but not make people overly anxious. (Interview #35)

These accounts reveal that risk perception has a temporal aspect. People's perception of a given risk is not always fixed and may undergo reinterpretation and change through time as more information is learned. When the secondary effects are dominant in shaping people's perception of risks, however, it is very difficult for them to accept additional information that might alter the risk perception. Therefore, even though the information about risks could be explained in a refined way without intending to amplify or attenuate them, this is frequently not the outcome of the communication. The secondary or higher-order effects emerging from the incident often make such goals harder to achieve. As a consequence, some secondary effects may have the potential to put the social fabric itself at risk (Short, 1984). These secondary effects are frequently

not taken into account in the risk communication or the risk assessment of a specific hazardous event.

Secondary Impacts Emerging from the RCB Incident

The interpretation and response to information about risks and risk events form the second major stage of social amplification / attenuation of risks. Some observations of the secondary impacts which have emerged from the RCB incident follow.

Mistrust of the Capacity of Government's Risk Management

The ripple effect from the RCB incident also extends to attitudes about the nuclear power industry and the government's capacity for crisis management for nuclear accidents. In my study, when the impacted residents and non-impacted activists were asked whether they agreed or disagreed with the construction of the fourth nuclear power plant, most of those who had become activists, had changed their attitudes[3] from favoring to opposing constructing the fourth nuclear power plant. They adopted this position because they associated the RCB incident with the nuclear power plant accidents, and they did not trust the government in dealing with a possible nuclear accident. Most of these informants expressed the opinion that after this RCB incident, they had learned more about radiation and its related harms, and they now tended to favor alternative energy over the fourth nuclear power plant.

[3] The research finding also shows that four impacted residents without activism indicated that they considered it beneficial to Taiwanese society if the fourth nuclear power plant was established. Three of them indicated that the nuclear power plant was not as dangerous as the public thought. One of them expressed her uncertainty about the odds of nuclear accident, but she still felt it is good to have a nuclear power plant. They don't all associate RCB incident with the application of nuclear energy.

> Tell you what? I used to think it's necessary to build the fourth nuclear power plant because we did not have enough power supply. Without the fourth nuclear power plant, the prosperity of society will be hindered. But now, my opinion has been changed due to this radiation incident. I know the negative impacts of radiation and if there is an alternative way for nuclear power, I will say no to the fourth nuclear power plant. (Telephone interview #4)

Though this seemed to be a result of social amplification of radiation risk as an official from the TAEC indicated:

> The risk of application of nuclear power plant is not bigger than the risk of walking, driving and taking a flight. However, messages from the media or the State portray the application of nuclear energy as dangerous. In the newspaper and movies, you may find messages in this area are all telling the public nuclear energy is dangerous. Therefore, after receiving these messages, people perceive that nuclear power plant is dangerous. Also, after the two atom bombings in Japan, such a perception is aggravated. Such a perception does not match the analysis of empirical study of radiation harm. (Interview #36)

The public's attitude moves beyond the scientific calculation of the probability of the accident's occurrence. In the view of lay people, anti-nuclear power plant is a consequence resulting from a secondary effect from the government's poor handling of the RCB incident and other nuclear-related issues, such as the management of nuclear waste storage. In the words of two informants:

> I disagreed with the fourth nuclear power plant. Based on my readings, I found it's tough to deal with hazards from the nuclear power plants for several countries all over the world, including developed countries. ... With the poor managerial ability of Chinese [Taiwanese] and unethical ways to make profits, I doubt it can be dealt with well if a nuclear accident happens ... Also, since RCB, this single incident, has not been properly dealt with yet, how can we expect a good crisis management for the nuclear power plant accident? (Telephone interview #20)

> From my point of view, in the long term, the fourth nuclear power plant is still dangerous. If an accident happens and the radiation is released and flows to the Greater Taipei area, I wonder where people in this area will be evacuated. Two thousand people died from the earthquake [in 1999]. If a nuclear accident happens, I'm afraid the number of deaths will be more than that. In addition, the government has managed the nuclear waste poorly and I don't think it's capable of dealing with an emergency from the nuclear reactor. (Telephone interview #46)

While officials in the risk management institution emphasize the low-probability of the occurrence of certain risk events, such as nuclear accidents, and are puzzled by the "irrationality" of the public towards risks involved, the public often gives more weight to the high consequence of the event, especially when the the managerial agencies have a history of poor risk management. In other words, this "different rationality" (Freudenburg, 1992) reflects public mistrust of the ability of crisis management of the risk management institution and lack of concern for the public's suffering when the hazard did happen.

Social Stigma

Stigma refers to the negative imagery associated with undersirable social groups or individuals (Goffman, 1963). When environments or communities have heavy pollution, waste storage sites or hazardous technology, they are also associated with negative images. Typically, people avoid stigmatized persons or environments, which often causes the impacted people to feel isolated from others. Sometimes, the risk-induced stigma may increase the social anxiety of the impacted people, especially in a certain life cycle stage, such as marriage and child bearing. In this study, it was discovered that some women of child-bearing age did not want to be identified as RCB residents and they even declined to register and receive the government-sponsored health

examinations because the social stigma and the possibility of bearing a baby with birth defects might make them undesirable for marriage. In addition, in one case, after a woman was identified as a RCB resident, her fianace's family called the engagement off, and the woman commited suicide (Interview #4). Moreover, children whose households or classrooms were contaminated are often ridiculed by other kids and labeled as "radiation kid" or "radiation people" (Interview #1, #21, #34).

In this RCB case, social stigma extended to the local neighborhood (Interview #9, #14, #19, #27) and neighbors, whose apartments were in the same apartment complex but were not contaminated. The local bank denied a loan to the owner of the uncontaminated apartment, which was in the apartment complex where RCBs were discovered. Owners of uncontaminated apartments lost their income from rent because no one wanted to rent the apartments in the RCB apartment complex. Otherwise, the renters often negotiated with the landlord to lower the rent to an unreasonable price (Telephone interview #45).

The social stigma attached to the impacted residents and the neighborhood explains to a certain extent why many impacted residents do not want to be identified as RCB residents, which also undermines local people's networking and the emergence of collective actions. The following two accounts reveal the fear of such effects of social stigma. One from the leader of the RSPAT:

> ... A young daughtor of one impacted resident was diagonosed with last-stage of cancer and they came to us [the RSPAT] seeking help. With the permission of the father, we [the RSPAT] arranged for media to report this case and sought the public for donation to help the medical expenses ... That night after the daughtor's story was reported in one of the TV channels, the father called me [the leader of the RSPAT] ... The father was very upset ... He [the father] said one of his relatives from his hometown in sounthern Taiwan, after seeing them on the TV, called him right away and blamed this act for making them [the impacted family and their relatives] lose face ... His relative said "Why do you do

> this [to be on the media]? Even if someone dies in your family, you should have not done such a shamful thing." .... (Interview #21).

