

Role, Structure, and Style:
Concurrent Mediation Means in Public Engagement Mechanisms

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ABSTRACT

A pressing question in public policymaking is how best to allocate decision-making authority and to facilitate opportunities for input. When it comes to science, technology, and environmental (STE) policy decisions, persons impacted by those decisions often have relevant information and perspectives to contribute yet lack either the specialized, technical knowledge or the means by which to effectively communicate that knowledge. Consequently, due to a variety of factors, they are frequently denied meaningful involvement in making them. In an effort to better understand why this is so, and how this might change, this dissertation uses an activity systems framework to examine how three factors mediate the circulation of information in STE public engagement mechanisms.

In this project, I examine the transcripts of a 2015 administrative hearing and community meeting about the Santa Susana Field Lab—a former nuclear- and rocket engine-testing facility 30 miles from Los Angeles, where an experimental nuclear reactor suffered a partial meltdown in 1959. Specifically, I identify (1) who was designated as an "expert" versus a member of "the public," (2) the structural features, and (3) the stylistic features of participants' remarks at these events; and I study how these factors mediated the flow of information at each. To do so, I view "expert" and "public" as what Michael McGee has termed ideographs, and consider the structural and stylistic features that prior scholarship has identified to impact information flow.

Based on my analysis, I theorize that role designations, structural features, and stylistic features work together to mediate whose, what, and how information flows in public engagement mechanisms. Based on my findings, I also suggest that this mediation

impacts policy outcomes. As such, I contend that better understanding the relationships among these mediational means, information flow, and policy outcomes is an important step towards developing public engagement mechanisms that most effectively use the relevant knowledge and other insights of all who have a stake in policy decisions.

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PREFACE

This project spawns from my interest in the complex, sometimes daunting, but vitally important process of public policy-making in the realm of science, technology, and the environment (“STE”). More specifically, my interest in this particular project began in college when I volunteered for a nuclear policy group called Committee to Bridge the Gap. Through this work, I learned that in 1959 a nuclear reactor suffered a partial meltdown fewer than 10 miles from where I grew up; some say this meltdown released more radiation than the accident at Three Mile Island (see, e.g., Morgenstern, Beebe-Dimmer & Yu, 2007, p. 11). I learned that the soil and groundwater on the site (the Santa Susana Field Laboratory (SSFL)) remain both chemically and radioactively contaminated, and that how and to what degree to clean it up are subjects of ongoing disputes—scientific, legal, administrative, and political. During my time at Committee to Bridge the Gap, I attended several hearings and community meetings regarding SSFL, and was struck by the sometimes seemingly dismissive tone of the designated experts and decision-makers, the exasperation of community members trying to gain information and be heard, and the hostility between them. Over a decade later, my continued interest in SSFL and the designated expert/non-expert dynamics surrounding its cleanup has led me to pursue a research trajectory of STE public engagement mechanisms,¹ and a study of these mechanisms in the context of the SSFL cleanup controversy is a fitting first step.

¹ I define and explain my use of this term on page 2, below.

CHAPTER 1

STUDYING FACTORS THAT MEDIATE INFORMATION FLOW:

TWO PUBLIC ENGAGEMENT MECHANISMS

In July 1959, an experimental nuclear reactor just 30 miles from downtown Los Angeles suffered a partial meltdown, releasing unknown but potentially vast amounts of radioactivity into the atmosphere. The accident was not made public until 1979, when a group of students at UCLA discovered an Atomic Energy Commission (the U.S. Department of Energy's predecessor) report that, among other things, included a photograph of a partially melted fuel rod captioned "melted blob" (see Fig. 1, below) (Sahagun, 2010, p. 1). Since that time, the site of the accident—the Santa Susana Field Laboratory ("SSFL")—has been the subject of contentious, complex, and ongoing disputes regarding its health impacts on former site workers and surrounding community members, and regarding its future cleanup. SSFL is owned by a combination of federal (National Aeronautic Space Agency ("NASA")) and private (The Boeing Company ("Boeing")) entities. It is located less than two miles from residential neighborhoods; over 150,000 people live within five miles of the site, and over 500,000 live within ten miles of it (Kuehl & Brownley, 2007, p. 2). In addition, the science behind the accident and its subsequent impacts—specifically, the precise amount of contamination released from the accident and its health and safety risks—is both complex and not entirely known. The cleanup involves a broad range of stakeholders, including: designated scientific experts on issues such as epidemiology, hydrology, civil engineering, and nuclear physics; local, state, and federal decision-makers; local residents; and the private company that will bear its costs. It also invokes a wide variety of state and federal

environmental laws governing chemical contamination, radioactive contamination, water quality, and the legal, bureaucratic, and political processes by which the cleanup plan is determined and undertaken. These factors make SSFL a prime locus of study for examining STE public engagement mechanisms.

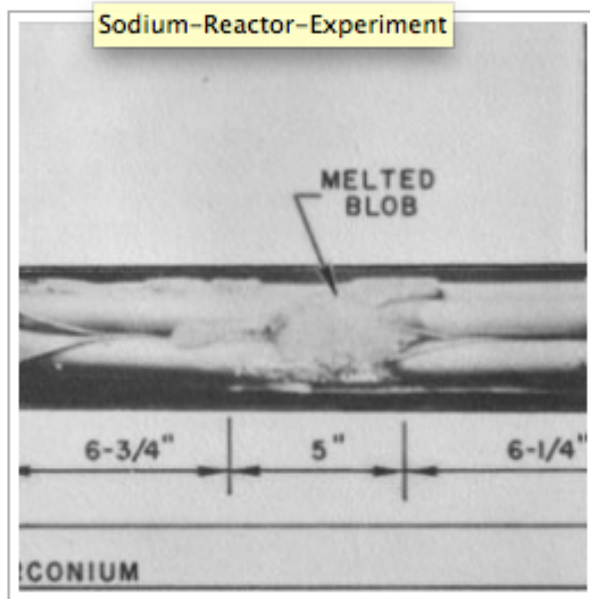


Figure 1: Excerpt from AEC Report

At the beginning of this project, I offer a historical overview of SSFL, but my focus is neither the history of the accident itself, nor how it was handled. Nor do I deal with the many legal issues surrounding the accident and subsequent cleanup efforts, though these aspects of SSFL are ripe for rhetorical study. Instead, in this project I use an activity systems framework to explore whether and how three factors mediate the flow of information in two public engagement mechanisms regarding SSFL. In the following section, I explain these concepts in the context of the theoretical framework I use to conduct my study.

I. Theoretical Framework

I.a. Public Engagement Mechanisms

I use the term “public engagement mechanisms” throughout this study, which I have borrowed from Gene Rowe and Lynn J. Frewer. Rowe and Frewer (2005) use the term “public engagement” as an umbrella term that encompasses what they see as three distinct types of interaction between mechanism sponsors and participants, distinguished based on the way information flows between them: (1) public communication—where information is conveyed unilaterally from the initiative’s sponsors to the public; (2) public consultation—where information is conveyed from members of the public to the initiative sponsors but only following a process initiated by the sponsor; and (3) public participation—where information is exchanged bilaterally between members of the public and the sponsors and this dialogue transforms the opinions of initiative sponsors and participants (pp. 255-56). Rowe and Frewer define “public engagement mechanisms” as the methods intended to enable public engagement.

In this project, I examine two public engagement mechanisms regarding SSFL: a public hearing (the Water Board hearing) and a community meeting (the Work Group meeting), discussed below in section III.a. Rowe and Frewer (2005) identify both of these mechanisms as public communication mechanisms that rely on the public to come to the information and in which participants are thus self-selected, where information is communicated face-to-face, and where that information varies to some—but usually small—extent based on the questions participants ask (p. 278). Both the Water Board hearing and Work Group meeting generally fit this definition, but to what extent, and the

implications thereof, are explored in Chapter 4, which addresses the structural Mediation Means at play in each of these mechanisms.

I.b. Activity Systems Theory

Activity systems theory posits a basic “mediational triangle” consisting of: (1) an actor in that activity system, called the Subject; (2) the purpose or Object of activity in that system; and (3) the Mediation Means, Instruments, or Tools that mediate how a Subject achieves the Object (Witte & Haas, 2005, p. 138, explaining the model set forth by A.N. Leont’ev) (see Fig. 2). “Mediate” in this sense means to impact or affect. As Witte and Haas explain, Mediation Means “stipulate certain local conditions to which the operations embedded within the actions constituting the activity [...] must meet and respond” (2005, p. 147). In other words, Mediation Means dictate to some degree what rules an actor (Subject) in a given activity system must abide by or what conditions an actor must respond to. As such, Mediation Means can restrict, expand, or otherwise alter how a Subject achieves an Object. It is important to be aware that there are different kinds of Mediation Means. Some, such as gender, are fixed and static, and cannot be changed, while others, such as the style a Subject uses when speaking, are dynamic. Further, Mediation Means often overlap with and impact one another.

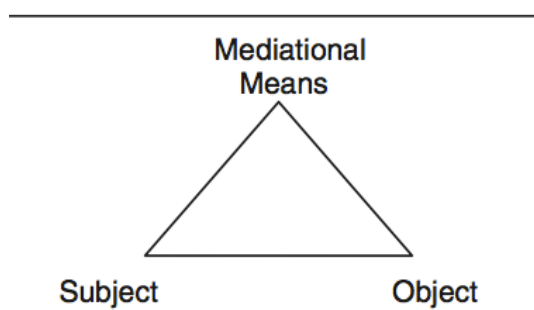


Figure 2: Witte and Haas’s depiction of “the components of practical human activity” underlying Leont’ev’s theory of activity (Witte & Haas, 2005, p. 134).

Yjro Engestrom expanded on this theory by adding three additional components: Rules (norms and conventions for acting), Community (those who address the same object), and Division of Labor (how tasks, power, and status are apportioned between community members) (Witte & Haas 2005, p. 138; Higgins, Long, & Flower, 2006, p. 13 citing Engestrom 67) (see

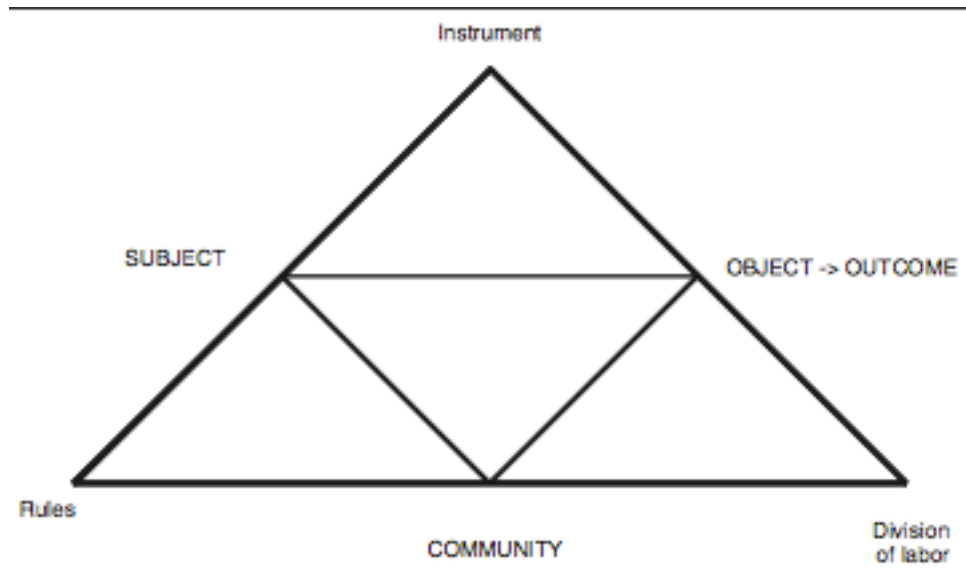


Figure 3: Engestrom's Depiction of Mediation in Activity Systems (Witte & Hass, 2005, p. 138).

Fig. 3). When STE public engagement mechanisms are viewed in the framework of activity systems, the Subjects can be understood as the participants in the mechanism, the Object as increasing the flow of information in that mechanism, and the Mediational Means or Instruments as those factors that impact how information flows in that mechanism. Note that although Engestrom's additional components are worthy areas of study regarding STE public engagement mechanisms, here I take up only the Subject, Object, and Mediational Means, for feasibility reasons. Later work should, of course, consider the roles of Community, Rules, and Division of Labor in STE public

engagement mechanisms. I ground my project in activity systems theory because it provides me with a useful framework within which to consider multiple, concurrent factors as Mediatational Means that work together to mediate the flow of information in STE public engagement mechanisms.

I.c. Mediatational Means at the Water Board Hearing and Work Group Meeting

In this project, I focus on three potential Mediatational Means at the Water Board hearing and Work Group meeting: (1) whether participants in each of these public engagement mechanisms are designated as “experts” or members of “the public”; (2) the structural features of each mechanism; and (3) the stylistic features of participants’ remarks in each mechanism. I chose to focus on these three Mediatational Means because they are factors that STE scholars have repeatedly identified as important to the flow of information in STE public engagement mechanisms.

Prior scholarship exploring these Mediatational Means has treated each one independently, and has not expressly used an activity systems frame (see, e.g. Hartelius, 2010, p. 166, Hikins & Cherwitz, 2011, p. 292, and Jasanoff, 2012, p. 393 regarding what makes someone an “expert”; Rowe & Frewer, 2005, pp. 262, 264 regarding structural variables that are likely to impact the effectiveness of an engagement mechanism; and Killingsworth & Palmer, 1992, p. 173 regarding stylistic features that typify various kinds of engagement mechanisms). Here, in contrast, I begin to theorize that these three Mediatational Means—which occur concurrently in public engagement mechanisms—work together, rather than in isolation, to mediate information flow. This notion has implications for both the future of SSFL cleanup efforts as well as for other STE public

engagement mechanisms. It is my hope that future scholarship will explore additional meditational means so that researchers can begin to develop a more complete picture of public engagement mechanism activity systems, which is necessary if public engagement mechanisms are to be developed that most effectively utilize the input of all who have a stake in policy decisions.

In the next section, I offer a brief historical overview of SSFL, to provide readers context for the NPDES permit renewal controversy.

II. Historical Context

II.a. SSFL

SSFL is a former nuclear- and rocket engine-testing facility approximately 30 miles northwest of downtown Los Angeles, on the boundary between Los Angeles and Ventura counties (Kuehl & Brownley, 2007, p. 2). As can be seen in Figure 4, below, it is located in the middle of several residential areas. As explained in a California state legislature bill regarding SSFL's cleanup,² "[t]he location of SSFL was chosen [in the late 1940s] for its remoteness in order to conduct work that was considered too dangerous to be performed in more densely populated areas. In subsequent years, however, southern California's population has mushroomed. Today, more than 150,000 people live within five miles of the facility, and at least half a million people live within 10 miles" (Kuehl & Brownley, 2007, p. 2).

² The California legislature passed this bill but before it took effect, Boeing successfully sued to have it invalidated as unconstitutional (*Boeing*).

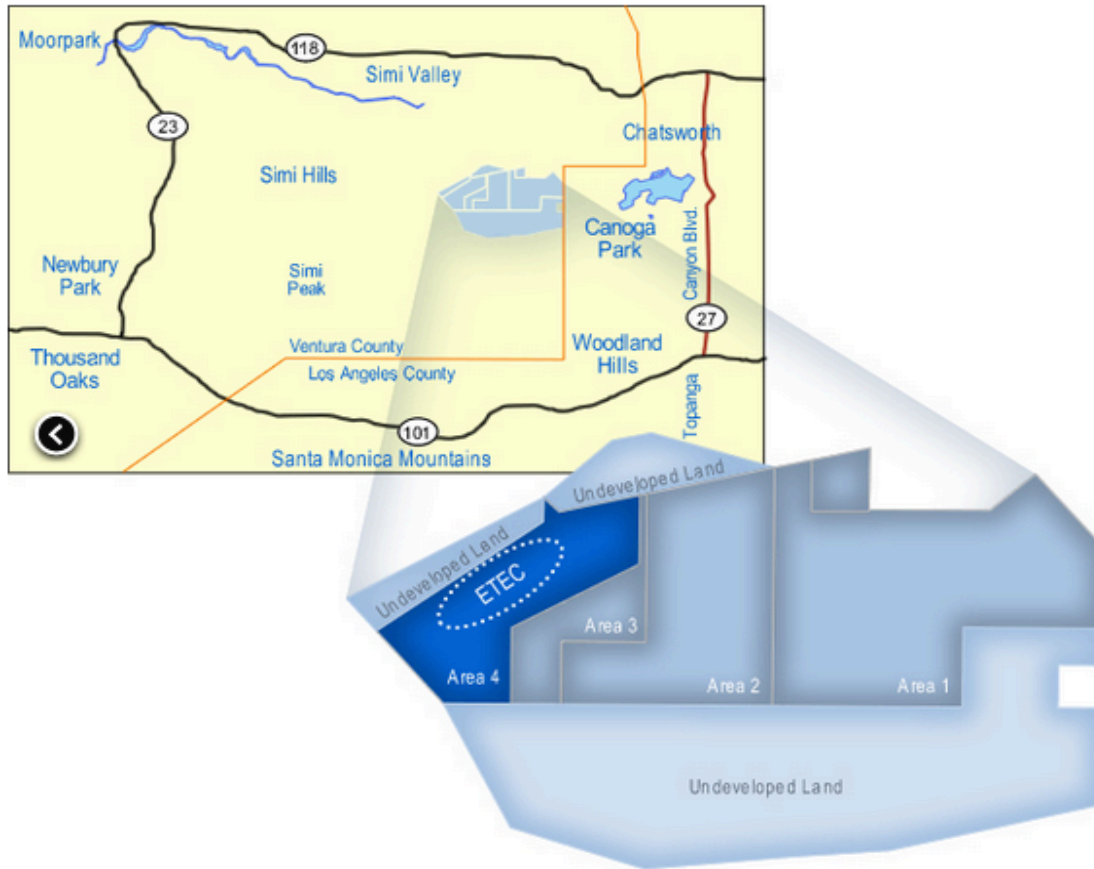


Figure 4: Site Map of SSFL from EnviroReporter.com, an investigative journalism website

The 2,850-acre SSFL site was established in the late 1940s by the federal Atomic Energy Commission, which contracted with a company now owned by Boeing (North American Aviation’s Rocketdyne division) to operate the site (Weston Solutions, Inc., 2007, p. 3). SSFL is divided into four regions—Areas I through IV—plus two undeveloped buffer zones (Weston Solutions, Inc., 2007, p. 2) (see Fig. 4, above). During SSFL’s operational years, Areas I, II, and III were primarily used by Rocketdyne for missile and liquid rocket engine research, assembly, and testing, while Area IV housed the site’s nuclear reactor development activities (U.S. Department of Energy, 2003, p. 1).

Area IV—an approximately 290 acre region—was used to build and operate the first commercial power plant in the United States (California Energy Commission; Weston Solutions, Inc., 2007, p. 2).

Since the 1950s, the Department of Energy has leased 90 acres of Area IV from what is now Boeing. Between 1956 and 1988, the Department of Energy operated at least ten nuclear reactors, a plutonium fuel fabrication facility, and a “hot lab” for processing spent fuel rods there (Kuehl & Brownley, 2007, p. 2). One of the Department of Energy’s main projects was the Sodium Reactor Experiment (“SRE”), which used sodium instead of water as a cooling agent for the radioactive fuel, and used an organic coolant called tetralin to cool the pumps that brought the sodium to the reactor core (Sandia National Laboratories, n.d., p. 1).

In 1996, Boeing became the primary owner of SSFL. Today, NASA owns the 451.2 acres that comprise Area II and a portion of Area I, and Boeing owns the remainder of the site (NASA, 2007, p. 2). The Department of Energy continues to lease 90 acres of Area IV from Boeing (Weston Solutions, Inc., 2007, p. 2). As such, NASA, Boeing, and the Department of Energy are all legally and financially responsible for the cleanup of their respective portions of the site. The cleanup is necessary in large part because of the partial nuclear meltdown described in the next subsection.