He continued and indicated that the pressure from relatives caused by the social stigma somehow played a role in hindering the mass participation of activism, although it did not necessarily keep people from some degree of involvement in collective actions. He said:

> Many people don't want to join the protests because they are afraid to be identified. For some people, they join protests with us [the RSPAT], however, when the media / reporters are present, they will hide from the media with something covering on their faces (laughing) ... (Interview #21).

Another account is from an impacted resident who has never participated in any collective actions. While being asked whether neighbors had ever gathered together to discuss this incident and remedies, this impacted resident reponded that she would do her best not to let people know that their household was contaminated. She said:

> Informant #25: " ... If you were me, I think you would also do your best to hide this fact [the household's contamination], and not let your neighbors know. Because people's mentality ..."
> Researcher: "Would you please elaborate why you don't want your neighbor know?"
> Informant #25: "Because people will say 'Oh, you live in a RCB ... there are some impacts on people [people's health] ... Something [bad] may happen to you in the future ... Well, if I plan to sell this apartment without telling people it's a RCB ... if others know my apartment is a RCB, they would tell people not to buy it because of ..., therefore, as a result [of being identified as a RCB] I lose a lot ... "

Later, she continued:

> ... I am very unhappy that why it is so easy for we to be identified as RCB residents and our information was released ... Ok, it's fine with me as an adult, but my children, who will grow up in this neighborhood, will encounter many comments on them [related to this incident] .... (Interview #25).

It seems that social stigma, such as the potential to bear offspring with birth defects caused by radiation exposure and other problems, attached to the impacted residents, produces many latent burdens to the impacted residents. This explains why participation in collective actions does not appeal to many impacted residents, since joining in activism means being identified as a RCB resident, which leads to bearing the effects of social stigma. This may also explain why some people rejected the TAEC or the environmental groups' efforts to detect the presence of radiation in their households (Interview #1, #15 and #37).

An important question to ask is how social stigma affects those who participated in collective actions. There is a contrast for those who actively join the activism. They tend not to be concerned about being stigmatized. As one female impacted resident who had been active in the RSPAT's activism said:

> ... There is nothing to be felt shameful [about us as RCB residents] ... The government should feel shameful ... it failed to manage the radioactive waste properly which caused this RCB incident ... why I should feel shameful or concern to be labeled? (Interview #2)

Also, the other female activist responded in this way when she was asked how she felt about being identified as a RCB resident on the media:

> ... (smile) ... I think people are forgetful ... they will not remember forever that I live in RCB... I know most of my neighbors concern about being identified as RCB residents, but I don't care at all ... Because as time goes by, people will not remember any more .... (Interview # 26)

Alienation from Governmental Agencies and Public Affairs

Similar to findings from the literature on the communities experiencing CTDs (e.g., Edelstein, 1988), in Taiwan, when the government, which is supposed to assist the impacted people to solve the contamination problems they encounter, failed to fulfill its function, impacted people tended to feel isolated with a strong sense of alienation from the government. Accounts revealed that throughout the prolonged process of seeking assistance from the government, some people became alienated from the govenmental agencies because they were frustrated with the government's responses or lack of response. As one of the activist indicated:

> Ordinary people do not have the ability to solve such a problem ... for them, the problem is so tremendous that the only way is not to do anything about it. The government leaves you alone ... to live or to die is your business. So, what is the use to have such a government? (Interview #11)

In addition, one impacted resident expressed the sense of powerlessness and the frustration from interaction with governmental agencies when seeking assistances:

> You know? I feel a tremendous sense of powerlessness. After I had sought the city governmental agencies for approval of improvement project but gained no answer, I was very frustrated. ... felt as an ordinary citizen without any connection with people who have power, I was wasting my time in dealing the bureaucratic system. (Interview #25)

Two impacted residents, who had not taken any collective action, explained the reason why they did not participate any activism. They believed whatever actions they took would be all in vain and waste their time and energy because they did not think the government would respond to them. On the contrary, they mistrusted the government assuming that governmental corruption was an unavoidable consequence.

> Why have I not appealed to the government or done anything ? I think it doesn't work at all. You see people in the MSV ... their case is still pending there, do they get anything? It's all a waste of time and energy to deal with the government. (Intereview #19)

> Policies? They are all nonsense. When the contamination was just discovered, the government said it would do this, do that ... as time goes by, nothing is done. Well, I think it's useless to appeal to the government or ask for a policy to help us. Did you see what happened after 9-21 earthquake? Where did the donation from the whole society go? Nobody knows! Tell me who took it? Did the government eat up those donations? (laughing) We don't have evidence, do we? (Interview #23)

Although some impacted residents were alienated from the governmental agencies, others indicated a hope towards the new government.[4]

> For most of the impacted residents, they are frustrated because they did not know how to solve the problem. They are not necessarily seeking compensation. If the government cares for their feelings and shows sincerity to them, I believe most of the impacted people would understand the difficulty of the government and accept it ... well, now we have a new government, which will deal with the problem in a better way. I think President Chen cares for this incident. It looks promising for what this new government is going to do. (Interview #5)

When the current leader of the country, President Chen, was the Taipei City Mayor, he implemented a policy, the *Regulation in the Management and Assistance for Residents in Residences with Excessive Radiation Contamination,* to assist the impacted residents and earned a good reputation among the RCB residents in Taipei City. It seems that the current government has a better opportunity to build on its greater trust in people's eyes, especially in the RCB impacted residents' eyes. The outcomes need to be observed

[4] In 2000, the DPP won the election for president. It was the first time that many central government officials, who were appointed by President Chen Shui-Bien, did not hold conservative positions on various political, economic, and social policies.

further in order to affirm this conclusion, and such a further study is beyond the scope of this dissertation research.

Findings from this dissertation study, however, do reveal that the sense of powerlessness and political passivity are demonstrated among some impacted residents who have avoided participating in collective activism. The author suggests that this phenemenon results from the historical discouragement of citizens' participation in public affairs and the formation of varied policies during the previous KMT regime. This issue will be elaborated further, along with other contextual factors in this Taiwan case, in order to suggest why mass long-term grassroots environmental collective action did not take place in response to the RCB incident.

Contextual Factors that Account for the Emergence of Activism

Social / Cultural Conformity

As the approach of social amplification of risk emphasizes, it is essential to examine the interaction between risk experiences and the broader social, political and cultural context where these risks emerge. In the Taiwan case, it is discovered that even after the late 1980s, some people seem to have the shadow of "white horror" (*Bai-Serh-Kong-Bu*) still, and they fear that their participation in activism may potentially cause harm to themselves or their families. Two accounts of the impacted residents, who did not participate in any activism, give a glimpse of such a concern:

> Informant #19: It's useless to protest ... Unless it is a big scale protest, however, I prefer not to participate in such a big scale protest ...
> Researcher: Why?
> Informant #19: ... Mmh ... The cost is huge ....
> Researcher: What do you mean by 'the cost is huge?'

Informant #19: On the top of that I spend my time and energy and end up with getting nothing ... Having a strong protest may cause troubles ... and you never know what will happen to you .... (Interview #19)

Informant #25: ... I think if people only take mild actions [to appeal and to have petitions], it's useless. The government will not seriously respond to these actions. Only if it's a strong protest ... But, it [a strong protest] is not good ... I will not do it anyway ....
Researcher: ... Would you please explain why you say 'it's not good?'
Informant #25: You should know what I mean ... fighting with the government ... you will never win ... in addition, I may be caught into a trouble ... After all, we are just belittled citizens .... (Interview #25)

From the author's personal observation, socially, many Taiwanese people tend to conform to authority. It is expected that people obey and respect authority. Therefore, most citizens do not dissent from the government and its policies by taking collective actions to express their dissatisfactions.[5] Participation in collective actions against the government for many people, especially in the older generation, signifies rebellion. Another cultural factor that may be mentioned in the context of this Taiwan case is family loyalty. It is socially and culturally important to have healthy offspring from one's blood. The old saying, "*bu xiao yo san, wu hou wei da*" which means that filial disobedience is shown in three forms and the first and the worst form is that one does not have offspring from one's blood to carry on one's lineage, reveals the heavy burdens placed on people to have healthy offspring in order to continue the family lineage. Therefore, the shadow that one may potentially have a defective baby and the stigmatization attached to the impacted residents and their offspring in this matter plays a

[5] An alternative analysis of how networks of personalistic ties and revitalization of older communal ties like religion shape the formation of the civilian associations and in turn change the course of political culture in Taiwan is presented in *Alternate Civilities* by Robert P. Weller (1999).

significant role in the impacted residents' minds which causes them to prefer not to be identified as impacted residents from this radiation contamination incident. Further discussion of the interaction of social stigmatization with the constraints of the government's RCB remedy policy contributes to an understanding of the factors undermining grassroots collective action in the study of Taiwan.

Double Jeopardy of Social Stigma and Institutional Remedy Constraints

Given the evidence of social stigma attached to individuals and neighborhoods in the radiation contaminated complexes and the limitations of the government's policy in assisting the impacted residents, the author argues that these two factors in combination lead to a situation of a double jeopardy for the majority of the impacted residents in the contaminated complexes resulting in weakened grassroots activism. The risk management institution categorizes the contaminated households into three groups. It sets the radiation level of 15mSv/yr. as a standard in order to legitimate either the government's purchase of the contaminated apartments from the owners, or provision of subsidies in order to assist the residents to move out. For those contaminated households in which radiation levels are more than 5mSv/yr. and less than 15mSv/yr., the owners of the apartments are provided with subsidies for relocation as well. Those, whose households exhibit radiation levels of less than 5mSv/yr. and more than 1mSv/yr., are categorized as a low-level RCB and do not qualify to receive any subsidies from the government.

Because in a single apartment complex, there may be varied levels of radiation discovered, that thereby qualify for different treatments under the government's remedy

policy, some impacted residents end up experiencing bitter feelings towards the government. Their bitterness is also reflected in disagreements with neighbors over reconstruction of the contaminated apartment complex as a whole, as has been discussed earlier. For most of the impacted households, the governmental subsidies have not been really helpful in the long term. Since the remedy policies have already been settled, for most of the impacted people, it seems there is no way to alter this result and obtain further assistance. This circumstance, along with the social stigma experienced by residents, undermines any positive incentive for a significant portion for the impacted residents to risk taking collective action.

Findings That Fill Theoretical Gaps

Findings from the Taiwan RCB case help us to fill theoretical gaps in the current environmental sociology literature. First, in terms of the association between the character of the contamination agent and people's perception of the contamination, it is discovered that the invisibility to ordinary sensory perceptions of the Cobalt-60 radioactivity generated ambiguous definitions of threat. Further, the TAEC, as the risk management institution that defines the threat of radiation, has emphasized that because it is bounded within the walls of the residences, it poses no immediate danger for radiation exposure to the affected residents. A contrasting understanding is reflected by the ESMO, which defines the threat as diffused because the radiation is activated. In addition, since Cobalt-60 radiation's latency period between initial exposure and manifestation of physical impacts is ten to fifteen years, and the peak manifestation of physical effects was not reached while this study was conducted, the risk perceptions of the impacted residents

tend to vary widely. For those impacted residents who do not experience manifestations of significant physical effects so far, they do not worry about the health impacts after a couple of years. When significant physical effects are experienced personally, the risk concerns are obvious.

Another theoretical gap relates to whether the activism tended to occur more among the marginal victims who were less likely to receive government compensation or aid for damage (c.f. Hatcher, 1982). The findings from this Taiwan case demonstrate that most of the impacted residents, whose households exhibit medium to low levels of radiation, have not mobilized by participating in any collective action. The combination of contextual factors of social stigma and the limitations of the remedy policy explain why the costs of collective activism are experienced as being too high without providing any compensating benefits. Thus, activism is not promising, and it is apparently more rational to avoid any collective action.

Regarding the extent of class variation in the constituencies mobilized in response to the Taiwan Cobalt-60 contamination incident, it is revealed that the composition of activists is drawn from a wide range of the socioeconomic spectrum for both impacted and non-impacted activists. Since impacts of this RCB incident occurred randomly in northern Taiwan across neighborhoods of varied class composition, local activism emerged from the apartment complexes of upper-middle class residents as well as those of working class. On the national level, the composition of activists who are not directly impacted, also crosses class lines as was noted in chapter six. It was discovered that among all the RCB residents, working-class people bear more economic burdens and lack social resources to overcome their problems than do their upper-middle class counterparts.

Although they tend to lack the resources to conquer their contamination problems, collective responses are possible on the local level when strong networks of friendship exist among neighbors, or when veteran social activists are present in the local neighborhoods.