II.b. The 1959 Partial Nuclear Meltdown

On July 13, 1959, the SRE experienced an unexplained “power excursion” in which the reactor’s operators lost the ability to control it. After several hours, the operators managed to shut down the reactor in a “scram” (emergency shutdown), and restarted it a few hours later. High radiation readings, power excursions, and scrams

continued for the next two weeks until operators shut down the SRE for good. At that point, one third of the SRE's nuclear fuel rods had experienced melting. Because the radioactivity levels during the accident were higher than the SRE's instruments could measure, and some of the instruments malfunctioned, the amount of radioactivity released into the environment is unknown, though some nuclear scientists have estimated that it was as much as 240 times that released in the Three Mile Island disaster of 1979 (Senate Committee on Environmental Quality, 2007, p. 4). Further, because this was an experimental reactor, it had no containment dome so the radioactive gases were released directly into the air (Senate Committee on Environmental Quality, 2007, p. 4).

II.c. Other Sources of Contamination

The SRE accident was not the only source of contamination at SSFL, although it accounts for approximately 90% of the site's radioactive contamination (*Boeing v. Movassaghi*, Ninth Cir. 11-55903 JFW, hereinafter, "*Boeing*"). In 1964 and 1969, two other nuclear reactors suffered damage to 80% and 35% of their fuel, respectively. There were also multiple nuclear fires at the hot lab. In addition, radioactively and chemically contaminated reactor components covered with sodium were routinely reacted in an open, unlined pit (the "sodium burn pit") for decades, releasing contaminants into the air and surface runoff offsite (*Boeing*). Further, one waste disposal procedure at SSFL consisted of shooting barrels of toxic substances with shotguns to make them explode and burn (*Boeing*). Moreover, as part of the tens of thousands of rocket tests conducted at SSFL, hundreds of thousands of gallons of trichloroethylene ("TCE"), were used to flush out rocket engines, and seeped into the surrounding soil and groundwater (NASA, 2007, p. 2). TCE is a chemical linked to adverse health effects on the central nervous system,

immune system, and endocrine (hormonal) system (U.S. Environmental Protection Agency, 2007). These activities resulted in the release of contaminants that have been shown to pose risks to human health.

II.d. Health Impacts

Several studies have found that the contaminants at SSFL have had negative impacts on human health. A UCLA School of Public Health study found that former nuclear workers at SSFL had an increased risk of dying from cancers of the lungs, upper digestive tract, and blood and lymph system (Morgenstern, Froines, Ritz, & Young, 1997, p. 56). A University of Michigan study found that rates of bladder, blood and lymph tissue, upper digestive tract, and thyroid cancers in persons living within a two-mile radius of SSFL were similarly elevated (Morgenstern, Beebe-Dimmer, & Yu, 2007, p. 4). These studies and others like them have further spurred calls for cleanup of the site.

II.e. The Cleanup

As a result of the chemical and nuclear activities that took place at SSFL, the site's soil and groundwater are contaminated with a variety of harmful substances. Among these are radioactive contaminants called radionuclides, which have been linked to cancer; a chemical called perchloroethylene, which has been linked to cancer, liver and kidney damage, and adverse effects on the nervous system; and TCE (Office of Pollution Prevention and Toxics, U.S. EPA, 1994; Water Board Tr. p. 249).³ Although the extent of chemical contamination at SSFL has not been fully assessed, NASA, the Department of Energy, and the U.S. Environmental Protection Agency estimate that there are more than

³ The main radionuclides at the site today are cesium-137, strontium-90, and plutonium-239. Other radionuclides at the site are tritium, plutonium-238, iodine-131, cobalt-60, thorium-228, and uranium-235 (U.S. Environmental Protection Agency "SSFL").

500,000 gallons of TCE beneath the site (NASA, 2007, p. 2). Today, the only activities at SSFL are related to decontamination, decommissioning, and environmental remediation and restoration (Water Board Tr. p. 251). It is from these activities that controversies involving “experts,” “the public,” Boeing, and decision-makers have emerged.

The history of cleanup efforts at SSFL is complex and contentious for several reasons. First, the parties responsible for the cleanup consist of both federal agencies (NASA and the Department of Energy) and a private company (Boeing).⁴ Second, there is both chemical and radioactive contamination at the site, which are governed by multiple federal laws including the Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation, and Liability Act, as well as several other federal and state laws including the Clean Water Act, the National Environmental Protection Act, and the California Environmental Quality Act. Lastly, the site is subject to regulation by federal, state, and local agencies including the Department of Energy, U.S. Environmental Protection Agency, California Department of Toxic Substances Control,⁵ and the Water Board. In addition to these factors, and in some ways because of them, cleanup efforts—which began in 1989—have been stalled due in part to disagreement over the appropriate cleanup standards (Water Board Tr. p. 249). Among

⁴ The Department of Energy and NASA are barred from transferring their interests in the site until they conduct further environmental reviews of cleanup operations (Department of Toxic Substances Control Public Participation Plan, 2009, p. 12; *Boeing*). Boeing has unsuccessfully tried to sell its ownership interest and thus remains majority owner of the site (NASA, 2007, p. 1).

⁵ The Department of Toxic Substances Control is the arm of California’s Environmental Protection Agency that enforces state and federal hazardous waste laws including the California Environmental Quality Act, Resource Conservation and Recovery Act, Comprehensive Environmental Response, Compensation, and Liability Act, and Toxic Substances Control Act, among others.

the holdups has been a proposed cleanup plan by the Department of Energy that, according to the federal Environmental Protection Agency, would have left the site too contaminated to be safe for unrestricted residential use, and instead safe only for restricted day hikes (Assembly Committee on Environmental Safety and Toxic Materials, 2007, p. 4). In addition, several years ago the California state legislature passed a law (SB 990) that would have required SSFL to be cleaned up to levels suitable for suburban residential or rural residential (i.e. agricultural) use, and would have made the sale or transfer of the property before such standards were achieved a crime (*Boeing*), but Boeing successfully sued to invalidate the law (*Boeing*). All of these factors have contributed to ongoing controversies over the cleanup of SSFL.

II.f. Boeing's NPDES Permit

Separate from the controversies over the cleanup of contamination at SSFL, Boeing is subject to the Clean Water Act's requirements for water leaving its portions of the site. The Clean Water Act requires a NPDES permit for any "discharge of pollutants" into "navigable waters" of the United States (Clean Water Act § 502). In this case, this means that the Water Board sets limits on the permissible amount of pollutants in stormwater runoff from SSFL, and prohibits Boeing from discharging pollutants into U.S. waterways without a NPDES permit. The Water Board has been issuing NPDES permits to Boeing at five-year intervals since it took ownership of SSFL.

Because of the technical challenges of regulating this runoff (because SSFL is located in two watersheds, the drainages are very steep, and the runoff carries soil and sediments contaminated from both past site activities and naturally occurring materials), the Water Board ordered Boeing in 2007 to assemble an "independent panel of experts"

(which the Water Board calls “the Expert Panel”) to provide technical oversight and recommendations for stormwater treatment requirements throughout the site (Water Board Tr. p. 250; Boeing SSFL NPDES Compliance Program, 2008, p. 1). To select this panel, Boeing retained the consulting firm Geosyntec Consultants (“Geosyntec”). After soliciting statements of qualification from prospective panelists, Geosyntec, in consultation with Water Board staff, submitted a list of six names to Water Board staff, which Water Board staff approved (Boeing SSFL NPDES Compliance Program, 2008, p. 2). Collectively, the six panelists hold five PhDs, five current or former professorships, three “Professional Engineer” certifications, and three private consultantships (Boeing SSFL NPDES Compliance Program, 2008, pp. 2-3).

II.f.i. The Water Board Hearing

Most recently, on February 12, 2015, the Water Board held a public hearing regarding the renewal of Boeing’s NPDES permit for SSFL (Water Board Tr. p. 245). At this hearing, Water Board staff, representatives from Boeing, the Expert Panel, and a number of public interest organizations (“the Organizations”) made presentations, followed by the legally required opportunity for “public” comments (Water Board Tr. pp. 246-247). The Water Board then asked questions of the presenters, followed by deliberation and a vote on the tentative permit (Water Board Tr. p. 247). Prior to the hearing, the Water Board prepared and circulated a tentative NPDES permit for both Boeing and “the public” to comment on (Water Board Tr. pp. 268-269). The transcript of this hearing, obtained via request to a Water Board employee, is one of the two components of the data set for this study.

II.f.ii. The Work Group Meeting

Shortly before the Water Board hearing, on February 5, 2015, the Work Group held a quarterly meeting in which it discussed the tentative NPDES permit and upcoming Water Board hearing. Several of the people who spoke on behalf of the Organizations at the Water Board hearing also spoke at the Work Group meeting. The transcript of this meeting, made from video recordings posted on the Work Group's website, is the second component of the data set for my study.⁶

The Water Board hearing transcript and Work Group meeting transcript comprise the data set for this study.⁷ In the analysis that follows in the subsequent chapters of this project, I cite excerpts of the Water Board hearing transcript as "Water Board Tr. [page number]." For the Work Group meeting, there is a separate transcript for each speaker, so I cite those as "[speaker last name] [page number]."

III. Research Questions

Both the content and format of the Water Board hearing and Work Group meeting invoke notions of expertise, knowledge, and "the public." They also designate distinct roles and opportunities for participation for "the public," "experts," and decision-makers.

⁶ I use a transcript of this meeting, rather than the video recording, so that I am conducting an apples-to-apples comparison of the Water Board hearing (which was not videotaped, only transcribed) and Work Group meeting. I have not viewed the Work Group meeting video recordings in order to ensure that my analysis is only of the words of the presenters at both the Water Board hearing and Work Group meeting, rather than on the words of presenters in one mechanism and the body language, intonation, and other visual cues of presenters at the other.

⁷ The Water Board hearing transcript is available by request pursuant to the contact information at http://www.swrcb.ca.gov/losangeles/board_info/minutes/2015/03-13-15.pdf. The Work Group meeting videos are available at <http://www.ssflworkgroup.org/video/>.

As such, these events serve to inform one of the most significant problems to vex scholars of rhetoric, communication, and science and technology policy in recent years: Persons lacking either specialized, technical knowledge about STE decisions, or the means by which to effectively communicate that knowledge, are impacted by those decisions, yet due to a variety of factors they are often denied meaningful involvement in making them. At the heart of this transdisciplinary problem are several fundamental matters for contemporary deliberative rhetoric, including:

- (1) Who is deemed an “expert” or a member of “the public” (either explicitly or implicitly) in a given STE public engagement mechanism, and why.
- (2) Whether, and if so, how these role designations mechanism mediate the flow of information among participants in an STE public engagement mechanism;
- (3) Whether, and if so, how structural features of an STE public engagement mechanism mediate the flow of information among participants;
- (4) Whether, and if so, how stylistic features that persons designated as “experts” and “the public” use in a given STE public engagement mechanism mediate the flow of information among participants;
- (5) What impacts—if any—these potentially mediating factors have, both independently and as concurrent coexisting mediational means, on visible and measurable outcomes in a given STE public engagement mechanism.

Each of these questions matters for the following reasons:

Prior scholarship indicates that who is deemed an “expert” versus a member of “the public” matters for two primary reasons. First, designated experts tend to be treated very differently than the “lay public” in STE public engagement mechanisms. Until

recently, the default public engagement mechanism has been what Rowe and Frewer call public communication: it has been top-down, with information and decisions flowing one-directionally from decision-makers and designated experts to members of “the public” (Waddell, 1995a, p. 205; Simmons, 2007, p. 87). Second, members of “the public” frequently possess different kinds of knowledge and bring to the table different considerations and perspectives than those traditionally labeled “experts” (Flower & Heath, 2000, p. 44; Collins & Evans, 2002, p. 238). Taken together, these two facts mean that valuable, relevant knowledge is often excluded from STE decisions. As I explain in more detail below, what studying these concepts in relation to SSFL allows me to understand better is what factors lead one to be granted expert status in a case study of an STE public engagement mechanism (explored in Chapter 4). By examining the features of those persons granted expert status in both the Water Board hearing and Work Group meeting, we see that expertise is a highly context-dependent notion, reaffirming the work of several rhetoric and STE scholars (see, e.g. Hartelius, 2010, p. 166; Hikins & Cherwitz, 2011, p. 292; Jasanoff, 2012, p. 393). Defining what “expertise” means in a particular mechanism is the first step in tracing how that expertise mediates information flow in that mechanism. This knowledge, in turn, can aid both the designers of and participants in a public engagement mechanism in maximizing participants’ contributory potential.

How STE public engagement mechanisms are structured matters. The structural components of these mechanisms mediate information flow among participants and thus set the stage for how decision-makers, “experts,” and “the public” interact (e.g. via one-way transmission of information from designated experts and decision-makers to “the

public,” or true two-way communication) (Waddell, 1995a, p. 205). They determine who gets to offer input into a decision (Waddell, 1995a, p. 205). They affect how and to what degree people are able to participate (Coogan, 2006, pp. 683-84). And they frame the issues for deliberation in ways that ensure consideration of some aspects of a controversy while excluding others (Stirling, 2012, p. 4). Further, certain structural variables impact the effectiveness of public engagement mechanisms (Rowe & Frewer, 2005, pp. 262, 264). This project views these structural features as one of several Meditational Means that affect how information flows over the course of activity.

Lastly, differences in the stylistic features of presentations by those deemed “experts” and those deemed part of “the public” matter because they impact how well a speaker’s message resonates with his or her audience (see, e.g., Collins & Evans, 2002, pp. 255-256). Examining the stylistic features used by speakers at the Water Board hearing and Work Group meeting takes this research a step further by providing a concrete, real world locus of study in which to not only shed light on what it means to be a recognized expert in a particular STE public engagement mechanism, but also to understand stylistic features as one of several Meditational Means that mediate the flow of information in a public engagement mechanism.

In these ways, this study begins to answer important questions for deliberative rhetoric and science and technology policy.

IV. Data Set, Methodology, and Limitations

I designed this study to contribute to the continuing discussion among deliberative rhetoric scholars about how to maximize the flow of information—and thus create meaningful opportunities for persons lacking technical STE knowledge, accreditations, or

specialized language to participate—in STE public engagement mechanisms.

Specifically, I sought to begin to understand whether, and if so, how “expert” and non-expert role designations, structural features, and stylistic features come together to act as Mediation Means that mediate the flow of information in STE public engagement mechanisms.

IV.a. Data Set

The data set for this study is: (1) the transcript of the February 12, 2015 Water Board hearing; and (2) the transcript of the February 4, 2015 Work Group meeting. I selected these materials for several reasons. First, these engagement mechanisms are about the same issue, but have different structures. Second, both designated experts and members of “the public” participate in each mechanism, and some of the same people speak at both mechanisms, but in different roles. Examining these mechanisms in tandem thus provides a rich opportunity to analyze the discourse of the designated experts and “the public” surrounding the same issue in different structural settings. In addition, it allows me to explore whether the same actors change the way they talk about the same issue when they present as designated experts versus as non-experts, and offers insights into how these actors approach communication and persuasion when faced with differing audiences and public engagement mechanisms. These insights aid in understanding how the design and structure of such mechanisms can affect participants’ behaviors and messages in them, which in turn may impact substantive outcomes.

IV.b. Methodology

At the start of this project, I knew I wanted to explore the ways that designated experts and “the public” performed in public engagement mechanisms surrounding

SSFL. Having volunteered for Committee to Bridge the Gap, I had previously attended Water Board hearings and Work Group meetings, and had seen firsthand the power differentials between the “certified” and “uncertified” experts (Collins & Evans, 2002, p. 260) in these public engagement mechanisms—though I lacked the terminology to describe this difference then. Through my training as a lawyer, I had gained awareness of structural differences in various administrative public engagement mechanisms. And through my work as a graduate student in Rhetoric and Composition, I was cognizant of the importance of stylistic choices in communicating a message to one’s audience. For this project, I chose to use an activity systems frame—explained above in section I.a.—to integrate each of these concepts into one study in which I could consider whether and how these factors work together as Mediational Means.

To begin to do this theorizing, I realized I needed to break my project into two steps. First, I needed a way to identify the role designations, structural features, and stylistic features at play in each of these mechanisms. Only once I had identified these Mediational Means could I consider whether, and if so, how they mediate the flow of information at the Work Group meeting and Water Board hearing.

To facilitate the first step of this research—identifying the role designations, structural features, and stylistic features at the Water Board hearing and Work Group meeting—I turned to three separate means of analysis. In each, scholars considered how one of these factors worked independently to mediate information flow in STE public engagement mechanisms, although they did not describe their work in an activity system frame. First, to identify who was designated as an “expert” or a member of the “public” at the Water Board hearing and Work Group meeting, I looked to Michael McGee’s

ideograph analysis—especially as implemented by David Coogan. McGee and Coogan’s ideograph analysis allow me to consider what <expert> and <the public> *mean* in these public engagement mechanisms—that is, who qualifies as an expert or “the public” in each mechanism (McGee, 1980; Coogan, 2006).

Second, to identify the structural features of these two public engagement mechanisms, I applied Rowe and Frewer’s work on structural variables that impact the effectiveness of public engagement mechanisms (Rowe & Frewer, 2005, pp. 262, 264). Through a review of multiple case studies, Rowe and Frewer theorize that public engagement mechanisms that maximize the following structural variables are most effective (or, in activity systems terms, that these variables mediate the flow of information in a public engagement mechanism): (1) the number of participants; (2) the relevant information elicited from those participants; (3) the relevant information provided by sponsors; (4) the transfer of information to, and processing by, recipients; and (5) the aggregation of all relevant information from participants. I also consider a sixth variable: (6) the degree to which ostensibly independent designated experts are perceived as such. Using Rowe and Frewer’s work allowed me to identify and name key structural features of the Water Board hearing and Work Group meeting that Rowe and Frewer’s work suggests serve as mediational means in STE public engagement mechanisms.

Third, to examine the stylistic features used by participants at the Water Board hearing and Work Group meeting, I employed the tools that Jamie Killingsworth and Jacqueline Palmer use to rhetorically analyze Environmental Impact Statements in *Ecospeak* (Killingsworth & Palmer, 1992). Specifically, I looked for the following features that Killingsworth and Palmer have identified as means by which authors

distance themselves from their subject matter and audiences: passive voice; nominalizations; strings of noun modifiers; and acronyms (Killingsworth & Palmer, 1992, p. 173). I also looked for technical language; narrative; precise language; and deferential language, as these features also impact how accessible one's message is for different audiences (Rowe & Frewer, 2005, p. 273; Dahlstrom, 2014, p. 13615). This analysis allows me to consider what the designated experts and "the public" *do* in these mechanisms—that is, what stylistic strategies each group invokes in performing their designated "expert" or "public" roles. This lays the groundwork for considering stylistic features as a mediator of information flow in STE public engagement mechanisms.

In each of the body chapters that follow, I include a "methodology" section in which I explain each approach in detail before I apply it.

Conducting each of these analyses provides me the bases from which to move to the second phase of my analysis: to consider how role designations, structural features, and stylistic features serve as Mediatational Means to mediate the flow of information in two real-world public engagement mechanisms. As demonstrated in Chapter 2, much research exists on "expert" and "public" role designations in public engagement mechanisms, as well as on their various structural and stylistic features. How these designations, structural features, and stylistic features combine as concurrent Mediatational Means in these activity systems, however, has not been explored. Combining McGee/Coogan's ideograph analysis, Rowe and Frewer's structural variables, and Killingsworth and Palmer's rhetorical analysis offers an avenue by which to do so.