Summary

Because the risk management institution attenuated the risks involved in this RCB, the message that there was no danger involved might be accepted by some impacted residents. This was indeed shown from the accounts of the impacted residents who did not participate in the collective actions (Interview #23, #24 and #25). The ESMO, on the contrary, heightened the risks by emphasizing the physical effects from the radiation exposure. Although the causal relation between biological harms and chronic radiation exposure is uncertain,[6] and especially the outcome of defective offspring is not proven empirically in this case, the effect of social stigmatization on the contaminated neighborhoods and their inhabitants is a social reality. Such effects of social stigmatization are especially severe for women of childbearing-age living in the contaminated residences. The effect plays a significant role in minimizing the willingness of residents to participate in the collective actions and even in promoting individuals' adoption of risk-minimizing actions, such as not participating in health examination on a regular basis or not joining the governmental free health management plan, but instead having health examination paid for with money out of their own pockets. In other words, the ESMO, in the Taiwan setting where it is important to have a healthy offspring to continue the family lineage, amplified the risks of physical harms by

[6] A number of medical findings, however, did indicate association between specific physical effects on young children and chronic radiation exposure. This was presented in Chapter Four.

promoting awareness of radiation threats and unintentionally magnifying the effect of social stigma attached to the impacted residents and neighborhoods. As a consequence, it is possible that the impacted residents would avoid being associated with the ESMO, or learning of the information it disseminated, or being identified publicly as a RCB resident.

CHAPTER EIGHT

CONCLUSION

This final chapter discusses some of the research contributions and future research suggestions that have emerged from this study. The research contributions are twofold – including theoretical and policy implications. First, theoretical implications from the findings of this Taiwan case are presented to broaden our understanding of how the framework of social amplification of risk contributes to studies of people's risk perceptions and secondary effects as well as how these effects in turn influence risk behaviors and the emergence of collective actions. In addition, the contextual factors from the research findings, such as social stigma and the characteristics of the contamination agent, are employed to expand the CTD paradigm. Second, policy implications from the findings of the investigation are discussed. The chapter closes with three suggestions for future research.

Research Contributions

Theoretical Implications

In this dissertation, multiple theoretical approaches are employed to capture the complexity of contamination experiences and public responses to them in a case study of a radiation contamination incident in Taiwan. Specifically, two approaches, the framework of social amplification of risk and the chronic technical disaster model, are used to fulfill such an endeavor. In the following section, I present some findings which reveal the contributions and limitation of the framework of social amplification of risk, and findings which suggest modification of the chronic technical disaster model.

The RCB case in Taiwan demonstrates the complexity in investigating the interplay among the risk event and its interaction with psychological, social, organizational and cultural elements. In this study, factors including how widespread the contamination area is and the level of radiation contamination account, to some extent, for the variations in risk perceptions among the impacted residents. It is discovered, however, that among the groups with similar levels of radiation contamination, other factors, such as how and from whom the impacted residents receive the information about risk events and their distrust of the government regarding its capacity of risk management are secondary effects that shape people's perceived risks as well.

In addition, the risk management institution in Taiwan, the TAEC, and Taiwanese environmentalists hold different views on estimating risks of physical harm from radiation exposure. Such divergent views on risk estimates arise in part as a consequence of ongoing chronic effects of contamination resulting from the nature of the contamination agent, Cobalt-60, such as its latency period between exposure and health impacts. Divergent views between these two parties also come from their different beliefs and perspectives on nuclear energy and how risk should be measured.

Historically, the TAEC has promoted the usage of nuclear power and emphasized the safety of nuclear energy by using the languages of probability assessment of extremely low risk of nuclear accident occurrence. In the early 1990s when this RCB incident was discovered, the TEAC applied the same language of probability assessment to emphasize that there was no scientific base of risk involved from radiation exposure. On the other hand, environmental activists in Taiwan have stressed the historical context

of poor radioactive risk management in Taiwan and employed studies of medical experts[1] to point out risks involved and the urgency to clear up the contamination agent – thereby communicating such risks to the public, and amplifying them as well. This case emphasizes that assessing risks is not free from politics and is, in fact, a social construction (Clarke, 1988). Scientific assessment of risk is included in such constructions. In other words, risk becomes a social product of various key actors' interpretations according to their interests and the broader values of the groups they belong to, and assessing risks is subject to influences of broader social, institutional and historical contexts in Taiwan.

In addition to a national remedy policy which might paralyze the activism of the impacted people, social stigma also plays a role in explaining why activism was limited in Taiwan. In a Taiwanese society where female fertility is highly valued, the threat of undesirability for marriage as a consequence of social stigma from this RCB incident limited impacted people's willingness to identify themselves as RCB residents and to take collective actions. From a strictly empirical perspective, it is difficult to trace out exactly how secondary effects, such as social stigma, shape people's behavior and then generate higher orders of risk amplification / attenuation processes. Refining our understanding of these pathways is a legitimate and important goal in studying social experiences of risk that arise in response to chronic technological hazards, which has not been dealt with sufficiently well in the framework of social amplification of risk. Nevertheless, the framework does offer a broad analytical approach that opens doors for

[1] As it was mentioned in Chapter Four, Japanese medical experts were involved in the medical assessment in the early stage of RCB incident. In addition, medical researchers from National Yang-Ming University have been studying physical effects in relation to varied levels of radiation exposure among impacted residents.

us to better understand how varied risk constructions emerge in specific contexts, such as Taiwanese society. Such an understanding of risk events in relation to their various social, institutional and cultural contexts is especially important for studying chronic technical disasters and the social responses to them.

Several contextual factors revealed in this Taiwan case are also useful in expanding the CTD paradigm in order to capture the complexity of the phenomena under study and reveal the patterns that affect public responses to such disasters. First, in addition to the ambiguous collective definitions and responses that may be influenced by the ecological aspects of technological hazards, social stigma attached to the impacted individuals and neighborhoods was found to be significant in accounting for the impacted people's failure to mobilize. As mentioned previously, the threat of undesirability for marriage as a consequence of social stigma attaching to child-bearing women is highly weighted in the context of Taiwanese society.

Second, the extent of the contamination, radiation level, and its distribution also shape individual and community's responses. The research revealed that random distribution of radiation contamination in households of contaminated enclaves and a wide range of radiation contamination levels generate various interpretations of how severe the contamination problem is and produce different interests among residents in the same enclave, which hinder the emergence of broad based collective actions among them.

Third, this study also reveals that when political competition between varied governmental agencies, or between local and national levels of government, results in regulatory variations, it may lead to power struggles among impacted individuals and

neighborhoods and subsequently weaken coalition formation among them. This study indicates that the more attention must be paid to the social context and political structure in which the contamination occurs in order to better appreciate manifestations of public responses to the chronic technical disaster.

The contextual factors indicated above suggest two points about the basic CTD model claims. First, the ecological aspect of the disaster and characteristics of the contamination agent, namely Cobalt-60 in this case, is defined and shaped mainly in the social realm with interaction with other social, political and cultural factors. While the CTD model highlights the emergence of various interpretations of contamination within impacted communities resulting from the ambiguous nature of the contamination agent, it does not point out how and in what way different interpretations of risk emerge. The contextual factors from the findings of this RCB case show us how various risks are constructed by a range of key actors and how these in turn shape people's response to contamination.