IV.c. Study Limitations

While this study makes some valuable contributions to our understandings of participants’ “expert” or “public” role designations, participants’ stylistic features, and the structural features of STE public engagement mechanisms as mediators of information flow, it has several limitations. Several key ones are noted here. First, it cannot and does not assess causal relationships among these factors, but attempts to begin to lay the groundwork for future studies that can. Second, because the scope—both in terms of duration and subject matter—of the SSFL controversy is so vast, this study is but a snapshot of one small aspect of this larger picture. Because this study explores only one moment in time in this decades’ long controversy, and addresses only one sub-controversy among the multitude that surround SSFL, it does not account for how notions of <expert> and <public>, or stylistic features of participants’ remarks, have changed over time or amongst sub-controversies. In McGee’s terms, this study explores the ideographs of <expert> and <public> synchronically but not diachronically, and is thus incomplete (McGee, 1980, p. 16). Exploring the impact of the circulation of discourse over time on these issues is a worthwhile endeavor, but one that is beyond the scope of this project. As a result, the contributions of this study come with the caveats that they neither account for changes in these issues over the duration of the SSFL controversy nor assess these issues within the context of the larger picture of the SSFL controversy as a whole. Third, there is certainly a multitude of Meditational Means in STE public engagement systems, and this study considers only three factors—role designations, structural features, and stylistic features. It is important to stress that this project is not intended to be comprehensive, but rather to encourage scholars to view Meditational Means in conjunction, rather than isolation, when evaluating the flow of information in

STE public engagement mechanism. Fourth, as explained above, this study does not address the Rules, Divisions of Labor, or Community in the Water Board hearing or Work Group meeting, but rather considers only the original components of activity systems theory—the Subject, Object, and Mediational Means. This, of course, paints an incomplete picture that can be made more robust through future work. Finally, because the data set for this study is transcripts, it does not account for the impacts of factors such as body language and intonation.

V. Personal Background

Like all researchers, in conducting this analysis I bring with me my own experiences, perspectives, and biases. Of particular relevance here are my experiences as a former volunteer for Committee to Bridge the Gap, an attorney, a Los Angeles resident, and an emerging Rhetoric and Composition scholar. Through my work at Committee to Bridge the Gap, I observed firsthand several Water Board hearings and Work Group meetings, so although here I am only reviewing the transcripts of two recent proceedings, I have witnessed past proceedings in person, and have watched these controversies develop over the past decade. As a lawyer, I was trained to analyze deposition and trial transcripts, and spent four years doing so. As a resident of Los Angeles, I am particularly concerned with the resolution of the cleanup controversies surrounding SSFL. Lastly, as an emerging Rhetoric and Composition scholar, I have spent several years studying rhetorical techniques in written and oral texts. Through these experiences, I have developed the analytical tools that this study's transcript analysis demands.

VI. Chapter Overview

This chapter has provided a brief history of SSFL and the controversies over its health impacts and cleanup efforts, focusing especially on the sub-controversy that is the subject of this study: the renewal of Boeing's NPDES permit under the Clean Water Act. It has also set forth the research questions I use this sub-controversy to explore, the methodology I use to address those questions, and the limitations of this study.

In Chapter 2, I review existing literature on ideas of knowledge, expertise, the "public," and STE public engagement mechanisms, and position my project in relation to it.

In Chapter 3, I conduct an ideograph analysis of <expert> and <public> to show readers how these concepts are understood and enacted at the Water Board hearing and the Work Group meeting, which allows me to explore how these role designations served as Mediation Means in these mechanisms. Specifically, in this chapter I apply existing scholarship about knowledge and expertise to consider which speakers were "certified" experts via formal credentials or training versus "uncertified" experts via firsthand experience (Collins & Evans, 2002, p. 260), what types of expertise (e.g. "contributory," "interactional," or "referred") each speaker demonstrated (Collins and Evans, 2002, p. 257), and what kinds of knowledge (e.g. quantitative versus qualitative) each speaker possessed (e.g. Stirling, 2012, p. 4). In doing so, I offer some ideas as to why some people were granted expert status in each of these engagement mechanisms and others were not, and consider how these role designations mediated the flow of information in each mechanism.

In Chapter 4, I examine the structural components of the Water Board hearing and Work Group Meeting as Mediation Means. By "structural components," I mean

components that impact the: (1) the number of participants; (2) the amount of relevant information elicited from those participants; (3) the amount of relevant information provided by sponsors; (4) the degree to which information is transferred to, and processed by, recipients; (5) the degree to which all relevant information from participants is aggregated; and (6) the degree of perceived independence or collusion of an engagement mechanism's sponsor.

In Chapter 5, I analyze the stylistic features of participants' presentations at the Water Board hearing and Work Group meeting as Mediation Means. Specifically, I look at speakers' use of: (1) passive voice; (2) nominalizations; (3) strings of noun modifiers; (4) acronyms; (5) technical language; (6) narrative; (7) precise language; and (8) deferential language. I compare both the presentations of the speakers who spoke at both the Water Board hearing and the Work Group meeting, as well as the presentations of the designated experts and non-experts at the Water Board hearing.

I conduct each of these inquiries to lay the groundwork for theorizing that (1) the designated "expert" and "public" roles of mechanism participants (explored in Chapter 3); (2) the structural features of a mechanism (explored in Chapter 4); and (3) the stylistic features a presenter uses in that mechanism (explored in Chapter 5) serve as Mediation Means that mediate the flow of information in that mechanism. In Chapter 6, I offer a brief summary of my body chapters and consider how these Mediation Means may have mediated information flow by looking at who was granted expert status as well as whose feedback the Water Board incorporated into the final NPDES permit.

CHAPTER 2

REVIEWING LITERATURE THAT INFORMS THIS STUDY OF MEDIATIONAL MEANS

To answer the questions set forth in Chapter 1, I situate my study in relation to literature related to public engagement mechanisms and their capacity to maximize participants' contributory potential. Accordingly, in this chapter I review existing scholarship on notions of "public," "expert" and "knowledge," and the public's current and suggested role in STE policymaking processes. I conclude this chapter by situating within this existing body of work this project's concern with role designations, structure, and style as Meditational Means in two public engagement mechanisms.

I. "Public"

Research abounds regarding what role the public should play in policy decision-making processes. The general consensus seems to call for increasing the public's role in decisions that affect them. However, what and who exactly constitutes "the public" are more contested issues.

I.a. "Public" As Continually Existing

Ideas vary on whether "the public" is stable and continuously existing regardless of what issues arise, or whether instead publics form around particular controversies and exist only as long as those controversies persist. Subscribers to the notion of the "public sphere" see it as an always-existing forum for people to discuss various issues. For example, Jurgen Habermas (1962) understood this space as a realm of social life where people set aside differences in status and discussed issues of "common concern" without state, church, or economic influence (p. 36). To Habermas, it is not that the public sphere

was a discursive space where people were presumed equal, but rather where their inequalities—social, economic—were irrelevant (p. 36).

Some scholars have taken issue with Habermas's conception of the public sphere as a place where status is disregarded, issues of "common concern" are discussed," and that is accessible to all. These scholars see this understanding of the public sphere as idealistic, unrealistic, inaccurate, and detrimental to marginalized groups. For example, Nancy Fraser (1990) argues that disregarding status differences usually benefits dominant groups and disadvantages subordinate ones (p. 64). Scholars also criticize Habermas's vision of the public sphere as a place to discuss matters of "public concern," suggesting that the distinction between "public" and "private" matters is an artificial one. Fraser (1990) offers the example of domestic violence, which was once considered a private matter but is now generally accepted as a public one (p. 71). Relatedly, Benhabib (1992) points out that deeming certain matters as "public" relegates issues that typically affect subordinated groups, such as issues that impact women like reproduction and caring for the sick or elderly, to the private realm and prevents them from being publically deliberated (p. 91). Echoing these concerns, Robert Asen (1999) has pointed out that restricting deliberation to matters of common concern, and making a priori distinctions that deem certain topics "public" and others "private," excludes voices and suppresses difference (p. 116). Furthermore, the bourgeois public sphere authorizes an assertive approach to critical-rational discourse, an approach that skews access toward economic and cultural privilege; consequently, the cultural conventions associated with the public sphere implicitly extend membership only to those speakers who abide by and embody those conventions (Asen, 1999, p. 126). In addition, Elenore Long (2008) points out that

putting aside personal interests and differences to deliberate for the common good may actually be doing participants a disservice because self-interests can be a useful tool for developing cooperation and identification in community organizing (p. 113, citing Alinsky). Although they do not label them as such, these scholars identify role designations (Fraser's critique of disregarding status differences), structural features (Benhabib, Asen, and Long's discussions of public/private realm distinctions and suppressing difference), and stylistic features (Asen's focus on the favoring of assertive and confrontational styles) of the public sphere as Mediational Means that mediate information flow within it in various ways.

I.b. "Public" as Controversy-Based and Transient

In contrast to Habermas's notion of an always-existing public sphere, some scholars conceptualize a "public" as created around a controversy, and existing only so long as that controversy exists. John Dewey (1954), for example, argues that a public "comes into being" only when people are faced with "indirect, extensive, enduring and serious consequences of conjoint and interacting behavior" and have a common interest in controlling them (p. 126). Similarly, for Gerard Hauser (1999), a public is created when people come together to engage in an ongoing dialogue about a specific issue (p. 64). He defines a public sphere as "a discursive space in which strangers discuss issues they perceive to be of consequence for them and their group" (p. 64). For Hauser (1999), a public is defined by the ongoing dialogue about an issue, rather than by the identity of the group engaged in that dialogue, or the formality with which that dialogue takes place (p. 108). For example, under this view, the public created by the SSFL controversy consists of persons who engage in dialogue about it, even if they initially do so only in

small informal discussions. This public would include community members, public interest groups, scientists, and decision-makers, and its makeup may continually change depending upon who continues to participate in such dialogue. Hauser (1999) proposes that a public's effectiveness can be determined by its adherence to several "rhetorical norms": (1) how permeable its boundaries are (i.e. whether people outside the core participants can join in the discussion); (2) whether participants are actively engaging the issue and other publics surrounding it rather than passively listening, absorbing, and applauding; (3) whether participants use the contextualized language particular to that discourse community to render their respective experiences intelligible to one another; (4) whether the public appears believable to its own members and outsiders; and (5) to what extent diverging opinions are tolerated, which is necessary to maintain a vibrant discourse (pp. 77-79).

Like Dewey and Hauser, Michael Warner (2002) also sees a public as temporary and issue-based. For Warner, a public is created and sustained by the attention people pay to the issue through the reflexive circulation of discourse (p. 62). Once that attention and circulation cease, so too does that public's existence (Warner, 2002, p. 62). For Warner (2002), a public is not a material body but rather a space for sustaining the circulation of discourse (p. 62). Warner identifies several key features that allow a public to exist. According to Warner (2002), a public: is self-organized; is a relation among strangers, whose identities cannot be known in advance because they come together as a public only through participating in it; is comprised of both personal and impersonal speech; is created through mere attention, and ceased when that attention ceased; the social space created by the reflexive circulation of discourse—it is the understanding and use of a text

over time, not the text itself, that creates a public; and must be sustained through regular intervals of publication, because circulation over time changes both the text's and the public's character (pp. 50-62).

These days, contemporary publics often form around “public scientific controversies” (Crick & Gabriel, 2010, p. 207). In much the same way that Dewey, Hauser, and Warner see publics as “coming into being” around particular issues, Crick and Gabriel (2010) describe public scientific controversies as “ethical or political conflicts that help call into existence a scientific dispute that potentially has direct bearing on [the conflict's] resolution” (p. 207). Such conflicts arise when technical authorities, public interests, and political exigencies intersect, and they “embed epistemological disputes over knowledge-claims within pragmatic contexts of public opinion formation to achieve intersubjective consensus on broad-based policies that are legitimated through shared understandings of complex problems” (Crick & Gabriel, 2010, p. 203). In other words, these conflicts—which occur at sites of intersection between citizens, scientists, and legislators—provide unique opportunities for discussions and shared understandings of issues of common concerns to a variety of stakeholders.

These scholars view publics as grounded in dialogue around particular controversies, and as existing only as long as that dialogue continues. This understanding of publics highlights the importance of information flow within them, and of exploring what factors function as Mediation Means to impact that flow.

I.c. Ways to Make Publics More Effective Spaces for Engagement

Across various schools of thought, scholars have sought to make publics more effective spaces for engagement. While these suggestions differ, two unifying strategies

emerge: first, to value difference rather than disregard or bracket it; and, second, to approach difference as a resource for problem-solving, rather than to treat difference as a hindrance to group consensus. These strategies broaden and maximize participants' contributory potential..

Some scholars focus on minimizing preset, universal rules of discourse in favor of giving particular discourse communities' members the power to set their own rules. Asen (1999) suggests using thin, rather than thick, discursive norms (p. 123). Thick discursive norms prescribe rules of proper conduct for discussion before dialogue begins (Asen, 1999, p. 116). This external rule-setting assumes a subject with a fixed set of desires that cannot be modified by the actual participants in a discussion (Asen, 1999, p. 116). Thin discursive norms, in contrast, set in advance only the minimum rules needed for participants to decide proper conduct themselves (Asen, 1999, p. 116). This deliberative model allows participants to decide for themselves the goals of their dialogue by minimizing the prescriptive exclusion of styles, topics, and forums, and by allowing participants to raise questions about justice and fairness (Asen, 1999, p. 117). Similarly, Hauser (1999) proposes using "critical norms," which are derived from actual discursive practices rather than prescribed in advance, and allow arguments to be judged based on how well they resonate with the particular population discussing the issue, rather than by a universal standard of reasonableness (p. 61).

Like Asen, Benhabib (1992) advocates for a deliberative public sphere that includes marginalized voices. By deliberation, she means a "procedure for being informed" in which everyone has equal opportunities to speak, equal rights to question the assigned topics of conversation, and equal rights to challenge the rules of the

discourse procedure and how they are applied (p. 31). The benefits of a deliberative process, Benhabib (1992) explains, are that it allows for multiple perspectives, which leads to more robust and better-informed decisions, and that requiring participants to articulate their views in public prompts them to support their positions with good reasons or risk dismissal of their views as unsupported (pp. 33-34). Leon Mayhew (1997) echoes this sentiment in his criticism of professional communicators. Mayhew explains that professional communicators use rhetorical techniques designed to avoid having to defend their claims, which precludes meaningful discussion of policies and issues (pp. 42, 71). Relatedly, Long (2008) explains that eliciting situated knowledge from a variety of stakeholders can help participants see their own situated knowledge in terms of the larger landscape, which allows them to better assess the problems with which they are faced (p. 205). From this perspective, a deliberative, more inclusive public sphere is not only procedurally fairer, insofar as it allows for more equal opportunities to participate and be heard. In addition, according to these scholars, it allows for substantively better outcomes as a result of more robust and meaningful deliberation and consideration of a wider range of perspectives.

Fraser offers a different but related solution to the bourgeois public sphere's exclusionary nature. She argues that a single public sphere erroneously homogenizes many different publics and that because of this, we must pluralize the public sphere with "subaltern counterpublics" to give voices to the many distinctive groups that comprise modern societies (Fraser, 1990, p. 67). Doing so offers a way to counter the tendency of a singular public sphere to allow for hegemonic domination by the majority ideology (Fraser, 1990, p. 67).

Echoing Fraser, Asen, and Benhabib, Elenore Long, Linda Flower, and Shirley Heath stress the value of recognizing and utilizing, rather than ignoring or suppressing, difference in a public. Like Benhabib, Long, Flower, and Heath see differences—in power distribution, cultural backgrounds, views, and experiences—as opportunities for richer, better-informed, more robust policy outcomes (Long, 2009, p. 14; Flower & Heath, 2000, pp. 51, 52). A variation on Benhabib and Mayhew’s view that presenting one’s views to others is a way to ensure that those views are supported and strong, Long, Flower, and Heath see value in articulating one’s purposes, positions, and assumptions to people from different backgrounds. They term this process “intercultural inquiry,” and find its value in how it requires one to continuously revise those purposes, positions, and assumptions (Higgins, Long, & Flower, 2006, p. 67; Flower & Heath, 2000, p. 53). Pittsburgh’s Community Literacy Center (the CLC) offers an example of one such site for this process—a counterpublic that engages alternative, often suppressed discourses. From the CLC, as well as Flower and Heath’s community think tank, we learn three strategies to engage dialogue, foreground participants’ experiences, and promote understanding. First, seeking the “story-behind-the-story” reveals participants’ situated knowledge and the significance of particular events to those participants (Long, 2009, p. 23; Flower & Heath, 2000, p. 51). Second, seeking “rival hypotheses,” wherein multiple participants are asked to share differing opinions, creates opportunities to consider the complexity of a given issue and challenge assumptions (Long, 2009, p. 23; Flower & Heath, 2000, p. 43). Lastly, examining “options and outcomes” allows participants to translate rival hypotheses into suggested plans for action (Long, 2009, p. 23; Flower &

Heath, 2000, p. 52). Each of these strategies offers a way to utilize and value, rather than suppress and ignore, the heterogeneous nature of publics.

The effectiveness of these participant-centered strategies demonstrates what many successful entrepreneurs already know: in policy-making, as in knowledge industries, the greatest asset lies in people, and this “community expertise” should be treated as a valuable resource (Flower & Heath, 2000, p. 44). This fact necessitates a reconceptualization of where expertise “naturally” resides, and of how and by whom knowledge is constructed (Flower & Heath, 2000, p. 53). For example, in the case of university service learning programs, we must flip the traditional script of history, which views college students as the experts who impart skills and knowledge on community members one-directionally. Instead, we must understand these partnerships as just that—collaborations in which those with more power—the students—conduct work *with*, rather than *about*, those with less power—the community members (Flower & Heath, p. 45). Doing so entails viewing the public as composed of diverse persons with valuable knowledge of their own to contribute, rather than as a homogenous group of mere receptacles for experts’ knowledge.

Not only do we need to recognize the public as heterogeneous and competent, but we must go a step further and move away from the dominant treatment of the public as mere laypersons, consumers, or stakeholders. When we view members of the public as laypersons, we see them as passive recipients of knowledge who need to be educated and informed. Public engagement processes based on this view aim to create an informed populace that trusts institutional structures and scientific expertise via a one-way model of knowledge transmission (Wickson, Delgado, & Kjølberg, 2010, p. 757). This is the

model Flower, Heath, and others (e.g. Andy Stirling, discussed in more detail below) caution against. Similarly, engagement processes that view the public as consumers involve a unidirectional flow of information designed to promote acceptance of existing products or of the development of future products, such as in the case of genetically modified foods (Wickson, Delgado, & Kjølberg, 2010, p. 757). Viewing the public as stakeholders leads to more inclusive public engagement processes, but this view is still insufficient, according to Wickson, Delgado, and Kjølberg (2010) (p.757). Instead, we must view the public as composed of citizens—that is, as dynamic, self-defining actors who not only have the right to be informed and make choices as individual consumers, but also have a duty to inform, consider, and represent others (Wickson, Delgado, & Kjølberg, 2010, p. 758). This entails reconceptualizing members of “the public” as heterogeneous individuals who have a duty to share their knowledge, visions, and values with researchers and decision-makers, and to ensure that the interests of themselves and those not directly represented in the decision-making process (e.g. future generations, animals, and the environment) are taken into account (Wickson, Delgado, & Kjølberg, p. 758). Such a reconceptualization sets the stage for designing STE public engagement mechanisms that give “the public” opportunities to access and share information that are on par with those that designated experts currently enjoy. Doing so, however, requires one to consider what Mediation Means mediate this information flow, and how—the subject of this project.

In seeking to make “publics” more effective, some researchers focus less on making the public more inclusive and representative, and instead point to improving communication to combat what they see as the public’s loss of focus on important issues.