Second, contextual factors discovered in this RCB incident suggests that the CTD model needs to be refined by adding factors of social stigma and the broader political context where the contamination occurs to the analysis of social responses to the chronic technical disaster. These implications suggest some link between the framework of social amplification of risk and the CTD model. The CTD model highly focuses on variations of social and psychological effects caused by toxic exposure and by the social response to exposure. Such contamination experiences are analyzed with a broader perspective by the framework of social amplification of risk

Policy Implications of Research Findings

A theme that is emphasized throughout the study is that technical risk analysts tend to convey the message of "objective" probability in support of their efforts to promote rational public reaction to risks or risk events. These endeavors are in conflict with the understanding that risk is socially constructed and must reflect a negotiation among social actors. From this perspective, the scientific estimate of risk is one of these social constructions. As Freudenburg (1992) points out, technical risk assessors calculate risk probabilities with their biased heuristics and the public has their own rationalities based on their social experiences of how risks have been managed in that social context.

In fact, this Taiwan study supports the view that public responses are products of the interaction among the risk event and other social, psychological, institutional and cultural factors as Kasperson and his colleagues emphasize (Kasperson et al., 1988). Since scientific estimates of risk involve political negotiation among various social actors and emerge from the specific contexts where risk is managed, it is essential to discover the social processes by which risk is defined by varied actors or groups in the society through the process of risk amplification and / or attenuation. It is also important to discover why such a risk amplifying and / or attenuating process occurs in the specific context. This is the strength of the framework of social amplification of risk and where it fits in this analysis since it fosters better understandings of social experiences of risk in their social contexts. To understand such a dynamic process among different constructions of risk among various key actors in the society will serve as a pound of cure to alleviate conflicts emerging from such various understanding and interpretation of

risks or prevent the negative secondary impacts, which may put the social fabric in danger.

In addition, one important consideration in risk management policy is to support increased participation by stakeholders, such as the impacted residents. When people have experienced a great loss of control over their lives and feel alienated from public affairs and the government, it is essential to include them in negotiation over remedies in order to restore trust and create a more responsive and effective policy to serve people. As revealed in the RCB case, impacted residents and the NGOs, such as the RSPAT, were largly ignored in the formation of remedy programs. Needs and interests of impacted residents in each contaminated enclave are different, so it is important to have local inputs for solving the contamination and addressing local concerns. Drawing locally impacted people into the formation of remedies, not only empowers the alientated impacted residents, but also contextualizes issues and problems in each contaminated enclave in order to find a better solution for such a chronic environmental problem.

Another significant role for risk communication and management policy involves addressing the problems of social stigma. Because stigma and discrimination are harmful to the impacted residents, it is essential for the policy makers to find ways to address them. This requires a proactive stance at the community level and emphasizes the social dimension by conducting additional research to define the role of risk in creating stigma and its negative impacts on the victims. A complementary step would be for environmental sociologists, social workers, community psychologists, public health experts, and other professionals with expertise in environmental hazards to be included in

emergency response mechanisms and task force teams in order to tackle the social effects of environmental accidents and alleviate the problems which arise in their aftermath.

Suggestions for Future Research

The author has three suggetions for future research that relate to both general and specific questions in the field of environmental sociology. The first concerns the general question of the usefulness of the framework of social amplification of risk. Though the framework of social amplification of risk gives a better understanding of the dynamic of social processes of risks and risk events, in order to sustain a more holistic risk analysis, the paradigm still needs to be developed further in terms of how the secondary or higher order effects shape and interact with the risk experiences in order to sustain a more holistic risk analysis. In other words, future research must focus more on each single risk event and try to trace each secondary effect by systematic comparative study of different factors.

The other two suggestions concern specific research questions directed toward radiation contamination in the safety of contemporary Taiwanese society. Concerning the character of the contamination agent in relation to risk experiences, it is essential to study further regarding how risk perception is shaped by the interplay between the half-life period of radiation and its latency between exposure and health effects. Second, as it is discovered that social and insitutional contexts do shape the public's ongoing risk experiences and risk-related responses, it is important to investigate in what ways the public's risk perceptions may change following the establishment of the new political regime in Taiwan in 2000. Such research will shed light for further understanding of the

interaction between social responses to risks and the larger institutional context in which the risks are managed (Freudenburg, 1993). Furthermore, it is beneficial to conduct comparative research in other settings in order to generate a wider network of empirical findings that will enhance broader understanding of these contamination experiences. Comparative studies across different settings may extend examination of conceptual frameworks that are needed in order to understand these contamination experiences and respond to these social crisis.

APPENDICES

Appendix One

Pre-Interview Telephone Survey Questionnaire:

I. Background Information:

1. Sex ___ Male ___ Female

2. Age _____

3. Marital Status
___ Single ___ Married ___ Divorced ___ Other, indicate _____

4.Occupational Experience _____ Years in current position _____

5. Did you have children live in the household at the time of discovery of the Co-60 incident? ___ Yes How old were they? _____
___ No

6. Did you own or rent the apartment when the Co-60 incident was discovered?
___ Own ___ Rent ___ Other, indicate _____

7. Ethnicity
___ Taiwanese ___ Haka ___ Mainlander ___ Native Taiwanese

8. Education level
___ none ___ Elementary School ___ Junior High School
___ Senior High School ___ College ___ Master ___ Ph.D.

9. Political Party Affiliation
___ KMT ___ DPP ___ NP ___ Other, indicate _____

10. Are you a member in other non-government organization(s)?
___ Yes, please indicate what are the membership(s) _____
___ No

11. Religious belief
___ Buddhism ___ Catholic ___ Christian ___ Muslim
___ Folk religion ___ Other, indicate _____

II. Content Questions:

1. Was your residence with the presence of the Cobal-60 radiation?
____ Yes ____ No (please skip Questions 2-5)

2. How did you find out the presence of the Co-60 radiation?
___ By the detection of the TAEC
___ Self detection by TLD
___ By neighbor's notification
___ By the detection of the TEPA
___ Other, please indicate _____

3. When was the discovery of the presence of the radiation? Year ___ month ___

4. What was the radiation level at the time the contamination was discovered?
___ high level ___ median level ___ low level

If you remember, would you please write down the radiation level at the time the contamination was discovered? _____

5. After the discovery of the Co-60 radioactivity in your residence, what did you do about it?
___ The contaminated apartment was sold to the TAEC and moved to the other apartment you bought
___ The contaminated apartment was sold to the TAEC and moved to the other apartment you rented
___ Moved out from the contaminated apartment you rented and found the other place to live
___ Rented an apartment to live while shielding the contaminated spot(s) with lead, and later moved back to your apartment after the shielding finished
___ Rented an apartment to live while replacing the contaminated construction bar(s) with uncontaminated one(s), and later moved back to your apartment
___ Rented an apartment to live while replacing the contaminated construction bar(s) with uncontaminated one(s), and later rented your apartment to people after the reconstruction
___ Continually stay in the same apartment, but changed the usage of space and avoid passing the contaminated area
___ Continually stay in the same apartment, and remained in a same lifestyle prior to the discovery of Co-60 incident
___ Other, please indicate _____

6. Do you have any relatives or friends whose residences had been contaminated?
___ Yes ___ No

7. Based on your personal experiences, would you please use the scale from 5 to 1 (5—extremely concern, 1—not concern at all) to rate the following issues that the incident has raised for you.

7a. **At the early stage of discovery of this incident**	(please circle the number)				
(1) property value declined	5	4	3	2	1
(2) being stigmatized / blamed	5	4	3	2	1
(3) environmental quality	5	4	3	2	1
(4) reproduction related problems	5	4	3	2	1
(5) cancer related diseases	5	4	3	2	1
(6) children's health	5	4	3	2	1
(7) economic hardship	5	4	3	2	1
(8) Others, indicate _____	5	4	3	2	1

7b. How long had you felt in that way (please circle)					
(1) property value declined	>6yrs	5-6yrs	3-4yrs	1-2yrs	<1yr
(2) being stigmatized / blamed	>6yrs	5-6yrs	3-4yrs	1-2yrs	<1yr
(3) environmental quality	>6yrs	5-6yrs	3-4yrs	1-2yrs	<1yr
(4) reproduction related problems	>6yrs	5-6yrs	3-4yrs	1-2yrs	<1yr

(5) cancer related diseases	>6yrs	5-6yrs	3-4yrs	1-2yrs	<1yr
(6) children's health	>6yrs	5-6yrs	3-4yrs	1-2yrs	<1yr
(7) economic hardship	>6yrs	5-6yrs	3-4yrs	1-2yrs	<1yr
(8) Others, indicate _____	>6yrs	5-6yrs	3-4yrs	1-2yrs	<1yr

7c. How do you feel about these issues **NOW**? (please circle the number)

(5—extremely concern, 1—not concern at all)

(1) property value declined	5	4	3	2	1
(2) being stigmatized / blamed	5	4	3	2	1
(3) environmental quality	5	4	3	2	1
(4) reproduction related problems	5	4	3	2	1
(5) cancer related diseases	5	4	3	2	1
(6) children's health	5	4	3	2	1
(7) economic hardship	5	4	3	2	1
(8) Others, indicate _____	5	4	3	2	1

8. When did you join the membership of the RSPAT? Year ____ month ____

9. How did you learn of the RSPAT at the first time?

___ Through the radio
___ Through your neighbors
___ Through your friends
___ Through the TAEC
___ The RSPAT contacted you and invited you to join the membership
___ Other, please indicate _____

10. What were your reasons for becoming a member of RSPAT?

___ RSPAT might help me to get compensation from the government for the cost of moving to the other apartment
___ RSPAT might help me to get resources to re-construct my apartment
___ RSPAT might help me to get free health examinations
___ RSPAT might help me to solve various kinds of problems from this incident please indicate the types of problems _____
___ Want to learn more about radiation knowledge and protection
___ Agree with RSPAT's goal to have systematic health examination for all the impacted residents
___ Agree with RSPAT's endeavor to legalize the radiation safety and management policy
___ Others, please indicate _____

11. Please tell me all the activities that you participated in the RSPAT during your membership.

___ Attending seminars about radiation safety, detection and related radiation knowledge
___ Attending seminars about radiation and human health
___ Attending other meeting(s), please describe _____
_____
___ Petition and protest to the governmental agencies.
___ Volunteer to trace the impacted residents for health examination
___ Volunteer to detect the potential contaminated apartment

___ Volunteer to answer questions to the public regarding radiation safety and health related issues

___ Others, please list them all _____

_____

12. During your first year membership in the RSPAT, generally speaking, how much time have you spent in the activities related to the RSPAT?

___ Less than 1 hour a month
___ About 1 hour a week
___ About 2-3 hours a week
___ About 4-6 hours a week
___ More than 6 hours a week, please indicate ____ hours a week

13. What did you say about the level of your participation in the RSPAT during your first year membership?

___ Highly participated
___ Somehow more participated
___ Average participated
___ Somehow less participated
___ Rarely participated

14. **If you renewed your membership in the second year**, during your second year membership, generally speaking, how much time have you spent in the activities related to the RSPAT?

___ Less than 1 hour a month
___ About 1 hour a week
___ About 2-3 hours a week
___ About 4-6 hours a week
___ More than 6 hours a week, please indicate ____ hours a week

15. **If currently you are a member of the RSPAT,** generally speaking, how much time have you spent in the activities related to the RSPAT?

___ Less than 1 hour a month
___ About 1 hour a week
___ About 2-3 hours a week
___ About 4-6 hours a week
___ More than 6 hours a week, please indicate ____ hours a week

16. Have you ever held any leadership position in the RSPAT?

___ Yes, please indicate what's your title _____
___ No

17. If currently you are **NOT** a member of the RSPAT, would you please indicate when you withdrew your membership? Year _____
What were your reason(s) for withdrawing your membership of the RSPAT?

___ Too busy and don't have time to participate any more
___ The goals of the RSPAT's activism were not in line with my needs/goals
___ membership fee was too expensive
___ pressure from family members / relatives (they did not like my participation in the RSPAT)

___ The RSPAT was not as helpful to my problems as I thought
___ Others, please indicate _____
_____
_____

18. Do you agree with the construction of the fourth nuclear power plant in Taiwan?
___ Yes, please briefly describe the reason(s) for your opinion _____
_____
_____

___ No, please briefly describe the reason(s) why you disagree _____
_____
_____

___ This issue has never been my concern

19. Has your opinion about the construction of the fourth nuclear power plant ever changed after the Co-60 radiation contamination incident? ___ Yes ___ No
Please describe in what way it's changed _____
_____
_____
_____
_____

20. If you have any thought you would like to add to help my understanding of this incident, please use the following space to write them down
_____
_____
_____

Appendix Two

SAMPLE QUESTIONS FOR IN-DEPTH INTERVIEW FOR KEY ACTORS:

DEMOGRAPHIC INFORMATION:

1. Name _____
2. Sex _____
3. Age _____
4. Marital Status _____
5. Occupational Experience _____ Years in current position _____
6. Did you have children live in the household at the time of discovery of the Co-60 incident _____ How old were they? _____
7. What have been your primary residential locations since 1980 in terms of city or neighborhood? Whether you have been an owner or renter at each of them?
8. Political party affiliation _____
9. Ethnicity _____
10. Education _____
11. Hobbies _____ Do you have membership(s) in non-government organization(s)?
12. Religious belief _____

CONTENT QUESTIONS:

I. For Activist Impacted Residents:

A. Perceptions of the incident:

1. Based on your experience, how would you describe the Cobalt-60 incident that has been affecting some Taiwanese residents? (**follow up** ... by asking his/her view on how to solve these problems.)