Habermas (1962) attributes this loss of focus to two factors: the media's increasing influence over the public sphere, combined with its consolidation in the hands of a powerful few (p. 160). These factors, he argues, have caused a breakdown in the democratic and deliberative nature of the public sphere, which has led the public to care more about consumption and entertainment than politics (Habermas, 1962, p. 160). Similarly, Dewey (1954) sees the public as distracted and overtaken by powerful forces like special interests and entertainment, which has made public communications about issues difficult (p. 321). Mayhew (1997) also sees the demise of a public sphere as a space for good faith, two-way discourse, replaced by a "New Public" that is subject to manipulation by lobbyists and "professional persuaders" (p. 43). He argues that people lack the time and energy to filter through the "manipulative efforts of professional persuaders," which preclude true deliberation in which speakers would have to defend their claims—or, in Mayhew's terms, citizens are unable to test speakers' "rhetorical tokens" (p. 254). Both Habermas and Dewey note the importance to publics of strong means of communication, and Dewey (1954) suggests that perhaps one day technology will be used not to distract the public from, but rather to improve communication about, important issues (p. 142). Dewey (1954) also stresses the importance of local communities as places where people can become active participants in conversations about issues that impact them (p. 219).

While the suggestions posited by each scholar for making "publics" more productive sites for engagement vary, each entails at its core a way to broaden and strengthen participation in decisions by those impacted by them. Ideas about how to

determine whether these efforts are successful also differ, as discussed in the following subsection.

I.d. What is a Successful Public?

While some scholars' suggestions for improving publics seem geared towards the ultimate goal of achieving outcomes that incorporate a broader range of perspectives and that have been thoroughly deliberated, others are quick to point out that substantive outcome changes and duration of a public are not the only measures of its success (e.g. Long, 2008, pp. 73, 116; Crick & Gabriel, 2010, p. 220). Instead, the processes a public goes through in identifying and describing problems, listening to others' perspectives, exploring alternative ways of naming and describing these problems, and imagining strategies for addressing them, are valuable in and of themselves (Long, 2008, p. 73). Similarly, Crick and Gabriel (2010) reject the production of legislation as the measure of a public scientific controversy's success, positing instead that it is the long-term influence of its communicative processes—what communicative, collaborative, and participatory procedures and forums it creates—that makes it successful (p. 220). Dave Guston (2014) likewise sees success as broader than impacting laws and regulations. He explains that changes in the ways issues are framed, the vocabulary used to discuss them, and the substance and procedures involved in policymaking around them, are also viable and important measures of policy impact (p. 56).

While the yardstick for a successful public thus varies, the unifying theme in each of these ideas is that acknowledging difference rather than disregarding it, treating it as a valuable resource for meaningful dialogue, and using it to provoke reflection, revision, and understanding in those involved in a policy decision is beneficial to both the decision

itself and the people impacted by it. This concept is tied to the idea of expanding notions of expertise to include local and experiential knowledge, and modifying our understandings of the traditional divisions between “experts” and “the public,” discussed in the next section.

II. Expertise and Knowledge

Traditionally depicted as the more knowledgeable counterbalance to the “lay public,” experts also play an important role in public engagement mechanisms. How one defines expertise has implications for allocations of power, input, and decision-making authority in a given mechanism, all of which impact both the mechanism itself as well as its outcomes. Most scholars agree that having expertise involves the possession of some sort of specialized knowledge (an issue taken up in more detail in section II.b., below), but opinions differ as to whether there are other factors at play in achieving and demonstrating expert status.

II.a. What Is Expertise and How Does One Acquire It?

Just as scholars differ in their ideas of who or what constitute a public, they likewise vary in their views of what makes someone an expert. Some see expertise as solely a matter of possessing specialized knowledge, while others consider how one’s audience receives and views them as an explicit criterion for being an expert. Still others focus more on what experts do—how they approach and interact with the issue at hand—than on what knowledge they possess or how they are perceived by others. As explored further in this study, these differences matter because who we designated as experts in a given STE public engagement mechanism has significant implications for how information flows in that mechanism.

II.a.i. Expertise as What Someone Has: Possession of Knowledge

Carolyn Miller (2003) sees expert opinions as “judgment[s] based on knowledge and experience” (p. 177). Similarly, Harry Collins and Robert Evans view expertise as knowledge acquired through experience. While expertise is frequently recognized using the heuristic of a degree, certification, or other formal training, Collins and Evans argue that it is actual experience, not the formalism of a degree, that qualifies one as an expert. In other words, the focus in evaluating expertise should be on scientists as specialists regarding the particular issue at hand rather than as generalists in possession of formal credentials (Collins & Evans, 2002, p. 260). Frank Fischer (2000) echoes this sentiment when he argues that we need a new understanding of experts as “specialized citizens” (p. 46). According to Fischer (2000), this notion appropriately emphasizes that experts are merely ordinary citizens for everything outside their areas of expertise, and that knowledge is not generalizable beyond a specific context (p. 44). Fischer (2000) explains that such an understanding of expertise opens a place for citizens to participate in scientific inquiries (p. 47). To demonstrate this point, Collins and Evans (2002) offer the example of Brian Wynne’s study of the relationship between scientists and Cumbrian sheep farmers after Chernobyl (p. 255). Although the farmers possessed experiential expertise regarding the sheep’s ecology and behavior, they lacked the formal certification of the scientists, which made the scientists reluctant to take their advice (Collins & Evans, 2002, pp. 255-256). Collins and Evans (2002) explain that this is not an example of “lay expertise,” a term they reject as contradictory and counterproductive, but rather of the interaction between two communities of experts, one of which lacks formal certification (p. 270).

Collins and Evans (2002) distinguish between three types of expertise: “contributory,” “interactional,” and “referred” (p. 257). By “contributory expertise,” they mean the type of expertise that allows one to make substantive contributions to the actual decision at issue (Collins & Evans, 2002, p. 254). If one has “interactional expertise,” in contrast, they are able to interact with the participants in a scientific debate, though they may not be able to make substantive contributions to it. Interactional expertise is particularly important for uncertified contributory experts, who may have valuable experiential knowledge to contribute but lack the technical language of the decision-making discourse community, making it difficult for them to communicate that knowledge in ways that will resonate with others (Collins & Evans, 2002, p. 256). This focus on sharing one’s knowledge in a way that his or her audience values and respects is reminiscent of Simmons and Grabill’s discussion of “nonexpert citizens” lacking the “performative” aspects of expertise (Simmons & Grabill, 2007, p. 422). Simmons and Grabill (2007) explain that citizens must “understand the particular institutional systems (rhetorical situations) in which they find themselves—to know how to ask questions that will uncover rules, procedures, protocols, and values. [...] And they must be able to produce the professional and technical performances expected in contemporary civic forums” (p. 422). While Simmons and Grabill focus on ways citizens can develop these abilities themselves, Collins and Evans recommend that those lacking interactional expertise use spokespersons or institutional translators who possess it to increase their chances of impacting technical decisions (Collins & Evans, 2002, p. 256). Returning to Wynne’s Cumbrian sheep farmer example, they explain that the sheep farmers possessed contributory expertise, but lacked the interactional expertise necessary for the scientists to

hear them, and suggest that the farmers may have been more successful if they had a mediator who did (Collins & Evans, 2002, pp. 255-256). Lastly, Collins and Evans (2002) use the term “referred expertise” to describe contributory expertise about a different issue than the one at hand (p. 257). For example, they discuss a scientific project manager who lacks contributory expertise in the particular science at issue, but possesses contributory expertise about other issues (Collins & Evans, 2002, p. 257). This manager, Collins and Evans tell us, will do a better job, and have more authority and legitimacy, than one without referred expertise, because he or she understands what is involved for the scientists he or she is managing in contributing to their science (2002, p. 257; 2007, p. 65). Given their emphasis on experience, it is not surprising that Collins and Evans (2007) view the acquisition of expertise as a social process; tacit knowledge, which they explain as the deep understanding of an issue, can only be gained through social immersion in groups who possess it, rather than through the degree process (p. 3).

Collins and Evans (2002) also distinguish between possessing political rights versus expertise regarding an issue by asking us to imagine that a group of London financiers bought the Cumbrian farm shortly before the Chernobyl explosion and employed the farmers to tend to them (p. 261). In this scenario, the financiers would possess political rights in decisions about the sheep, but all the expertise would lie with the farmers (Collins & Evans, 2002, p. 261). Sheila Jasanoff (2003), however, takes issue with this distinction, arguing that policy is made through the negotiations between science and society, making any distinction between the two difficult to discern and not in line with the actualities of science policy-making processes (p. 394).

At the same time that Collins and Evans (2002) stress the importance and value of experiential knowledge in developing and assessing expertise, they caution against relying solely on local experiential expertise, pointing out that while locals may be experts on a decision's or activity's local impacts, they may lack expertise about its effects on the larger population (p. 267). They offer the example of a mining community, where local residents have expertise on the disadvantages to the local population but may lack expertise on the advantages to the larger population (Collins & Evans, 2002, p. 267). Echoing this concern, James W. Hikins and Richard A. Cherwitz emphasize the importance of both breadth and depth of expert knowledge. They explain that an expert must have not only focused knowledge of the issue at hand but also broader knowledge of collateral issues that influence and are influenced by the exercise of that focused knowledge (Hikins & Cherwitz, 2011, pp. 302-303). Otherwise, a myopic focus can lead to "ineffectual expertise or unanticipated consequences" (Hikins & Cherwitz, 2011, p. 303).

II.a.ii. Expertise as How Someone Is Received: Societal Recognition

Others focus not only on the experience or knowledge one possesses in assessing expertise but also on how that experience or knowledge is received by others. For example, Carolyn Miller focuses on what makes an audience perceive someone as credible as an expert. Miller (2003) explains that ethos is usually established through one's moral values or character, but that due to the nature of risk assessment, which values the technical and quantitative over the evaluative and qualitative, an STE expert's ethos comes instead from his or her experience grounded in technical, specialized knowledge (p. 200). This shift stems from risk assessment's "technicizing" of problems,

whereby the central question changes from “how safe is safe enough”—an evaluative, values-based question focused on “safe enough,” that members of the public are quite competent to answer—into a technical one focused on “how safe” that requires specialized knowledge to answer (C. Miller, 2003, p. 197). Miller (2003) cautions that this conflating of ethos and logos can lead to a loss of trust in experts (p. 202). Miller’s focus on logos as the means by which an expert gains audience acceptance demonstrates that she understands expertise not just as the possession of knowledge but rather as the audience’s acceptance of one’s expertise through his or her demonstration of that knowledge.

Camille Limoges also focuses on audience acceptance as a means to establish expertise. However, Limoges argues that audiences assess an expert’s credibility not by their individual attributes like their own experience-based specialized knowledge, like Miller, but rather from the strength of the networks with which they are associated. This is because Limoges (1993) views expertise not as the education of the public by experts, but rather primarily as a collective learning process through which experts’ data is assessed and used by others, earning experts the credibility required to perform as experts (p. 418). This notion echoes Frank Blackler’s focus on knowing as something people do rather than as on knowledge as something people have (*see* “Knowledge” section, below).

Johanna Hartelius also understands expertise as the combination of specialized knowledge and audience acceptance. She explains that an expert must obtain the public’s consent and trust to succeed in earning legitimacy and authority (Hartelius, 2010, p. 32). For Hartelius (2010), expertise is a rhetorical construct that is both social and contextual

(pp. 150, 250). “‘Experts’ are not merely autonomous repositories of factual info; they are embedded in ‘social and discursive contexts’ whose unfolding meanings are evoked by audiences, creating and legitimizing expertise” (Hikins & Cherwitz, 2011, p. 292, citing Hartelius, 2010, p. 166). She identifies six “congruities”—her term for strategies used to solve challenges—that experts share: they identify themselves within larger networks; they possess *techne*—a specialized skill or knowledge set; they possess expert pedagogy—that is, they take a stance on teaching the objects or process of their knowledge; they take a stance on whether the public should defer or participate in discussions about a given issue; they create a sense of urgency that requires their expertise; and they relate their expertise to everyday life (Hartelius, 2010, pp. 164-166). It is through these actions, Hartelius explains, that experts establish themselves as such, by both demonstrating specialized knowledge and rhetorically persuading others of their legitimacy and authority. James Fleck also incorporates notions of power and authority into his explanation of expertise. He defines expertise as a “trialectic” of: (1) knowledge—the “technical ‘substance’ of expertise”; (2) political and institutional power; and (3) economic tradability (Fleck, Faulkner, & Williams, 1998, pp. 144-49). Frank Fischer echoes this idea when he traces the view of those with scientific but not local knowledge as experts back to colonial beliefs in “the need to convert and improve the ‘uncivilized savages’ of the underdeveloped world and to abolish their primitive, ‘childlike ways’” (Fischer, 2000, p. 195, quoting Jiggins, 1989). For these scholars, merely possessing specialized knowledge is not enough to be viewed as an expert; one must also be granted societal and/or institutional recognition as such.

Jasanoff (2003) also stresses the social and contextual nature of expertise, explaining that it is not merely “held in the heads and hands of skilled persons who have had extensive experience with a given issue,” but rather is “acquired and deployed in particular historical, political, and cultural contexts” (p. 393). As such, expertise is context-specific and what qualifies as expertise in one country or regarding one issue may not in another place or situation. At the same time, Hikins and Cherwitz (2011) stress that experts are only perceived as such if their opinions align with reality (p. 294). Accordingly, while notions of expertise are relative and context-dependent, they cannot reject notions of “truth” and “objectivity” (Hikins & Cherwitz, 2011, p. 296). Collins and Evans (2002) begrudgingly echo the sentiment that expertise requires not only knowledge but also societal acceptance when they note that acquiring expert status may have little to do with the possession of real and substantive expertise (p. 265), and reject formal certification as an accurate gauge of expertise, discussed further below (p. 260). In these ways, attaining expert status is as much about one’s audience as oneself.

II.a.iii. Expertise as What Someone Does: Engagement with Information

Still other scholars distinguish between experts and others based not on what knowledge they possess or how it is received, but rather by how they approach and interact with the issue at hand. For example, for Cheryl Geisler (2013), the difference between experts and non-experts is that experts create and transform knowledge, while lay people merely obtain and display it (p. 81). In other words, students and laypersons are taught to think of knowledge as a body of truths, to treat texts as authoritative and autonomous, and to merely absorb and regurgitate information. Experts, in contrast, challenge and argue with texts; they actively engage with, rather than passively receive,

information about the issue at hand. Geisler (2013) sees this distinction as a deliberate effort by professionals—those with power—to exclude others and ensure that they alone can understand and interact with the specialized content of their field (p. 94). Fischer (2000) echoes this sentiment when he writes that, “[t]he issue of citizen participation in inquiry is perceived by many professionals as a threat to their status and authority” (p. 261).

How one acquires and demonstrates expertise is contested. In the next subsection, I discuss one important component of that acquisition and demonstration: possession of knowledge. Just as with “expert” designations, understanding what knowledge is valued in a given STE public engagement mechanism has implications for how information flows in that mechanism.

II.b. Knowledge

Most scholars agree that the possession of specialized knowledge is at least part of what makes one an expert. Thus, in order to understand how those without specialized knowledge might come to be considered experts it is important to explore what is meant by the term “knowledge.”

II.b.i. Knowledge Is Contextual

Just as scholars like Carolyn Miller, Jasanoff, and Hartelius stress the contextual nature of expertise, many scholars likewise focus on the contextual nature of knowledge. Bruno Latour, for instance, explains that what we understand as scientific knowledge is heavily dependent on time, instruments, people, and institutions. He stresses that science is tentative and knowledge is iterative, in part because it is situated in communities of practice and culture, and also because it is, like all other human endeavors, contingent

upon history (Latour, 2007, pp. 6-7). In other words, knowledge, especially in the scientific realm, is continually developed and revised with the benefit of hindsight, and such development and revision are dependent on the historical contexts in which they occur.

Michel Foucault also notes the crucial role context plays in determining what is counted as knowledge in a given society. He explains that knowledge is created through discourse, but that the discourse that gets counted as knowledge is the discourse of the powerful. He writes, “knowledge is a matter of the social, historical and political conditions under which, for example, statements come to count as true or false” (Foucault, 1972, p. 26). Foucault sees knowledge not just as a thing that people possess, but as a part of a particular discursive practice that becomes privileged due to the power of its users. Similarly, Fleck defines knowledge as “information given significance by human agency,” and explains that “the power associated with formal knowledge is partly a reflection of past proven utility, and is partly dynamically coupled with current tradability (Fleck, Faulkner, & Williams, 1998, p. 155). In other words, whether information counts as knowledge is dependent on its usefulness in a given context.

While Foucault, Latour, and Fleck focus on the *creation* of scientific knowledge as contextual, Brian Wynne posits that the *understanding* of scientific knowledge is likewise context-dependent. He explains that scientific knowledge is never experienced as “pure knowledge” (Wynne, 1991, p. 115). Instead, people understand it in conjunction with supplementary experiential knowledge regarding situation-specific factors like one’s local environment, hobbies, occupation, or illnesses, or institutional or social knowledge (Wynne, 1991, p. 115; *see also* Scheufele, 2013, p. 14043). For example, if scientific

knowledge is already embedded in organizational procedures, a worker may feel the need to learn only the procedures and not the scientific knowledge itself (Wynne, 1991, p. 116). Accordingly, Wynne (1991) argues that public uptake of scientific knowledge is based not on intellectual capability (p. 116). Rather, it depends more on social-institutional factors, especially those that impact one's perception of the usefulness of that knowledge or how that knowledge accords with one's personal experiences (Wynne, 1991, p. 116). Similarly, Sarah Davies' (2011) research has shown that people use three sets of tools in weighing and evaluating emerging technologies: personal experience, analogies and comparisons to ideas with which people have more familiarity, and fiction and popular culture (p. 320).

Massimiano Bucchi (2008) takes a related stance, arguing that factual information is “but one ingredient of lay knowledge” that interweaves with other elements like value judgments, trust in scientific institutions, and perceptions of one's own ability to put scientific knowledge to practical use to “form a corpus no less sophisticated than specialist expertise” (p. 60). Bucchi (2008) further explains that lay knowledge is filtered by factors such as the selective perception of media messages, an audience's previous motivations and attitudes, and “communication intermediaries”—those who relayed information to them (p. 66).

Relatedly, risk communication scholars Vincent Covello and Peter M. Sandman identify several psychological and social factors that influence how people process scientific information about risk assessment. Instead of viewing this information in a vacuum, people interpret it in conjunction with their own beliefs, perceptions, and knowledge about the risk, such as whether it will personally affect them, how much

media attention it receives, if it will affect children, if it has catastrophic potential, if it is controllable, if it is voluntary undertaken, and if it is reversible (Covello & Sandman, 2001, pp. 164-178). Accordingly, one person's understandings of a risk may differ starkly from another's depending on a host of contextual factors.

For these scholars, knowledge is not universal and objective. Instead, it is context-dependent and a reflection of the environment in which it develops.

II.b.ii. Multiple Kinds of Knowledge

While many people conceive of knowledge as something that people *have*, Blackler, not unlike Foucault, sees knowing as something people (and organizations) *do* (Blackler, 1995, p. 1). This is similar to the way that Limoges sees expertise as a process rather than a message (Limoges, 1993, p. 418). For Blackler, knowing is a cultural phenomenon, and the focus should be on knowledge systems—that is, on ways of knowing and doing, rather than on knowledge as a commodifiable object of possession. Blackler (1995) identifies five prominent conceptions of knowledge from a review of organization studies literature. First, “embrained” knowledge is dependent on conceptual skills and cognitive abilities; this abstract knowledge is privileged in Western cultures, and is the kind of knowledge typically taught in Western schools (p. 2). Blackler (1995) also identifies several types of tacit knowledge: embodied, encultured, and embedded. “Embodied knowledge” is action-oriented, and learned by doing, such as through internships, rather than through general knowledge of abstract rules (p. 2). This is the type of experiential knowledge that Collins and Evans posit should be used to assess expertise, rather than the embrained knowledge typically used to do so today. “Encultured” knowledge is shared understandings that are part of cultural meaning

systems (Blackler, 1995, p. 2). This knowledge is socially constructed, heavily language-dependent, and open to negotiation (Blackler, 1995, p. 2). It is different from embodied knowledge in that it is about ideas and understandings rather than actions like problem-solving techniques. This type of knowledge brings to mind Hartelius's and Jasanoff's emphasis on the social and contextual nature of expertise. "Embedded" knowledge differs from embodied and encultured knowledge in that instead of residing in people, it resides in systemic routines, such as an organization's rules, routines, or processes (Blackler, 1995, p. 2). Lastly, "encoded" knowledge is information that is decontextualized and conveyed by signs and symbols, such as that found in manuals (Blackler, 1995, p. 3). Blackler (1995) takes issue with what he sees as the increasing commodification of knowledge in today's society, and focuses on the contextual, pragmatic, mediated nature of knowledge—how people "do" knowing by using and altering information in context-specific ways (p. 3).

In some ways a type of both embedded and encultured knowledge, local knowledge for many scholars is an important and often undervalued resource. Higgins, Long, and Flower (2006), for instance, explain that local knowledge is a "rich, experientially based resource for interpreting and problematizing familiar abstractions and stock solutions to problems that are not yet fully understood" (pp. 19-20). Similarly, Crick and Gabriel (2010) explain that although citizens may lack "encyclopedic knowledge," they "possess intimate understandings of their lifeworlds," which puts them in a unique position to know how policy decision might impact their environments and makes them especially motivated to seek outcomes that limit redress problems within them (p. 220). The idea that local knowledge is equally as valuable as other types of

knowledge echoes Collins and Evans' argument for experience- rather than credential-based expertise, as well as Bucchi's explicit stance that "lay knowledge is not an impoverished or quantitatively inferior version of expert knowledge," but rather it is qualitatively different (Bucchi, 2008, p. 60).

In these ways, we can understand knowledge as broader than the traditional view as an objective, universal object acquired through schooling. Instead, we see that what counts as knowledge depends very much on the context in which it has been developed and is being used, and that there are many different kinds of knowledge that are not always equally valued in STE policymaking. These understandings about knowledge have implications for how information flows in STE public engagement mechanisms.

III. Public Communication and Participation Mechanisms in STE Public Policy

In recent years, both public communication (meaning discussion and circulation of issues, information, and ideas not necessarily tied to particular decision-making) and public engagement in decision-making processes (meaning the involvement of the public in actual decision-making processes) in STE have experienced a shift from top-down approaches to more participatory ones. Still, debates and research abound regarding both the best ways to communicate about scientific issues with "the public" as well as the appropriate levels and types of public participation in STE public policy decisions.

III.a. Public Communication and Understanding of STE Issues

III.a.i. "Scientific Literacy"

Many scholars agree that public understanding of STE—often referred to as "scientific literacy"—is a prerequisite to effective public participation in STE policy. Jon D. Miller (1998), for example, explains that healthy democratic systems require a

significant number of citizens to have an understanding of science (p. 205, quoting Durant, Evans, & Thomas). Traditional scientific literacy is generally understood as the ability to read and write about science and technology, and is usually assessed via lists of questions posed in isolation without much context (J. Miller, 1998, p. 204).

Several scholars take issue with what scientific literacy is traditionally understood to mean. For example, Benjamin Shen proposes three categories of scientific literacy, rather than the singular one measured by traditional scientific literacy tests. Practical scientific literacy, Shen (1975) explains, is the most urgently needed but most neglected type, and involves information about science issues that impact people's daily lives, such as health and nutrition (p. 46). Civic scientific literacy, in contrast, aims to instill citizens with greater awareness of science and science-related issues so they will feel comfortable bringing their "common sense to bear" on these issues and "participate more fully in democratic processes of an increasingly technological society" (Shen, 1975, p. 48). Echoing Stirling's call for citizen involvement in the early stages of scientific policy decisions, Shen (1975) explains that, "*how* a technological project is implemented is mainly a job for experts, but the more basic decision of *whether* a project is to be undertaken must rest with citizens and their representatives" (p. 48). Shen (1975) sees the keys to increasing civic scientific literacy as: (1) more public exposure to science via more effective schooling and increased quantity and quality of scientific reporting in the media; and (2) analysis of "the science behind specific science-related public issues" in "plain English for the average citizen"—that is, in language that does not require specialized knowledge to understand (p. 48). Lastly, cultural scientific literacy is motivated by the desire to know something regarding science, not to solve practical

problems but as an end in itself, like art appreciation (Shen, 1975, p. 49). While cultural scientific literacy appears to lack utilitarian value, it helps bridge the gap between scientist and non-scientist “cultures” (Shen, 1975, p. 49).

Jon D. Miller expands on Shen’s work regarding civic scientific literacy. Miller (1998) explains that civic scientific literacy must be understood as a multidimensional concept that involves: (1) a vocabulary of basic scientific constructs sufficient to read competing views on a scientific issue in a newspaper or magazine; (2) an understanding of the process or nature of scientific inquiry; and (3) some level of understanding of the impact of science and technology on society (p. 205).

William Kinsella makes a strong argument as to why traditional notions of scientific literacy are not necessarily useful if the goal of such literacy is participation in STE policymaking. He contends that citizens do not need the same depth of technical knowledge as specialists to participate effectively in STE public policy decisions, but rather only a “working vocabulary of science terms and concepts, and an overall understanding of how technical reasoning operates” (Kinsella, 2004, p. 92). Kinsella (2004) explains that such a working knowledge cannot and should not replace “technical or policy professionals” knowledge, but that it can provide the public with “an adequate foundation for genuine dialogue with those specialists” (p. 85). If such a working knowledge is in fact sufficient for meaningful public participation in STE policy, traditional notions of scientific literacy seem inappropriate insofar as such participation is the goal.

Other scholars offer critiques not just of how scientific literacy is defined but also of how it is assessed. As Brossard and Lewenstein (2010) explain, due to power

relationships between those with the particular knowledge measured by scientific literacy surveys and those without it, most of the questions asked to the public to assess their scientific understanding have no context and ignore other forms of knowledge that may be relevant to people in their everyday lives (p. 13). This is problematic because people learn best when facts and theories have meaning in their personal lives (Brossard & Lewenstein, 2010, p. 13). Accordingly, Lewenstein (2003) suggests formulating these assessments with greater attention paid to other forms of knowledge that may be relevant to people in their everyday lives (p. 3).

For these scholars, the predominant singular vision of scientific literacy and non-contextual mode of its assessment are too narrow. They privilege certain types of knowledge, reify traditional power dynamics, and underestimate citizens' knowledge and understanding, all of which neglect the relevance and value of the "public's" input into STE policy decisions.

III.a.ii. Public Communication Mechanisms

Just as Shen discusses several types of scientific literacy with different aims (e.g. enabling citizen participation in STE policy decision versus one's own edification for personal enrichment), Bucchi identifies several levels of public communication for audiences with varying levels of scientific literacy. The "intraspecialist" level is the most esoteric, is provisional and tentative, and consists of texts like specialized journal papers (Bucchi, 2008, p. 61). Communications in the "interspecialist" level are aimed at researchers working in the same discipline but in different areas, such as interdisciplinary articles in "bridge journals" like *Nature* or *Science* (Bucchi, 2008, p. 61). The "pedagogic level" describes communications found in textbooks, which emphasize the historical

perspective of STE issues and attempt to transform theory into fact (Bucchi, 2008, p. 61). Lastly, the “popular level” consists of scientific articles found in popular media like television documentaries and daily newspapers (Bucchi, 2008, p. 61). These communications are full of metaphorical images and focus on issues with mass appeal and application, such as health, technology, and the economy (Bucchi, 2008, p. 61). In communications at the popular level, scientific information is presented as the most definite and certain (Bucchi, 2008, p. 62).

The results of traditional scientific literacy assessments have led to communication mechanisms based on what is often called “the deficit model” or the “diffusionist model,” wherein the public is seen as lacking knowledge and the solution is seen as transporting information from a specialist context to a popular one (Brossard & Lewenstein, 2010, p. 12; Bucchi, 2008, p. 58). Under this view, the public is passive and scientific communication is a one-way, linear process with a sharp distinction between scientific and popular discourse (Bucchi, 2008, p. 58).

Although there is disagreement over what the most effective public engagement mechanisms look like, there is general consensus that they should look different than the deficit model (Delgado, Kjølberg, and Wickson, 2011, p. 827). As explained above, Brossard and Lewenstein (2010) see the assessments that led to this model as deeply flawed (p. 13). They also point out that despite over 30 years of attempting to “fill the deficit,” assessments continue to reflect a largely stagnant level of scientific literacy (Brossard & Lewenstein 13). Others cite the artificial division this model perpetuates between knowledge creators and knowledge receivers, and the power dynamics inherent in it. Bucchi (2008), for example, argues that communication should be seen as “cross-

talk,” rather than transfer (p. 67). Based on such shortcomings, scholars have posed a variety of alternative models by which to more effectively communicate with the public regarding STE issues.

The “contextual model” responds to calls—such as those by Wynne and Lewenstein—for an increased focus on the needs, interests, and backgrounds of members of the public (Wynne, 1991, p. 115; Lewenstein, 2003, p. 3; Brossard & Lewenstein, 2010, pp. 13-14). It “acknowledges that individuals do not simply respond as empty containers to information, but rather process information according to social and psychological schemas that have been shaped by previous experiences, cultural contexts, and personal circumstances” such as stage in life, personality type, the social context in which information is received, and media influence (Brossard & Lewenstein, 2010, pp. 13-14). This model has led to messages that are tailored to their recipients’ needs, but it is criticized as merely a more sophisticated version of the deficit model in which the focus on individuals’ needs and responses is used as a tool for manipulation and the goal remains acquiescence rather than communication (Brossard & Lewenstein, 2010, p. 14).

The “lay expertise model” takes the contextual model a step further. Its focus is expressly on actively engaging citizens with science and scientific issues, and it is premised on the idea that knowledge based on the lives and histories of those citizens (what is variously referred to as “local knowledge,” “experiential knowledge,” and “lay expertise,” among other terms) is valuable and important (Brossard & Lewenstein, 2010, p. 15). Further, rather than seeking to verify local knowledge with modern scientific methods, it is explicitly designed to value such knowledge in its own right and to incorporate such knowledge into policy decisions (Brossard & Lewenstein, 2010, p. 15).

Critics of this model argue that it swings the pendulum too far, privileging local knowledges over reliable knowledge about the natural world produced by modern science, and that it is driven too strongly by a political commitment to empowerment of local communities (Brossard & Lewenstein, 2010, p. 15).

In some ways proffered as the “just right” middle ground between the deficit and lay expertise models, the “public engagement model” aims to integrate local knowledge and citizens’ views with scientific ones in STE public policy debates (Brossard & Lewenstein, 2010, p. 16). It is often driven by a commitment to democratizing science, and thus focuses on activities that enhance public participation in science policy such as consensus conferences and citizen juries (Brossard & Lewenstein, 2010, p. 16). This model, like the lay expertise model, has faced criticism as motivated more by politics than public understandings, and as being too focused on the process, rather than the substance, of STE public communication (Brossard & Lewenstein, 2010, p. 16).

Covello and Sandman pose a similar spectrum of STE communication models for risk communication. They posit four models of risk communication: communicators can either ignore the public, learn to explain their data better, engage in community dialogue to better understand what people mean by risk (which, they demonstrate, is more complicated than what technical experts mean due to the wide array of factors involved when people process risk information), or treat the public as a “full partner” (Covello & Sandman, 2001, pp. 164-178). Their first two models are most closely related to the dissemination model described above, while their latter two bear a stronger resemblance to the lay expertise and public engagement models, respectively.

Taking a somewhat different stance, Baruch Fischhoff (2013) distinguishes between “science communication” and “science education” (pp. 14033-14034). Fischhoff (2013) explains that science education starts by listening to scientists and “learning the facts they wish to convey,” while communication begins by listening to its audience to identify the decisions they face in order to determine what information they need (p. 14034). He argues that science education is a necessary precursor to science communication (p. 14034). Fischhoff (2013) explains effective science communication as that which “reaches people with information they need in a form they can use” (p. 14038). To accomplish this, Fischhoff (2013) advocates that scientists with “subject matter knowledge” (like Collins and Evans’ contributory expertise) collaborate with scientists with expertise in communication processes (like Collins and Evans’ interactional expertise) as well as practitioners to manage the process (like Collins and Evans’ referred expertise) (p. 14038).

While there are thus a multitude of responses to the deficit model of STE communication with the public, the general trend is towards increasing the attention paid to recipients—to their needs, their interests, and the knowledge and input they have to offer.

III.b. Public Participation Mechanisms in STE Policy

Related but slightly distinct from public *communication* mechanisms are public *participation* mechanisms in STE policy. As noted above, as used here, participation mechanisms refer to those surrounding STE policy decisions, while communication mechanisms are those by which STE issues are discussed but that do not necessarily involve a decision on a particular issue. As with communication mechanisms, however,

participation mechanisms are likewise the subject of much research and resultant models. Also like communication mechanisms, the general trend in participation mechanisms has been away from a top-down, hierarchical approach towards a more inclusive, egalitarian one.

III.b.i. Descriptive Models of What Is

Parallel to deficit models of public communication are participation models in which the public is a mere passive recipient of information and that are often aimed at achieving acquiescence to a predetermined end. Such models include Craig Waddell's "technocratic" and "one-way Jeffersonian" models, Crick and Gabriel's "transmission model," Stirling's "instrumental" model, Habermas's "strategic action" model, and Rowe and Frewer's "public communication" model" (Waddell, 1995a, p. 205; Crick & Gabriel, 2010, p. 204; Stirling, 2012, pp. 1, 3; Simmons, 2007, p. 90, citing Habermas; Katz & Miller, 1996, pp. 129-130). These models view public "participation" as one-way, linear, and with no role for recipients' knowledges, concerns, or input.

Other public participation models involve the public slightly more, but in ways that are still limited in scope and impact. In these models, the public is afforded the opportunity to provide some information to decision-makers, but it is either non-technical or high-level information, or only ostensibly impacts policy outcomes. For example, in Waddell's "Interactive Jeffersonian" model, the public communicates their "values, beliefs, and emotions" to the experts, while Stirling's "substantive" model allows space for public communication to experts but only about non-technical matters (Waddell, 1995a, p. 207; Stirling, 2012, p. 1). Importantly, although information is exchanged in both directions, technical information and non-technical information each only flow one

way, so there is no true two-way communication. Models in which the public's involvement lacks actual impact on policy outcomes include Simmons' (2007) partial and pseudo participation models (p. 96, borrowing language from Iacofano, Moore, and Goltsman, 1990). Under both of these models, "technical experts" determine a course of action for addressing an environmental issue, propose that plan to the public, and only then solicit feedback from the public by way of public meetings and comment periods prior to implementation (Simmons, 2007, 96). Similarly, Katz and Miller's (1996) "engineering model" also provides the public some opportunity for input into the decision-making process, but in a limited and imbalanced way: the public can offer input only through forums and situations that the decision-maker controls (p. 128). Likewise, in Webler and Tuler's "Science-Centered Stakeholder Consultation," public involvement is primarily limited to "providing information to inform the process" (Webler & Tuler, 2006, p. 711), while their Efficient Cooperation "de-emphasiz[es] [...] empowerment": there is "little support for participants' ability to place topics on the agenda" or for consensus, and "features that would reduce the efficiency of the process" are discouraged (Webler & Tuler, 2006, pp. 713-14). Instead, agency-public interactions are hierarchical, with the public acting much like a hired consultant (Webler & Tuler, 2006, pp. 717).

While they vary, each of these models involves limited public participation and retains power imbalances between the public and the experts, positioning the experts as dominant in the decision-making process.

III.b.ii. Prescriptive Models of What Could Be

Scholars have responded to what they see as shortcomings of these largely unidirectional approaches with a variety of suggested alternatives that provide a more

substantial role for the public and lessen the dichotomy between experts and the non-expert public. These mechanisms are frequently process- rather than outcome-oriented, involve members of the public earlier in the process, and/or presume that the public has valuable knowledge to contribute to policy debates.

Many scholars propose models that focus on the process itself and put the public on more equal footing with experts. Waddell (1995a), for example, advocates for what he terms the “Social Constructionist Model,” in which technical information, values, beliefs, and emotions flow in both directions between experts and the public (p. 207). Similarly, Stirling’s (2012) “normative” approach is focused not on a particular end but on the process itself, and values qualities like “independence, openness, accessibility, legitimacy, and accountability” (p. 1). Likewise, Rowe and Frewer (2005) call for a process that in which information flows two-directionally between a decision’ sponsors and the public (their “public participation” model). In this model, “the act of dialogue and negotiation serves to transform opinions in the members of both parties (sponsors and public participants)” (pp. 255-56). Similarly, Katz and Miller (1996) advocate for decision-making processes that are egalitarian, interactive, and truly dialogic, and a view of communication as historically situated, persuasive, and open-ended (135).

Likewise, Karin Backstrand (2004) argues that “[a]ppraisals of technological risk should be conducted in a pluralistic and deliberative fashion applying discursive and participatory techniques” (p. 711). She advocates for a “civic expertise” model, in which citizens are viewed as having valuable knowledge to contribute to the science policymaking process, and decisions are made through “collaboration between, and participation by, scientists, citizens and civil society” (p. 706). This concept is grounded

in the same premise as Shen's call for "civic scientific literacy," discussed above, which seeks for citizens to feel knowledgeable enough about science to "participate more fully in democratic processes of an increasingly technological society" (Shen, 1975, p. 48). In addition, Simmons (2007) advocates for a "participatory design" approach that "redistribute[s] the common imbalance of power in current risk communication practices" and in which the public's "input [is] viewed as valuable knowledge capable of *constructing* risk through discourse with technical experts" (pp, 110, 100). Each of these scholars advocate for greater opportunities for input from persons not traditionally viewed as experts.

One way to do more fully and equally involve "the public", according to Sara Davies, Cynthia Selin, Gretchen Gano, and Angela Pereira (2012), is to move away from many public participation processes' exclusive reliance on traditional modes of expression like speaking. These scholars explain that many public participation models value "rationality, reserve, selflessness, and powers of argumentation," which is "scientists' home turf" (p. 353, quoting Elam & Bertilsson). To create a more equal playing field, they propose that deliberative and citizen engagement processes incorporate "non-traditional modes of deliberation interaction" such as music, storytelling, and emotion (Davies, Selin, Gano, & Pereira, 2012, p. 353). This suggestion calls to mind Flower, Heath, and Long's *techne* of eliciting the story-behind-the-story, seeking rival hypotheses, and examining options and outcomes, which likewise serve as alternative means to elicit and connect with those not traditionally deemed experts.

There have also been calls for public participation earlier in the decision-making process. These include Stirling's suggestion to involve the public early in the process. He

explains that due to path dependence and the fact that “society cannot commit to any single trajectory without diminishing the potential for others,” it is particularly important for the public to have a voice early in the policymaking process, before such trajectories are set (Stirling, 2012, p. 4). Similarly, Simmons (2007) explains that “[i]n order for citizens to contribute significantly they must be brought into the decision making process early enough to contribute to the *design* of the policy” (p. 110). Jasanoff (2003) takes a similar position: she sees public engagement as necessary to “test and contest the framing of the issues the experts are then asked to resolve” (p. 397). Otherwise, experts may offer irrelevant advice on wrong or misguided questions (Jasanoff, 2003, p. 398). Echoing this call, Jack Stilgoe and James Wilsdon (2009) argue that we need upstream engagement before decisions have been made to explore questions such as, “Why this technology and not another,” “Who needs it,” “Who is controlling it,” and “Who benefits from it?” (p. 22). Guston (2014) has demonstrated the viability of upstream engagement in his review of the National Citizens’ Technology Forum on Nanotechnology and Human Enhancement, in which he found that lay citizens could deliberate in thoughtful ways on emerging technologies prior to possessing significant factual knowledge or establishing opinions about it (pp. 54, 55).