2. Please tell me when and how you learned that there was Co-60 radiation in your apartment? What was the radiation level at the time when it was discovered?

3. How do you answer your children when they ask you about the presence of radiation in your household?

4. Please tell me what were essential issues that you thought about when you first learned that your apartment was with Co-60 radiation? Why were these issues of special concerns? How has your understanding of these issues changed over time? What were reason(s) for such transition?

5. Was there any impact on you that you experienced from this radiation incident? **Follow up** by asking ...
   - home/future economic wellbeing
   - health
   - environment
   - being stigmatized

6. Please describe any changes in what concerned you at different points in time and how intensely felt.

7. Did you have any radiation knowledge before this Cobalt-60 incident? In what way, has your knowledge about Cobalt-60 radiation been changed? What are sources of information for this change? **Follow up ...**
   - From newspapers, editorial
   - From newsletters of TEPA and RSPAT and/or other non-government organizations
   - From newsletters of TAEC
   - From the radio
   - From RSPAT's seminars
   - From medical professionals (e.g. physicians)
   - From your friends
   - From your neighbors
   - Self study, sources _____
   - Others

B. Questions Related to Activism:

1.Have you ever thought about taking any actions in response to the problems?
→ Follow up ...
   - What were the reactions of local government officials
   - What were the reactions of officials from TAEC
   - What were the reactions of the construction company
   - What were your family member's reactions
   - What were your relatives and/or friends reactions

2.How long have you lived in this neighborhood (meaning the contaminated one)? How familiar are people with one another in this neighborhood? Do you chat and share general information with one another?

3.When the radiation was discovered in this neighborhood, how many people saw this as a severe problem? Have your neighbors ever thought about taking any actions in response to the problems? What do you feel about their actions?

4.In your judgment, how well did the local response in this neighborhood/enclave match up with the level of the threat presented in the radioactive contamination?

5.Why? What issues do you believe were reasons that have shaped this local reaction?

6.How were you brought into the RSPAT? And why did you join this group? How long you have / had participated the activities of the RSPAT and what kinds of activities did you participate?

7.What were your goals in participating in the activities of the RSPAT (or other activism, if any?)

8.Were there any special reasons why you later became less active OR stopping participating actively? Please explain.

9.Would you please say something about the dynamics among the RSPAT, the impacted residents and government agency (e.g. the TAEC or the Department of

Health?)

10. What are your points of view regarding the more/less active responses in some contaminated enclaves?

11. What issues do you believe were reasons for the impacted residents not participating in the collective actions in this neighborhood / enclaves?

12. What more would you like to add to help my understanding of this incident?

Thank you very much for your time and help for this research. Do you know someone else whose residence had been contaminated but has never participated in the collective actions? I would appreciate it if you can provide me with information that will allow me to contact them. (I will not use your name).

II. For Non-Activist Impacted Residents:

A. Perceptions of the incident:

1. Based on your experience, how would you describe the Cobalt-60 incident that has been affecting some Taiwanese residents? (**follow up** ... by asking his/her view on how to solve these problems.)

2. Please tell me when and how you learned that there was Co-60 radiation in your apartment? What was the radiation level at the time when it was discovered?

3. How do you answer your children when they ask you about the presence of radiation in your household?

4. Please tell me what were essential issues that you thought about when you first learned that your apartment was with Co-60 radiation? Why were these issues of special concerns? How has your understanding of these issues changed over time? What were reason(s) for such transition?

5. Was there any impact on you that you experienced from this radiation incident? **Follow up** by asking ...
   - home/future economic wellbeing
   - health
   - environment
   - being stigmatized

6. Please describe any changes in what concerned you at different points in time and how intensely you felt about them.

7. Did you have any radiation knowledge before this Cobalt-60 incident? In what way, has your knowledge about Cobalt-60 radiation been changed? What are sources of information for this change? **Follow up ...**
   - From newspapers, editorial
   - From newsletters of TEPA and RSPAT and/or other non-government organizations
   - From newsletters of TAEC
   - From the radio

- From RSPAT's seminars
- From medical professionals (e.g. physicians)
- From your friends
- From your neighbors
- Self study, sources _____
- Others

B. Questions Related to Activism:

1. Have you ever thought about taking any actions in response to the problems?
   → Follow up ...
   - What's the reactions of local government officials
   - What's the reactions of officials from TAEC
   - What's the reactions of the construction company
   - What's your family member's reactions
   - What's your relatives and/or friends reactions

   → Follow up (for impacted residents who have **never participated activism**)
   - If you were aware of any collective actions?
   - Why have you never participated in any collective actions (protests)?
   - Have you heard of the RSPAT? If yes, have you ever thought about to join this group? Why/why not?

2. How long have you lived in this neighborhood (meaning the contaminated one)? How familiar are people with one another in this neighborhood? Do you chat and share general information with one another?

3. When the radiation was discovered in this neighborhood, how many people saw this as a severe problem? Have your neighbors ever thought about taking any actions in response to the problems? What do you feel about their actions?

4. In your judgment, how well did the local response in this neighborhood/enclave match up with the level of the threat presented in the radioactive contamination?

5. Why? What issues do you believe were reasons that have shaped this local reaction?

6. What are your points of view regarding the more/less active responses in some contaminated enclaves?

7. What issues do you believe were reasons for the impacted residents not participating in the collective actions in this neighborhood / enclave? Do you know other people whose residence had been contaminated but have never participated in the collective actions?

8. What more would you like to add to help my understanding of this incident?

Thank you very much for your time and help for this research. Do you know someone else whose residence had been contaminated but has never participated in the collective actions? I would appreciate it if you can provide me with information that will allow me to contact them. (I will not use your name)

III. For Non-Impacted Members of the RSPAT:

A. Perceptions of the incident:

1. How would you describe the Cobalt-60 incident that has been affecting some Taiwanese residents? (**follow up** ... by asking his/her view on how to solve these problems.)