Another suggestion has been to move away from viewing consensus as the goal of participatory mechanisms. Stirling (2012) explains that seeking consensus can “thwart genuine substantive public participation” (p. 4). Under this view, a primary benefit of public participation is “not to force consensual prescriptive recommendations, but to map out alternative pathways” and to “catalyse and provoke—rather than substitute or suppress—wider public discourse” (Stirling, 2012, p. 4). Similarly, Hamilton and Wills-

Toker (2006) advocate for “exploring and valuing diversity and consent,” rather than quashing them to achieve consensus (p. 768). To do so, they propose a “dialogic discourse,” based on Bakhtin’s work, that allows for shifts between problem-solving discourses—which have a goal of recognizing agreement—and sense-making discourses—which aim to recognize similarities and differences in developing understanding (Hamilton & Wills-Toker, 2006, p. 771). Hamilton and Wills-Toker (2006) believe that sense-making discourse, which they describe as “ongoing engagement and struggle among multiple perspectives,” is key to public participation models because it “recover[s] dissent and incompatibility as essential features of dialoguing” (p. 771). Likewise, Webler and Tuler’s (2006) Informed Collaboration model posits that consensus “endangers collaboration by giving participants the opportunity to dig in their heels and not compromise on their preferred outcomes” (p. 713). Under these views, a shift away from a focus on consensus will lead to more robust policies and more accountable policymaking processes.

Rather than replace the transmission model, Crick and Gabriel (2010) propose that we need not dispense with it entirely if we add to it a “dramatist frame” (p. 219). Such an approach, they explain, uses Kenneth Burke’s language of theories of action rather than knowledge to view scientists and citizens as actors within a shared scene in which not only beliefs but also attitudes, conventions, relationships, emotions, aspirations, and sensations are acknowledged motivating factors (Crick & Gabriel, 2010, p. 218). In advocating for this approach, Crick and Gabriel (2010) state, “[t]he role that situational context plays in the resolution of public scientific controversies cannot be overstated” (p. 218). Such an approach is reminiscent of responses to the deficit model of

public communication, which similarly incorporate the contextual needs, interests, and knowledges of the public.

Similarly, Fischer (2000) calls for “cultural rationality,” which is centered around “personal and familiar experiences rather than depersonalizing technical calculations,” and which treats citizen participation and scientific expertise equally in policymaking processes (p. 132). Like so many others, he stresses the importance of local contextual knowledge, and of viewing citizens as savvy and having value contributions to make (p. 195). He further argues that the scientific method falsely universalizes and privileges the claims of experts, obscuring their socially constructed nature (p. 195). Consequently, lay citizens are rendered unable to contribute their nonexpert, though valuable, knowledge to decision-making processes that exclude perspectives grounded in local knowledge. Collins and Evans (2002) make a similar claim in their call for assessing expertise based on experiential knowledge rather than formal certification, and in their discussion of uncertified experts’ frequent lack of interactional expertise (p. 261).

Kinsella (2004) likewise explains that the current divide between experts and non-experts often means public debates become battles between experts, and non-experts “become spectators whose choice becomes only a nonrational choice between actors on a stage” (p. 85, citing Walter Fisher, 1987, 72). Like Fischer, Collins, and Evans, Kinsella argues for a broader conception of expertise that recognizes the value of citizens’ input, local knowledge, and experiences. He terms this notion “public expertise,” and explains that reconceiving the expert/public relationship as a civic dialogue is “essential to overcoming the barrier” between the general public and technical experts (Kinsella, 2004,

p. 86). Doing so, Kinsella (2004) tells us, will improve the quality of STE decisions (p. 86).

Not everyone agrees that increased public participation is always better. Collins and Evans (2002) argue that more public participation is only good when the public possesses expertise about the issue at hand (p. 283). They explain that, all other things being equal, “we ought to prefer the judgments of those who ‘know what they are talking about’” (even if they are sometimes wrong), and express concern over what they term the “problem of extension”—the issue of “when to limit participation in technical decision making so that the boundary between the knowledge of experts and of laypersons does not disappear” (Collins & Evans, 2007, p. 10). For Collins and Evans (2002), the distinction between experts and laypeople is useful, if experts are appropriately labeled as such based on a broader conception of expertise founded on experience rather than formal certification (p. 250). Thus, while Collins and Evans’ concern is finding the appropriate balance between expert and public roles in public policymaking processes, Kinsella’s and Fischer’s is equipping the public with the tools necessary to participate and be heard at all. Each of them agrees, however, that conceiving of expertise narrowly does both citizens and public policy itself a disservice.

IV. The Place of My Study

There is thus a plethora of research regarding what “public” and “expert” are and ought to be, and regarding how STE public engagement mechanisms should allocate roles, power, and opportunities for input among them. Further, many scholars have called for designing public engagement mechanisms that allow for greater input from those traditionally viewed as non-experts, and have offered a variety of suggestions for how to

do this. These range from reconceptualizing whom we consider to be experts and what we consider valuable knowledge, to revising the structures of these mechanisms, to changing ideas of what presentation styles we consider acceptable in them. Viewing these factors as Mediational Means and exploring how they may work together to mediate information flow in such mechanisms takes this existing research a step further. In this study, I explore these issues in a real-world situation with real exigencies—policy decisions are currently being made as to how, when, and to what degree SSFL will be cleaned up, and the public engagement mechanisms through which these decisions are made are continuously occurring and evolving. Using this existing body of work as a base allows me to more thoughtfully and productively explore how two such public engagement mechanisms (the Water Board hearing and Work Group meeting) enact notions of “public” and “expertise,” and whether, and if so, how participants’ role designations, the structural features of each mechanism, and the stylistic features of participants’ contributions act as Mediational Means to mediate the flow of information in these mechanisms. Doing so has implications for both the SSFL controversy in particular as well as STE public engagement mechanisms more generally, and helps move existing research on these important issues in the field of Rhetoric and Composition forward.

CHAPTER 3

EXAMINING “EXPERT” AND “PUBLIC” ROLE DESIGNATIONS AT THE SSFL WATER BOARD HEARING AND WORK GROUP MEETING AS MEDIATIONAL MEANS

I. The Problem Driving This Chapter: Role Designations and Information Flow

As we saw in Chapter 2, notions of what it means to be an “expert” or a member of “the public” vary widely. Further, Rowe and Frewer’s taxonomy of public engagement mechanisms, among others, discussed in Chapters 1 and 2, offers a means by which to understand and categorize different ways that information flows in various mechanisms. In this chapter, I ask whether and, if so, how “expert” and “public” role designations serve as Mediation Means affecting the flow of information in the two public engagement mechanisms I take up in this project: the Water Board hearing and the Work Group meeting. To answer this question, I consider, first, *whose* information—that of the designated experts and/or that of “the public”—gets “to flow” in each mechanism, and, second, *what* kinds of information it is that these designated experts and members of “the public” are putting into circulation.

I begin this chapter with an explanation of my methodology, followed by summaries of the Water Board hearing and Work Group meeting. Next, for each mechanism, I examine the terms <expert> and <public> as ideographs, followed by a consideration of which information flowed in that mechanism—whose and what kinds—and why this might be so. I close with a brief discussion of the implications of these findings regarding how role designations act as Mediation Means in these mechanisms.

II. Methodology

My goal in this chapter is to identify how “expert” and “public” role designations served as Mediatlional Means to impact information flow at the Water Board hearing and Work Group meeting. I conduct this analysis using a two-part inquiry. First, I ask what <expert> and <the public> meant at the Water Board hearing and Work Group meeting, respectively. To answer this question, I conduct an ideograph analysis of <expert> and <public> as used in each mechanism. Second, I ask which information—whose and what kinds—“flowed” in each mechanism and offer some ideas as to why. This two-part analysis allows me to understand “expert” and “public” designations as Mediatlional Means that mediate information flow by impacting whose information and what information gets to flow at an STE public engagement mechanism.

II.a. <Expert> and <Public> As Ideographs

To understand the contextual meanings of <expert> and <public> at the Water Board hearing and Work Group meeting, I turn to McGee’s ideograph analysis—especially as implemented in Coogan’s “Service Learning and Social Change: The Case for Materialist Rhetoric.”⁸ Ideographs are essentially shorthand expressions of larger ideas. They are, in Coogan’s (2006) words, “ideological icebergs: the visible bump of what lies beneath,” and as such, analyzing them allows one to “take the ideological pulse of the community” (p. 670). Ideographs draw attention to the social functions of a term,

⁸ To conduct his analysis, Coogan (2006) began with a historical account of how the ideographs <local control> and <accountability> were deployed in the decades before his case study (p. 672). He then documented a service-learning project about efforts to increase parental involvement in their children’s education. According to Coogan (2006), these ideographs were not used successfully in this project due in large part to their users’ failure to account for their historical meanings (p. 687).

insofar as they reveal the ideology behind the term as used in a particular community (McGee, 1980, p. 8). They are common expressive forms because, ““while they *appear* to be drawn from ordinary language’ and may also appear to express the speaker’s intentions in an original way, they in fact ‘represent in condensed form the normative, collective commitments of the members of a public, and they typically appear in public argumentation as the necessary motivations or justifications for action performed in the name of the public’” (Coogan, 2006, p. 670, citing Condit & Lucaites xii-xiii). Moreover, ideographs are “one-term sums of orientation” that lead audiences to particular, collectively understood ends (McGee, 1980, pp. 7, 15-16). For these reasons, analyzing the ideographs used in a particular argument sheds light on deeper, systemic ideologies held by both their users and recipients, and allows us to understand the embedded meanings they carry for participants in that controversy.

Here, I use McGee and Coogan’s ideograph analysis as a framework within which to conduct a contextual analysis of <expert> and <public> at the Water Board hearing and Work Group meeting. I do this via a two-part inquiry. First, I identify who was designated as an expert in each mechanism, using Hartelius’s six “congruities” of experts as a guide. To do this, I review the Water Board hearing and Work Group meeting transcripts to see how the words “expert,” “expertise,” “public,” and their cognates (Coogan’s term for alternative words with similar meanings) were used, by whom, and in what contexts. I also look at how the presenters at each mechanism were addressed and treated discursively by others, which allows me to identify persons who may have been treated as designated experts even if not formally referred to as such. I also consider the significance of the use of first, second, and third person in speakers’ presentations and

comments insofar as this usage reflects how speakers understand their own and others' roles as designated experts or members of "the public" in these mechanisms. In other words, the use of first, second, or third person sheds light on whether speakers see themselves and others as insiders or outsiders in the communities of designated experts and "the public," respectively. Identifying the designated experts in each mechanism is particularly important in this study because some of the same people spoke at both the Work Group meeting and the Water Board hearing, and were designated experts in the former mechanism but not the latter.

Second, after I have identified who the designated experts and "public" in each engagement mechanism were, I look for specific features shared by the designated experts within each mechanism, as well as specific features shared by the "public" and other non-experts in each mechanism. To do so, I look to existing scholarship about what <expert> and <public> mean (just as Coogan looks to historical meanings of the ideographs he examines in his study). In particular, I apply Collins and Evans' (2002) "certified" versus "uncertified" expert distinction as well their concepts of "contributory," "interactional," and "referred" expertise (p. 254). In focusing on the similarities among the designated experts and non-experts within each mechanism, I do not mean to gloss over the real and important differences that exist among the members of each of these heterogeneous groups. Instead, here I am explicitly looking for similarities among them—in both what they say and how they say it—for purposes of yielding potentially valuable insights about what <expert> and <public> mean in each of these engagement mechanisms. One could conduct a rich and fruitful analysis focused on identifying the differences within each of these groups. But here my aim is to explore

whether there are any shared traits among the members of each from which we can better understand the embedded meanings of <expert> and <public> as used in these two public engagement mechanisms.

II.b. Accounting for Whose and What Kinds of Information Flowed in Each Mechanism

For the final step of my analysis of role designations as Mediation Means, I consider how and why some information—that is, particular kinds of information offered by people holding particular roles—got to “flow” in each mechanism and other information did not. To conduct this analysis, I consider the Water Board hearing and Work Group mechanism in light of existing models of public engagement—specifically transmission models versus interactional models.

Before conducting this analysis, I first offer brief summaries of the Water Board hearing and Work Group meeting.

III. Summary of Water Board Hearing and Work Group Meeting

III.a. Summary of Water Board Hearing

As the owner and operator of SSFL Area IV, Boeing is required to obtain and comply with the terms of a NPDES permit pursuant to the federal Clean Water Act (33 USC §§ 1251-1387). The Water Board sets the terms for, issues, and grants renewals for Boeing’s NPDES permit. The NPDES permit controls pollutants by setting limits on the amounts of various pollutants in water discharged from the site, called “effluent limits.” These limits are set based on both the technologies available to control pollutant amounts as well as the pollutant concentrations in the water body into which the water discharged from the site is released. The NPDES permit also contains monitoring and reporting

requirements to assess compliance with the permit's effluent limits. This permit is up for renewal every five years, at which time the Water Board staff drafts a tentative revised permit, which is open to public comment and presented to the Water Board for revision and approval.

Because of the technical challenges of regulating the water discharged from SSFL (because SSFL is located in two watersheds, the drainages are very steep, and the runoff carries soil and sediments contaminated from both past site activities and naturally occurring materials), the Water Board ordered Boeing in 2007 to assemble an "independent panel of experts" (which the Water Board refers to at hearings as "the Expert Panel") to provide technical oversight and recommendations for stormwater treatment requirements throughout the site (Water Board Tr., p. 250; Boeing SSFL NPDES Compliance Program, 2008, p. 1). To select this panel, Boeing retained the consulting firm Geosyntec Consultants (Geosyntec). After soliciting statements of qualification from prospective panelists, Geosyntec, in consultation with Water Board staff, submitted a list of six names to the Water Board staff, which the Water Board staff approved (Boeing SSFL NPDES Compliance Program, 2008, p. 2). Collectively, the six panelists hold five PhDs, five current or former professorships, three "Professional Engineer" certifications, and three private consultantships (Water Board Tr., p. 250; Boeing SSFL NPDES Compliance Program, 2008, pp. 2-3). Water Board staff set the terms of the proposed permit in consultation with the "Expert Panel." Pursuant to Clean Water Act regulations, the Water Board accepts comments from Boeing and the public on the proposed permit, then holds a public hearing.

The most recent NPDES permit renewal hearing was held on February 12, 2015 (Water Board Tr., p. 245). At this hearing, Water Board staff and the “Expert Panel” made presentations to Water Board members to explain the terms of the proposed permit and the reasoning behind them. In addition, Boeing made a presentation in which it explained its efforts over the previous permit term to comply with permit requirements, and took issue with several of the proposed changes in the tentative revised permit. Prior to the hearing, a number of public interest groups sent a joint comment letter to the Water Board in which they requested, among other things, that they be granted collective party status in this proceeding and be allowed to make a presentation at the hearing (Rocketdyne Cleanup Coalition, et al., 2015, p. 16). The Water Board granted this request, and as a result, the Organizations also presented at the hearing.⁹ These presentations were followed by the legally required opportunity for public comments. The Water Board referred to speakers during this period as “interested persons,” and defined “interested persons” as anyone they did not identify as formal parties to this proceeding (Water Board Tr., pp. 246, 247). We know that “interested persons” meant “the public” at this hearing because the Acting Chair of the Water Board started the hearing by mentioning the specified time limits “for the parties and for the public” (Water Board Tr., p. 246). At the start of the hearing, the Water Board stated that these comments would be limited to “three minutes maximum or less depending on the time and number of speakers” (Water Board Tr., pp. 246-247). By the time Water Board

⁹ These organizations were Rocketdyne Cleanup Coalition; Physicians for Social Responsibility, Los Angeles; Southern California Federation of Scientists; Teens against Toxins; Committee to Bridge the Gap; Center for Race, Poverty, and the Environment; the People Senate; Aerospace Contamination Museum of Education; and Consumer Watchdog (collectively, “the Organizations”) (Water Board Tr., pp. 245-246).

reached this step in the proceeding, however, these comments were capped at “2 minutes each so that we have enough time” (Water Board Tr., p. 336). The Water Board then asked questions of the presenters, followed by deliberation and an affirmative vote on the tentative permit (Water Board Tr., pp. 341-385).

III.b. Summary of Work Group Meeting

Shortly before the Water Board Hearing, on February 4, 2015, the Work Group held one of its quarterly meetings (the “Work Group meeting”). The Work Group meeting consisted of five formal presentations followed by a question and answer session (the question and answer session was not recorded and is thus not part of this analysis). The first presenters were two high school students who spoke on behalf of Teens Against Toxins, a group whose goal is to raise awareness about SSFL among young adults. They gave a brief overview of the history of SSFL and its cleanup. This was followed by the presentation of interest for this project: a presentation regarding Boeing’s proposed NPDES permit given by Cindi Gortner, who also presented on behalf of the Organizations at the Water Board hearing. After Gortner, Denise Duffield—another Organizations presenter at the Water Board hearing—gave an update on building demolition and disposal at SSFL. Duffield was followed by a presentation about Department of Toxic Substances Control (DTSC, a California agency) reform. The final presenter at the Work Group meeting was Dan Hirsch—also a presenter on behalf of the Organizations at the Water Board hearing—who gave a presentation entitled “Cleanup Myths and Realities.” Hirsch’s presentation was followed by questions from the audience (unfortunately this segment of the meeting was not recorded). In this project I focus on the presentations by Hirsch, Gortner, and Duffield, for several reasons. First, the subject

of Gortner’s presentation is the renewal of Boeing’s NPDES permit—the precise subject of the Water Board hearing. Second, these three presenters spoke at both the Work Group meeting and the Water Board hearing, making their presentations a prime source for comparisons between these two participatory mechanisms.

IV. The Water Board Hearing

IV.a. <Expert> and <Public> as Ideographs at the Water Board Hearing

As demonstrated in the sections that follow, viewing <expert> and <public> as ideographs at the Water Board hearing reveals a rather narrow, traditional ideology in this public engagement mechanism that views “expertise” as tied to formal training rather than experiential knowledge, and to “encyclopedic” rather than evaluative knowledge, and that makes a sharp distinction between experts and “the public.” These factors make the Mediation Means of role designations one that likely inhibits the flow of information in this mechanism.

Throughout the Water Board hearing, the terms “expert” and “expertise” were used exclusively in regards to the “Expert Panel,” and were used only by the Water Board (members and staff) and the Expert Panel itself. In addition to being explicitly labeled as experts, the Expert Panel members also satisfy many of Hartelius’s “congruities”: they identify themselves within larger networks—including this panel, as well as the research institutions and/or private research firms with which they are affiliated; they possess *techne* (a specialized skill or knowledge set)—discussed later in this chapter; several of them possess expert pedagogy as professors; and they take a stance on whether the public should defer or participate in discussions about a given issue—addressed in Chapter 6 (Hartelius, 2010, pp. 164-166). The first reference to “experts” at the Water Board hearing

was when the Acting Water Board Chair stated: “The order of proceedings of this hearing will be as follows: Staff will present the tentative permit; next, *the Boeing Company and the Expert Panel* with [sic] make *its* presentation, which cannot exceed 40 minutes; *after Boeing*, the organizations I’ve previously mentioned will make its presentation, which also cannot exceed 40 minutes; the Board will then hear from interested persons, who will have three minutes maximum or less depending on the time and number of speakers” (Water Board Tr., pp. 246-247, emphasis added). As discussed more thoroughly in Chapter 6, it is noteworthy—and deeply troubling—that the Water Board gave Boeing and the Expert Panel one joint presentation slot and referred to both entities simply as “Boeing.” It is further worth noting that “interested persons”—i.e. members of “the public”—were given “three minutes maximum or less depending on the time and number of speakers,” as this structural aspect of the hearing has far-reaching implications for how being designated an “interested person” in this mechanism mediated (in this instance, by impeding) the flow of information from such persons. Again, this is explored in more detail in Chapter 6.

During the Water Board staff presentation, the term “expert” was used 57 times, all in reference to the “Expert Panel.” Cassandra Owens, Senior Environmental Scientist and Unit Chief of the Industrial Permitting Unit, explained: “The Expert Panel has provided the expertise and the experience required to implement a number of advanced Best Management Practices at the Santa Susana Field Laboratory” (Water Board Tr., p. 259). She made no similar statements regarding any other participants. In singling out the contributions of the Expert Panel, Owens signals that she values the contributions of the Expert Panel, perhaps more so than that of other participants. This sentiment is reinforced

by the fact that the only input reflected in the final NPDES permit is that of the Expert Panel, addressed in more depth in Chapter 6. Because experts tend to enjoy a position of privilege in policy decisions (see, e.g., Kinsella, 2004, p. 8), and because the designated experts in this mechanism were the only ones that had a direct influence on its final outcome (as discussed in Chapter 6), it is useful to identify what characteristics distinguish those persons who were designated as experts in this mechanism from those who were not.

IV.a.i. Certified Experts Only

Many speakers at the Water Board hearing possessed knowledge about the issues on which they spoke, but the only persons designated as experts were those who were also certified via formal credentials (see Collins & Evans, 2002, 257). Every Expert Panel member had formal accreditations to point to in support of his expert status. In contrast, the Organizations' representatives and the "interested persons" lacked advanced degrees or formal certifications regarding the issues on which they spoke. Instead, they acquired their knowledge through years of firsthand experience.

Of the six members of the panel, five hold PhDs (the sixth holds a Masters), five are current or past professors, three are registered "Professional Engineers," and one is certified as a specialist in the field of water resources engineering (Water Board Tr., p. 250; Boeing SSFL NPDES Compliance Program, 2008, pp. 2-3). As Michael Stenstrom, the first Expert Panel member to speak, explained:

So this is our Expert Panel. It's the same panel you've heard before. Bob Gearheart is Emeritus Professor at Humboldt State University and is a worldwide known expert on wetland systems. Jon Jones, to my left, is CEO of Wright Water

Engineers and is an experienced designer of BMP [Best Management Practices] and other hydraulic structures. Michael Josselyn is our plant expert; he is from WRA Consultants in San Francisco; and we have planted more than 10,000 plants at the site under his direction. Robert Pitt is Emeritus Professor of Civil Engineering at the University of Alabama, also an international expert on stormwater, most aspects of stormwater, particularly chemistry and corrosion. And I'm at UCLA, and I've done a variety of things in stormwater as well. (Water Board Tr., p. 287)

Not only did the Expert Panel members possess experiential knowledge about the issues on which they were designated experts, gained from years of research and experience in their respective positions, but they possessed formal accreditations and institutional recognition as well.

In contrast, none of the other speakers at the Water Board hearing held advanced degrees or formal certifications regarding the issues on which they spoke. The first speaker on behalf of the Organizations was Daniel Hirsch, President of the nuclear policy organization Committee to Bridge the Gap. Mr. Hirsch holds a B.A. but no advanced degree, and is a university lecturer but does not hold a professorship. However, he has been involved in research and advocacy work regarding the cleanup of SSFL since the 1970s, when his students discovered the 1959 partial meltdown while conducting work for one of his courses (Water Board Tr., pp. 306-307). Through this work, he has intimate knowledge of the SRE partial meltdown and broader history of SSFL, the continuing debates over its cleanup, and the technical aspects of nuclear reactors, nuclear reactions, and nuclear waste. Despite the expertise that Hirsch acquired through over 40 years of

experience regarding SSFL, he has never been designated as an expert at Water Board hearings.

Other speakers on behalf of the Organizations demonstrated the same trend: they possessed knowledge acquired through experience rather than certification, and were not designated as experts at the Water Board hearing. For example, Denise Duffield, Associate Director of Physicians for Social Responsibility, Los Angeles, spoke about the health impacts of radionuclides (Water Board Tr., pp. 308-309). Duffield has a BA in psychology and an MA in Theatre Arts but, like Hirsch, no science or technology-related advanced degree. However, she has over 15 years of experience working on SSFL and nuclear policy issues, presumably giving her a great deal of experiential knowledge about the content of her presentation (Physicians for Social Responsibility-Los Angeles website). Despite this experiential knowledge, however, she is denied expert status at this hearing.

Likewise, Cindi Gortner, another speaker representing the Organizations, is also denied expert status despite possessing knowledge gained through firsthand experience. Gortner, who holds an MBA but no STE-related advanced degree, introduced herself as a community member and began by stating: “I got involved five years ago when I realized I had been raising my three children near the site of a nuclear meltdown [...] I have some wonderful pictures of my kids in the mud after a big rainstorm, and I wonder what was in that water” (Water Board Tr., p. 315). Gortner goes on to discuss Boeing’s exceedances of permit limits and the lack of transparency in the permit renewal mechanism (Water Board Tr., p. 315). Despite her firsthand knowledge as a resident directly impacted by SSFL runoff, she is not designated as an expert regarding the ways that nearby residents

use their water or regarding the ways that fear about SSFL runoff impacts their lives. Nor is she designated as an expert regarding the experience of community members seeking to partake in the permit renewal mechanism, despite her continuing and direct experience as such. Lastly, she is not designated as an expert regarding Boeing's permit exceedances, despite her knowledge of them gained through five years of involvement with SSFL.

Like Hirsch, Duffield, and Gortner, the final speaker on behalf of the Organizations, Liza Tucker, possessed knowledge but no directly relevant credentials. Tucker works for Consumer Watchdog (a consumer advocacy organization), holds a BA and an MFA, and authored the report "Inside Job: How Boeing Fixers Captured Regulators and Derailed a Nuclear and Chemical Cleanup in LA's Backyard." She spoke about the "capture" of regulators by polluters—in this case, the "co-opt[ing]" of the Water Board by Boeing (Water Board Tr., p. 328). Yet, despite her thorough knowledge about these issues, gained through years of firsthand investigative experience, Tucker was not designated as an expert in this mechanism.

Persons who spoke during the "interested persons" comment period replicate this pattern. Christian Kiillkkaa, for example, is a member of the Board of Directors of the Los Angeles/Santa Monica Mountains Chapter of the California Native Plant Society, and a member of DTSC's Santa Susana Field Lab Community Advisory Group (Community Advisory Group, n.d., p. 3). Kiillkkaa described himself as "specializ[ing] in landscape planning and garden design, [and a] native plants and habitat restoration specialist" (Community Advisory Group, n.d., p. 3). Kiillkkaa explained that he had been involved in issues concerning the relationship between "the Bell Creek Watershed,

relocation of treated groundwater release, and riparian habitat degradation” for the previous two and a half years. Like the presenters for the Organizations, Kiillkkaa possessed experiential knowledge on this issue but lacked formal certification. Similarly, interested person David Troy stated, “I live in the community. I have gardened at the community garden that’s within a couple of miles, and I know people who died of cancer who were gardeners there” (Water Board Tr., p. 339). Another interested person, Dory Raskin, began her comment by stating, “I’ve been involved with trying to get the site cleaned up for over 25 years” (Water Board Tr., p. 341). Both Troy and Raskin thus lacked formal certification, but possessed experiential local knowledge about their experiences as public participants in proceedings regarding SSFL and about community members’ concerns and priorities regarding the site. Despite their knowledge acquired through experience, these persons were relegated to “interested person” status and each given only two minutes maximum to offer their input.

What we see from this examination is that possessing knowledge on an issue is not enough to qualify one as an expert in this public engagement mechanism. Instead, that knowledge must be demonstrated through formal credentials, rather than experience. This reflects a traditional view of expertise, that views knowledge acquired through schooling, and formally recognized through degrees or certifications, as the only specialized knowledge worthy of expert recognition (Collins & Evans, 2002, p. 254). Increasingly, however, scholars are calling for the recognition of alternative sources of knowledge, such as that acquired through experience, as a valid means to achieving expert status (see, e.g., Collins & Evans, 2002, p. 260). For example, many people have gained relevant substantive knowledge on an issue through personal experience but lack

formal training or certification. These uncertified experts can offer equally valuable perspectives and input on that issue as degree-holders, if given the opportunity to do so (Collins & Evans, 2002, pp. 255-56, 270). Importantly, this is not to suggest that the Expert Panel members lacked expertise on the issues on which they spoke. Rather, the important takeaway is that many of the speakers who lacked formal credentials were also experts in their own right (see, e.g., Collins & Evans, 2002, pp. 255-256, 270). However, they were not recognized as such in this mechanism. As such, we see that the ideograph of <expert> at the Water Board hearing represents an ideology that values formal training and education.

IV.a.ii. Contributory and Interactional Expertise Necessary But Not
Sufficient for Expert Status

An examination of the Water Board hearing transcript reveals that in addition to “certification,” one must possess also possess “contributory” and “interactional” expertise to be designated as an expert. As discussed in Chapter 2, Collins and Evans distinguish between several types of expertise. Persons who possess “contributory expertise” are capable of making substantive contributions to the decision at issue, while those possessing “interactional expertise” have the ability to express those contributions in ways that formally trained experts will recognize and value (Collins & Evans, 2002, p. 256). As demonstrated below, the possession of both of types of expertise was insufficient on its own to earn one expert status in this mechanism.

Although many speakers displayed both contributory and interactional expertise at the Water Board hearing, only those who also had formal credentials were designated as experts there. Not surprisingly, the Expert Panel presenters displayed interactional

expertise in addition to contributory expertise. That is, they used specialized language that demonstrated their belonging in the discourse community of hydrology experts. For example, in discussing some of the measures they have taken to improve the quality of water discharged from SSFL, they used technical terminology such as “end-of-pipe treatments,” “removing impervious surfaces as well as BMPs like catch basins,” “culvert modifications,” an “innovative statistically rigorous approach,” and “the change of dioxin compared as the influent versus [sic] the effluent conditions as the water passes through that system” (Water Board Tr., pp. 287-297). They used this precise and specialized language throughout their presentation, demonstrating interactional expertise as well as their belonging in a specialized discourse community.

Notably, many of the uncertified experts also demonstrated interactional expertise in addition to contributory expertise. That is, they spoke using the specialized language of the technical discourse communities in which they sought but were denied expert status. In doing so, they demonstrated a “working vocabulary of science terms and concepts, and an overall understanding of how technical reasoning operates”—a “basic technical literacy” (Kinsella, 2004, p. 85). This is important because “technical reasoning,” which is based on logic and grounded in scientific or technical knowledge, typically enjoys greater deference in STE decision-making than values-based reasoning grounded in practical or commonsense knowledge (O’Neill, 2006, p. 2; Kinsella, 2004, p. 4). Duffield, for example, demonstrated this “basic technical literacy” when she stated: “The National Academy of Sciences and all federal radiation protection agencies accept the principle that there is no safe level of radiation exposure; that there is no threshold of dose below which harm cannot occur” (Water Board Tr., p. 312). She continued, “Risk

increases, generally, in a linear fashion with radiation dose,” and “Dioxins are carcinogenic and can cause reproductive, developmental, immunological, and endocrine side effects” (Water Board Tr., pp. 312-313). Duffield’s use of specialized terminology and technical reasoning here is an example of her interactional expertise regarding the health risks and impacts of the standards the Water Board sets for Boeing’s NPDES permit. However, she gained this expertise through experience, rather than through a formal degree or certification program. Thus, while both Duffield and the Expert Panel demonstrated interactional expertise, only the Expert Panel members, who all possessed formal degrees and credentials, were designated as experts in this mechanism.

Similarly, Gortner took issue with proposed changes to sampling requirements and contamination limits using the technical language of a community of water sampling experts. She explains that the “old permit was weak” to begin with, in part because it used “non-enforceable benchmarks [...] instead of enforceable numeric limits for several outfalls,” and because it eliminate[d] requirements that “both grab and composite samples be taken” (Water Board Tr., p. 318). She continues, “The [new] permit [further] eliminates all monitoring and compliance requirements for acute toxicity. [...] It used to be that it was acute and chronic, and now it’s just chronic. We’d like to keep both measurements there” (Water Board Tr., p. 319). In arguing that an already weak permit is going to be made weaker and advocating for the use of more stringent and broad-ranging tests, she arguably exhibits a “working vocabulary” of specialized terminology as well an “understanding of how technical reasoning operates” (Kinsella, 2004, p. 85). But despite this display of interactional expertise, she was not designated an expert in this mechanism.

Like the Organizations' presenters, Kiillkkaa—a member of “the public” in this hearing—also exhibited at least some degree of interactional expertise in his brief comment. He asked the Water Board to “consider the future consequences to Bell Creek and the site ecology from those and more grim extraction wells scheduled to come online this year and divergence of treated water for irrigation, dust control, or hilltop aquifer recharge” (Water Board Tr., p. 340). Like Gortner, he used specialized language and technical reasoning to call attention to what he sees as problematic consequences of the proposed permit's terms, but was not designated as an expert in this mechanism. Each of these speakers thus “talked the talk”—that is, they demonstrated a “working vocabulary” and understanding of technical reasoning regarding the issues about which they spoke—but lacked formal credentials, and correspondingly was not given expert designation.

On the other hand, many public commenters failed to demonstrate interactional expertise. These speakers made statements including, “I understand that the previous standard wasn't really quite strong enough. [...] I believe that it is imperative to this community that this Board follow up on making the discharge of water not allowed into our community of pollutants” (Water Board Tr., pp. 339, 341), and “I feel that the water standard needs to be really strict and Boeing should not be discharging anything” (Water Board Tr., pp. 341-342). In contrast to the uncertified experts discussed above, these speakers used non-specialized, non-precise language, and did not frame their points as cause-and-effect arguments typical of technical reasoning. In doing so, they thus failed to demonstrate the “working vocabulary” and “overall understanding of how technical reasoning operates” that scholars such as Kinsella (2004) identify as the bare minimum of technical knowledge citizens need to give them “an adequate foundation for genuine

dialogue with [...] specialists (p. 85). As such, here we see that speakers who lacked interactional expertise were not designated as experts in this mechanism.

What we see from this analysis is that persons lacking interactional expertise were not designated as experts in this public engagement, and that even persons who demonstrated interactional expertise were denied expert status unless they possessed formal training or credentials. Once again, we see an ideology behind <expert> in this mechanism that values formal certifications, in addition to contributory and interactional expertise

IV.a.iii. “Encyclopedic” Knowledge Preferred

Comparing the presentations of the Expert Panel to those of the Organizations’ representatives and “interested persons” reveals that only persons who based their arguments in quantitative, scientific, “encyclopedic” knowledge were designated as experts in this public engagement mechanism. This is consistent with many scholars’ findings that STE and risk assessment tend to value technical and quantitative knowledge over evaluative and qualitative knowledge (see, e.g., C. Miller, 2003, p. 200). Similarly, Crick and Gabriel (2010) have explained that although citizens may lack “encyclopedic knowledge,” they “possess intimate understandings of their lifeworlds (p. 220). Likewise, Bucchi (2008) has argued that “lay knowledge is not an impoverished or quantitatively inferior version of expert knowledge,” but rather it is qualitatively different (p. 60). A review of the Water Board transcript suggests that <expert> in this mechanism does not embody this ideology, as only those persons “encyclopedic” knowledge were granted expert status here.

While the Expert Panel's presentation was focused solely on technical, quantitative information, several presentations by persons lacking the "expert" label offered more subjective, values-based input. For example, "interested persons" Troy and Raskin both took a qualitative rather than quantitative approach to ask the Water Board to make Boeing's NPDES permit requirements more stringent, and to express concern over the size of Boeing's fines for permit violations. Troy stated:

I understand that the previous standard wasn't really quite strong enough. I agree with some of the previous speakers that fines of minimal amounts to such a wealthy company is not a deterrent to polluting. [...] I believe that it is imperative to this community that this Board follow up on making the discharge of water not allowed into our community of pollutants. [...] Do not permit chemicals like perchlorate and more nuclear radioactive waste to continue to run on, to move to the underground aquifer. (Water Board Tr., pp. 339, 341)

Similarly, another public commenter stated:

And the concern I've had, and still have, is public health. And I feel that the standards that we're allowing for Boeing to dump all the contaminants is wrong. [...] I feel that this Board needs to enforce the cleanup, enforce that fine, make it really steep. Don't make it a little dollar or whatever; make it billions of bucks, because that's how much this corporation is making. And they don't care about our health. I have just been very disappointed and frustrated with what's going on. And I think about my friends who have cancer, friends who have died, and people who have been active in the community for a long time of wanting the site to be cleaned up completely. And I feel that the water standard needs to be

really strict and Boeing should not be discharging anything. And if they are, fine them, fine them so hard that it bites their tushes. (Water Board Tr., pp. 341-342)

While these speakers may have lacked specialized knowledge regarding hydrology, the above comments demonstrate that they had knowledge to share regarding community members' perception of and feelings about the Water Board's setting and enforcement of permit requirements, as well as regarding the priorities and preferences of those persons most directly impacted by the runoff from SSFL. However, this qualitative knowledge was based on the commenters' subjective values, perceptions, and common-sense experience. These speakers displayed no quantitative or technical knowledge about the relationship between the size of a fine and the impact it has on the entity required to pay it. Nor did they demonstrate specialized knowledge about or cite sources for the legality of increasing these fines. Instead, they relied on common sense and their own values and senses of fairness and justice, and used non-technical, imprecise language and spoke of qualitative issues like emotions, values, and desires, rather than technical, quantitative ones like measurements and statistics. These speakers, who grounded their arguments in qualitative knowledge, were not granted expert status in this mechanism. Further, as discussed in Chapter 6, they were asked no follow up questions by the Water Board and none of their feedback was incorporated into the final NPDES permit. Accordingly, the ideograph of <expert> at the Water Board hearing appears to represent an ideology that values quantitative, technical knowledge about technical issues over qualitative knowledge about values, fairness, and perceived risks

One might rightfully point out that the precise issues before the Water Board are which technologies the Water Board should require Boeing to use to control contaminant

levels in its discharges, and what limits the Water Board should set for those contaminants. Accordingly, it arguably follows that the only persons worthy of “expert” designation for these purposes are those with specialized knowledge of hydrology, stormwater, and related fields. From this perspective, the fact that the Water Board refers only to the Expert Panel as “experts” at this hearing appears unproblematic, because expertise regarding issues such as local residents’ water use, health impacts of radionuclides, and the trustworthiness of the Water Board is irrelevant.

However, this approach skips over a vitally important consideration in the NPDES permit renewal decision-making mechanism. In Carolyn Miller’s (2003) words, it “technicizes” the problem, changing the central question from “how safe is safe enough”—an evaluative, values-based question focused on “safe enough,” that people lacking specialized hydrology knowledge are quite competent to answer—into a technical one focused on “how safe” that requires specialized knowledge to answer (p. 197). Specifically, empaneling a group of credentialed hydrology-related designated experts to determine how to most efficiently achieve certain concentrations of pollutants—that is, a “how safe” focus—omits from this public engagement mechanism opportunities for public input into what those concentrations should be—the all-important “safe enough” aspect of this issue.

To refocus attention on the “safe enough” question, many researchers have called for early public involvement in the evaluative aspects of STE policy decisions. Stirling suggests that the public have a voice in such decisions early in the policymaking process, to allow for evaluative considerations of questions such as ““which way?, ‘who says?,’ and ‘why?’” instead of only technicized questions like ““how much?, ‘how fast?,’ ‘how

costly?,' or 'who leads?'" (Stirling,2012, p. 4). Stilgoe and Wilsdon (2009) echo Stirling in their call for upstream engagement before decisions have been made to explore questions such as, "Why this technology and not another," "Who needs it," "Who is controlling it," and "Who benefits from it?" (p. 22). Similarly, Simmons (2007) explains that "[i]n order for citizens to contribute significantly they must be brought into the decision making mechanism early enough to contribute to the *design* of the policy" (p. 110). Shen (1975) agrees, stating that, "*how* a technological project is implemented is mainly a job for experts, but the more basic decision of *whether* a project is to be undertaken must rest with citizens and their representatives" (p. 48). Likewise, Jasanoff (2003) sees public engagement as necessary to "test and contest the framing of the issues the experts are then asked to resolve" (p. 397). For these scholars, then, at least one purpose of public engagement mechanisms is to create opportunities for input into subsequent decision-making processes. From this perspective, the Expert Panel's input should be downstream from the preliminary evaluative questions about what levels of risk are acceptable for water discharged from SSFL, and to whom; and how much time, money, and effort achieving those risk levels is worth. However, in the case of the Water Board hearing and the larger administrative system of which it is a part, there is currently no space for public input into such preliminary evaluations. Instead, each of these considerations about what risk levels are acceptable; how much time, money, and effort should be expended to achieve them; and who should bear the burdens of these risks and costs, are relegated to the designated experts, while "the public's" only opportunity for input comes in the form of public comment periods that take place downstream from these important decisions.