2. Did you ever go into an apartment to detect whether there was the presence of the Co-60 radiation? How did you feel about it, when you went into the apartment with the presence of radiation? How did you explain to the residents of the household with the radiation when they asked you about the presence of the radiation (or what happened in their household)?

3. Please tell me what were essential issues that you thought about when you first learned of this Co-60 incident in Taiwan? Why were these issues of special concerns? How has your understanding of these issues changed over time? What were reason(s) for such transition?

4. Do you have any close friends, relatives or neighbors who experienced the Co-60 contamination directly? What essential issues were they concerned from this radiation incident? **Follow up** by asking ...
   - home/future economic wellbeing
   - health
   - environment
   - being stigmatized

5. Please describe any changes in what concerned them at different points in time and how intensely felt.

6. Did you have any radiation knowledge before this Cobalt-60 incident? In what way, has your knowledge about Cobalt-60 radiation been changed? What are sources of information for this change? **Follow up ...**
   - From newspapers, editorial
   - From newsletters of TEPA and RSPAT and/or other non-government organizations
   - From newsletters of TAEC
   - From the radio
   - From RSPAT's seminars
   - From medical professionals (e.g. physicians)
   - From your friends
   - From your neighbors
   - Self study, sources _____
   - Others

B. Questions Related to Activism:

1. How were you brought into the RSPAT? And why did you join this group? How long you have / had participated the activities of the RSPAT and what kinds of activities did you participate?

2. What were your goals in participating in the activities of the RSPAT (or other activism, if any?)

2a. Why later you did not continuously involve yourself in the activism?

3. Have you ever participated in any other social movements before? If yes, would you please share with me briefly your experiences in other activism?

4. Would you please say something about the dynamics among the RSPAT, the impacted residents and government agency (e.g. the TAEC or the Department of Health?)

5. What are your points of view regarding the more/less active responses in some contaminated enclaves? What issues do you believe were reasons that have shaped the variation of these local reactions?

6. What more would you like to add to help my understanding of this incident?

Thank you very much for your time and help for this research. Do you know someone else whose residence had been contaminated but has never participated in the collective actions? I would appreciate it if you can provide me with information that will allow me to contact them. (I will not use your name)

IV. For Core Leaders of the RSPAT:

A. Perceptions of the incident:

1. Has your residence ever been discovered with the presence of Cobalt-60 radiation?

2. Based on your experience, how would you describe the Cobalt-60 incident that has been affecting some Taiwanese residents? (**follow up** ... by asking his/her view on how to solve these problems.) (**For all core leaders regardless whether whose residence were contaminated or not**)

3. Please tell me when and how you learned that there was Co-60 radiation in your apartment? What was the radiation level at the time when it was discovered? (**For leaders whose residence were contaminated**)

4. How do you answer your children when they ask you about the presence of radiation in your household? (**For leaders whose residence were not contaminated**)

5. Did you ever go into an apartment to detect whether there was the presence of the Co-60 radiation? How did you feel about it when you went into the apartment with the presence of radiation? How did you explain to the residents of the household with the radiation when they asked you about the presence of the radiation (or what happened in their household)? (**For leaders whose residence were not contaminated**)

6. Please tell me what were essential issues that you thought about when you first learned that your apartment was with Co-60 radiation? Why were these issues of special concerns? How has your understanding of these issues changed over time? What were reason(s) for such transition?

7. Was there any impact on you that you experienced from this radiation incident? **Follow up** by asking ...
   - home/future economic wellbeing
   - health
   - environment
   - being stigmatized

8. Please describe any changes in what concerned you at different points in time and how intensely felt.

9. Did you have any radiation knowledge before this Cobalt-60 incident? In what way, has your knowledge about Cobalt-60 radiation been changed? What are sources of information for this change? **Follow up ...**
   - From newspapers, editorial
   - From newsletters of TEPA and RSPAT and/or other non-government organizations
   - From newsletters of TAEC
   - From the radio
   - From RSPAT's seminars
   - From medical professionals (e.g. physicians)
   - From your friends
   - From your neighbors
   - Self study, sources _____
   - Others

B. Questions Related to Activism and Organization:

1. Would you please tell me the story of the emergence of the RSPAT (History and its organizational structure)? In what ways has the organization changed during the time that you have been active?

2. What are goals and agendas of the organization and its activism? In what ways have these goals and agendas changed over time? What kinds of activities have been happening? How has the participation/membership changed over time?

3. What were the strategies used to recruit members over the past few years?

4. Prior to this incident, had you ever participated in other social movements? Please explain ... tell me about these memberships.

5. Do you view the activism of the RSPAT as a type or types of social movement? If so, what will you name it/them?

6. What more would you like to add to help my understanding of this incident?

Thank you very much for your time and help for this research. Do you know someone else whose residence had been contaminated but has never participated in the collective actions? I would appreciate it if you can provide me with information that will allow me to contact them. (I will not use your name).

V. Questions for Government Officials in the TAEC:

1. How would you describe the Co-60 incident that has been affecting some Taiwanese residents? (follow up ... by asking his/her view on how to solve these problems.)

2. What have been the responses of Taiwan Atomic Energy Council (TAEC) and the Department of Health towards the Cabalt-60 contamination incident? Follow up ...
   - What kinds of actions has TAEC taken to deal with the discovery of the contamination?
   - What kinds of actions has the Department of Health taken to deal with the health related issues from this incident?

3. In comparison with other contamination incidents in Taiwan, such as ground water contamination, how do you evaluate this Cobalt-60 contamination incident's severity?

4. Based on your experiences, what have been the challenges in working to resolve the problems from this incident in the past and now? Follow up ...
   - Does TAEC have any continuing contacts with the impacted residents? What are these contacts/ activities?
   - Has the Department of Health systematically traced of the impacted residents for health examination and follow up?

5. What is your point of view towards the lawsuits which were filed against TAEC by the impacted residents?

6. Would you please say something about the dynamics among the RSPAT, the impacted residents and government agencies (such as the TAEC or the Department of Health?)

7. As an official, who is in charge of the radiation safety management, what are the significant problems in radiation regulation or policies you see related to the emergence of Coblalt-60 contaminated buildings incident? In the past two years, is there any regulation or policies enforced for a better radiation safety management?

8. As an official, who is in charge of the public health, what will you evaluate about the health problems from the effects of the Co-60 radiation from this incident? Does the Department of Health have systematic studies about the association between the Co-60 radiation and health problems, such as cancers or others? What are the research findings?

9. Are the impacted residents able to use their insurance to cover all the expenses for health examination and follow-up? If not, what is the current health insurance coverage for this health examination? Are there any policies to subsidize the impacted residents to have long term follow-up health examination?

10. I would appreciate anything else that you would like to add to help my understanding of this incident?

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