This is particularly unfortunate because research has shown that persons with no specialized knowledge about wetlands, hydrology, plants, stormwater, or civil engineering are capable of providing relevant and useful answers to these evaluative questions. Indeed, Dave Guston (2014) has demonstrated the viability of upstream engagement in his review of the National Citizens' Technology Forum on Nanotechnology and Human Enhancement, in which he found that lay citizens could deliberate in thoughtful ways on emerging technologies prior to possessing significant factual knowledge or establishing opinions about it (pp. 54, 55). However, the Water Board hearing decision-making mechanism does not seem especially concerned with non-specialists' positions on these issues, and does not involve them in upstream decisions about them (and only involves them marginally in the downstream ones, via the brief public comment period). Indeed, the Expert Panel is composed of persons who specialize in figuring out how to achieve certain contaminant levels, but none who specialize in determining what those contaminant levels should be. As such, this mechanism misses opportunities for upstream engagement of non-specialists, as well as for considering important questions surrounding the reissuance of Boeing's NPDES permit—questions whose answers have direct impacts on the very people being denied substantive input in this mechanism. As such, in this regard we once again see <expert> functioning as an ideograph that conveys a privileging of technical specialists over persons with evaluative knowledge.

IV.b. Accounting for Information Flow at the Water Board Hearing: Experts and Public as Distinct Entities in Transmission Model

Only persons with certification, contributory and interactional expertise, and encyclopedic knowledge qualified as experts in this mechanism. Further, the Organizational presenters were given only three days' notice to prepare their presentation, and the "interested persons" were limited to two minutes each for their remarks. These two facts combined mean that only certified experts in possession of contributory and interactional expertise and encyclopedic knowledge had the opportunity to participate in this public engagement mechanism in a manner that was not rushed and from a position of authority. Perhaps not surprisingly then, as discussed further in Chapter 6, the only feedback that was incorporated into the final NPDES permit was that of the Expert Panel. These facts suggest that "expert" and non-expert role designations mediated the flow of information in this mechanism by privileging and promoting the experts' information while impeding and minimizing the flow of non-experts' information. One important consideration for why this might have happened is the Water Board hearing's strict adherence to a division between experts and non-experts. Researchers have increasingly called for "[d]econstructing the boundary between experts and laypeople" as "one necessary step toward improving the quality of public decisions on issues with technical dimensions" (Kinsella, 2002, p. 3). Experts often attempt to demarcate and preserve these boundaries in an effort to "maintain their cognitive and political autonomy" (Kinsella, 2002, p. 3, citing Taylor, 1996). However, such "boundary work" sustains a fiction that experts are the only ones who possess specialized knowledge. As Kinsella (2002) and others point out, "members of the public are experts

in their own practical and moral domains,” and can provide designated experts with local and evaluative contexts that “give meaning to expert discourse” (p. 3). Unfortunately, as demonstrated below, no such blurring of expert/public boundaries took place at the Water Board Hearing. Instead, the distinction between them was maintained in a transmission model of interaction.

The term “public” was used 47 times at the Water Board hearing (frequently in regards to “public health” (e.g., Water Board Tr., pp. 286, 327, 340, 368)). When members of the “Expert Panel” used the term, they did so in a way that reflects a transmission model view. For example, Expert Panel member Stenstrom explained, “So this is the scope of our work. We were created to be an independent Expert Panel to advise the Board, to advise you folks, as well as to advise Boeing. And it’s also become important to *advise the public*. [...] And we’ve taken on the job of *informing the public* with risk assignment [sic] communication” (Water Board Tr., p. 288, emphasis added). Here, Stenstrom makes clear that he sees his role as expert as one-directionally educating the public, rather than eliciting input from them in a two-way conversation. Other aspects of the Water Board hearing support this view. Among proposed changes to Boeing’s NPDES permit was the addition of the following language: “The discharger [Boeing] shall also support the Surface Water Expert Panel and organize periodic public interaction events that encourage public communication involvement” (Water Board Tr., p. 378). The wording of this sentence does not envision public *participation* or public *input*, but rather “interaction events” and “communication involvement” (Water Board Tr., p. 378). This vague language provides no participatory role for “the public” other than as passive recipient of information and communications from Boeing and/or the

Expert Panel. Both of these examples reflect not only a transmission view of expert/public communications, but also a view of experts and non-experts as clearly distinct groups.

When persons designated as non-experts in this proceeding spoke of “the public,” they likewise treated it as a singular entity distinct from the designated experts. For example, in raising concerns over a perceived lack of transparency in the permit revision mechanism, Gortner told the Water Board, “It took the Board 14 months to write the new permit, and the public was only given 30 days, which also was over the holidays, and I don’t know about you, but my brain, shuts down over the holidays, to provide public feedback” (Water Board Tr., p. 317). She then explained that there was no list of changes comparing the old and proposed permit terms, and stated, “I didn’t feel that [was] very helpful for the public” (Water Board Tr., p. 318). Similarly, Tucker, who spoke about the Board Chair’s a potential conflict of interest by the Water Board Chair, explained that “[h]aving the Board Chair employed by a major polluter that the Board regulates taints public perception of the Board. [...] And, indeed, the staff’s conduct regarding the Boeing permit reinforces public concerns in this regard” (Water Board Tr., pp. 328-329). She continued:

The public had a right to know of this relationship. That in itself could affect the way the Board treated Boeing and the public. Yet the Board’s Chief Executive Officer asserted there was no obligation to disclose the conflict and that, if the public was concerned, they could ask Mr. Stringer [the Chair] and his firm about their Boeing work. This badly misunderstands disclosure principles. The person with the conflict is supposed to publicly disclose the conflict; it is not up to the

public to discover the secret conflict and ask the official to reveal what he has hidden. (Water Board Tr., p. 329)

Tucker concluded her presentation by stating that “[i]t will take some very strong actions by this Board today to restore the public’s confidence” (Water Board Tr., p. 332). In both Gortner and Tucker’s presentations, they positioned “the public” as separate and distinct from their Water Board audience. In doing so, they preserved the boundaries between the “experts” and “the public,” reinforcing the notion that this mechanism operates on an ideology that “experts” and “the public” are entities that should play distinctly different roles.

IV.c. Conclusions Regarding the Water Board Hearing

As demonstrated above, numerous speakers at the Water Board hearing possessed both experiential contributory and interactional expertise, yet only those with formal credentials and scientific knowledge were treated as experts. Moreover, the only type of knowledge that warranted expert recognition in this mechanism was that of a scientific, technical nature. This suggests that the ideograph of <expert> as enacted at the Water Board hearing reflects a rather narrow conception of the term. As Collins and Evans explain, acknowledging expertise based on formal certification rather than on relevant knowledge acquired through experience potentially excludes valuable sources of input from this policymaking mechanism (Collins & Evans, 2007, p. 60). This is in part because experts, especially in the STE realm, typically hold a “position of privilege” in which their arguments enjoy greater deference than those of non-experts (Kinsella, 2002, p. 5). Although the Organizations were granted party status at this hearing, per their request, being called a “party” certainly does not carry the same weight as being called an

expert—the Water Board has no reason to give deference to a “party’s” input the way they do for an “expert’s.” Further, “interested persons” like Christian Kiillkaa were given less time in which to offer their input, and very likely even less deference, than those granted party status.

While there are clearly aspects of this controversy that require specialized technical knowledge of the sort the Expert Panel possesses, there are other important considerations involved in setting the terms of Boeing’s revised NPDES permit. Some of these are also technical in nature, such as the health impacts of the contaminants Boeing is discharging from SSFL. Speakers such as Denise Duffield offered expertise on this subject, but were not recognized as experts at this hearing. Other considerations are evaluative, and local community members who are most impacted by the outcome of this controversy, and who have been involved with these issues for years, possess the qualitative expertise required to take relevant, knowledgeable positions on them. However, the nature of this proceeding made an explicit distinction between those bestowed with expert status, and everyone else. Because of this, regardless of the expertise that non-Expert Panel members possess, they and all other participants and onlookers to this mechanism are sent an express message from the Water Board that their input is less valued and less important than that of the designated experts. The ramifications of this are potentially far reaching. Indeed, these role designations may be the reason that the Water Board disregarded or gave less consideration to the input of those deemed non-experts, as reflected in the Water Board’s failure to incorporate any non-experts’ feedback into the final NPDES permit. They may also have led those deemed non-experts to participate less. Moreover, the valuing of quantitative knowledge

and credentialed experts over local, qualitative knowledge and uncredentialed experts leaves no room for important evaluative questions about “what,” “whether,” and “who,” but only for questions about “how,” “how fast,” and “how much” (see Stirling, 2012, p. 4; Stilgoe & Wilsdon, 2009, p. 22). This may lead us down a path that those most impacted by this controversy—local residents and others lacking technical, certified expertise—dislike but are powerless to stop. While this awareness in and of itself does not change the current landscape of STE public engagement mechanisms, it suggests the importance of considering role designations as Mediational Means that have significant impacts on how information flows.

V. The Work Group Meeting

V.a. <Expert> and <Public> as Ideographs at the Work Group Meeting

As discussed in the following sections, the ideographs of <expert> and <public> at the Work Group meeting reflect an ideology that views expertise as tied to experience rather than credentials, and that sees distinctions between designated experts and “the public” as blurred. These factors make the Mediational Means of role designations at the Work Group meeting one that is likely to enhance, rather than impede, the flow of information in this mechanism. At the same time, this mechanism’s valuing of “encyclopedic” over evaluative information in regards to expertise echo the Water Board hearing’s more narrow and traditional <expert> ideograph.

Unlike at the Water Board hearing, none of the presenters at the Work Group meeting were given explicit “expert” role designations, and none of the presenters used the word “expert” in their presentations. However, it seems fair to infer that the presenters at the Work Group meeting were treated as the designated experts in this

participatory mechanism insofar as they were the persons given formal speaking platforms, and they were the persons that the audience asked questions of during the question and answer period. In other words, the audience looked to them for information and answers, in the same way that the Water Board looked to the Expert Panel. These are some of the “congruities” that Hartelius has identified as qualities that distinguish one as an expert (Hartelius, 2010, pp. 164-66). Further, unlike at the Water Board hearing, these presenters were not given a designated role of something distinctly non-expert. These factors suggest that the presenters at the Work Group meeting were the experts in that participatory mechanism. The question that follows, of course, is why these people were treated as experts at the Work Group meeting but not at the Water Board hearing.

V.a.i. Uncertified Experts Allowed

The same speakers given expressly non-expert roles at the Water Board hearing were the designated experts at the Work Group meeting. Each of these speakers lacked an advanced STE-related degree but possessed extensive experiential knowledge about the subject on which he or she presented. As explained above, Daniel Hirsch is a lecturer on nuclear policy, is the president of Committee to Bridge the Gap, and has spent over 40 years researching and advocating for the cleanup of SSFL. Similarly, Duffield has over 15 years of experience with SSFL and nuclear policy issues (Physicians for Social Responsibility-Los Angeles website), and Gortner has five (Water Board Tr., p. 315).

Further, Gortner not only has experience as part of the Work Group, but as a local resident as well, and her use of first and third in her presentation reflects this duality. In telling her audience about the upcoming Water Board hearing, Gortner stated:

So this new permit that is going to be voted on next week will be in effect until 2020, so it is important that the community is aware of what is happening. Why do we care about the water? [...] First, we want the community to be aware that we have some concerns about the transparency and the accessibility that the Water Board has given to the public. I will talk about that in a minute. And the old permit was weak to begin with and actually expired April 10th of last year. And this new permit, I will explain to you in detail, is even less protective of public health. (Gortner Tr., p. 1)

Here, Gortner positioned herself as an expert in her own right when she told the audience, “I will explain to you in detail [...]” and “one of the things I wanted to explain [...]” (Gortner Tr., pp. 1, 2, emphasis added). Through these statements, she conveyed to audience members that she possessed expertise (or, in Hartelius’s (2010) terms, “*techne*” (p. 164) that she wanted to share with those who did not (Gortner Tr., p. 2). In doing so, she demonstrated that she “possess[ed] expert pedagogy” (Hartelius, 2010, p. 165). She also positioned herself as part of the community of SSFL experts (or “*identif[i]ed herself*” within [a] larger network” of experts (Hartelius, 2010, p. 164)) with statements such as, “*we want the community* to be aware that we have concerns” (Gortner Tr., p. 1, emphasis added). In this statement, she aligned herself as part of the expert community and distinguished that group from the local resident and audience community. She made a similar move when she stated, “it is important that the community is aware of what is happening [...],” once again separating herself from “the community” (Gortner Tr., p. 1, emphasis added). Gortner closed her presentation by stating, “So we are letting you know that we would request people to attend the [Water Board] hearing next week and I

encourage you to speak up” (Gortner Tr., p. 4). In doing so, she not only positioned herself as part of the expert community, but she “[took] a stance on whether the public should defer or participate in discussions about a given issue, yet another expert trait (Hartelius, 2010, p. 166). At the same time, Gortner also positioned herself as part of “the public” through statements such as: “So if any public person wanted to really understand what the new permit was compared to the old one, they had to spend several days, hours, I don’t know, it was a long time going through it. [...] So I called the Water Board saying, ‘Look, you really want me to read this 180 page document, line by line and compare it to the other one?’” (Gortner Tr., p. 2). Here, Gortner positioned herself as a member of the public, rather than as an expert. Notably, at the Work Group meeting, Gortner did not introduce herself as a local resident and mother, but instead only stated that she had “been doing this for five years” (Gortner Tr., p. 2). Perhaps this is because she was trying to establish herself as an expert on the scientific and technical aspects of this issue, rather than as a member of “the public.” Or, perhaps it is because she had been involved with the Work Group for five years and assumed the audience already knew this about her. In any event, while Gortner at times seemed to align herself with “the public,” she made multiple moves in her presentation that expressly positioned her as a designated expert.

Hirsch and Duffield also cast themselves as members of a community of experts in their presentations, despite lacking formal STE credentials, by embodying Hartelius’s (2010) “congruities” of “identifying themselves within larger networks” and demonstrating that they “possessed [...] specialized knowledge” (pp. 164-66). For example, Hirsch explained that “the [Department of Energy] and NASA cleanups under

the Cleanup Agreement, what *we* call the AOC [...]” (Hirsch Tr., p. 2, emphasis added). Like Gortner, here Hirsch conveyed that he and other members of an expert community possessed specialized knowledge and insider language that he was sharing with an audience who lacked it. Similarly, Duffield introduced herself by saying, “I am with Physicians for Social Responsibility-Los Angeles and *our* organization has long been concerned with attempts to send waste from Santa Susana that is radioactively contaminated to sites that are not licensed to receive it” (Duffield Tr., p. 1, emphasis added). She continued, “[i]n 2001, *we* discovered that waste that was contaminated with radionuclides from the burn put at SSFL was going to be sent to Buttonwillow. Buttonwillow is a primarily Latino farmworker community in the Central Valley that is not licensed to receive radioactive waste” (Duffield Tr., p. 1, emphasis added). She further stated that “*we* were able to prevent” waste from SSFL from being sent to Kettlemen City, another community that is not licensed to accept radioactive waste” (Duffield Tr., p. 1, emphasis added). She closed by telling the audience, “If you would like to read the ruling [regarding a lawsuit against DTSC] *you* can go to *our* website and you can read it there [...]” (Duffield Tr., p. 3, emphasis added). Like Gortner, here Hirsch and Duffield used the first person to position themselves as designated experts with specialized knowledge to share with an audience that lacked it.

In addition to Gortner, Duffield, and Hirsch, two high school students spoke on behalf of Teens Against Toxins, a group whose goal is to increase awareness about SSFL among young adults. These speakers were ordained with expert status—at least insofar as they were responsible for sharing important information with an audience that lacked it, and were given a platform to speak from a position of authority—yet lacked any formal

certification or credentials in any STE-related field. Instead, their expertise came solely from their experience learning about SSFL.

Overall, what we see in the Work Group meeting is that, in stark contrast to the Water Board hearing, here the persons treated as experts were people who lacked formal certification but possessed extensive experiential knowledge regarding the issues on which they spoke. As a result, unlike at the Water Board hearing, here <expert> represents an ideology that expertise can be based on experiential knowledge rather than credentials. As such, in this mechanism, role designations act as Mediation Means that provide a greater potential to maximize the flow of information because that flow is not impeded by technicalities like formal credentials, and certified experts' arguments are not privileged over those from uncertified experts.

V.a.ii. Contributory and Interactional Expertise Necessary and Sufficient
for Expert Status

As at the Water Board hearing, the persons treated as experts at the Work Group meeting also demonstrated both contributory and interactional expertise. However, instead of demonstrating possession of only the specialized, technical language of STE experts, like the “Expert Panel” at the Water Board hearing, the presenters at the Work Group meeting demonstrated both the possession of specialized, technical language and the ability to translate that language into terms that were accessible to persons without specialized training. In other words, they demonstrate interactional expertise in both expert and non-expert discourse communities on these issues.

For example, at the Water Board hearing Gortner discussed “violations” without any explanation of what this term means (Water Board Tr., p. 317). At the Work Group,

in contrast, Gortner explained, “What is a violation? That means it has exceeded the amount that the permit has said is safe for the public” (Gortner Tr., p. 2). Similarly, at the Water Board hearing Gortner told the Board that “[t]he [proposed] permit eliminates all monitoring and compliance requirements for acute toxicity [...] It used to be that it was acute and chronic, and now it’s just chronic. We’d like to keep both measurements there” (Water Board Tr., p. 319). At the Work Group meeting, on the other hand, Gortner explained, “The permit also eliminates monitoring and compliance requirements for acute toxicity. Acute toxicity means that it is something that kills you instantly versus chronic. So, that is something we want to keep in and the requirements for monitoring for radioactivity have been changed in a fashion that weakens them” (Gortner Tr., p. 2). This difference is likely due at least in part to the fact that Gortner knew her Water Board audience was already familiar with the specialized terminology she was using, while her audience of community members at the Work Group meeting might not have been. As explained further in Chapter 6, however, this difference was not only a display of interactional expertise. It was also a rhetorical choice by Gortner to position herself as an expert speaking from a place of authority at the Work Group meeting, and as someone with less authority and more deference at the Water Board hearing. This issue is explored further in Chapter Six. But regardless of Gortner’s motivations for these differences, her presentation at the Work Group meeting reflects a conception of <expert> that requires neither formal credentials nor the exclusive use of specialized language. Instead, the ideograph of <expert> at the Work Group meeting reveals an ideology that values the ability to make specialized knowledge accessible to persons unversed in specialized

terminology. In these ways, role designations act as Mediation Means that mediate information flow in real and significant ways.

V.a.iii. “Encyclopedic” Knowledge Preferred

Just like at the Water Board hearing, the experts at the Work Group meeting demonstrated “encyclopedic,” scientific knowledge rather than qualitative, evaluative knowledge. Rather than rely on personal narratives, descriptive information, or judgments based on values or emotions, these speakers grounded their presentations in technical, quantitative knowledge.

At both the Water Board hearing and Work Group meeting, Gortner told her audience that the new permit would increase mercury limits “from 0.2 to 0.7,” boron “from 148 to 537,” and nitrate “from almost 2,000 to around 5,000” (Water Board Tr., p. 319; Gortner Tr., p. 3). Likewise, although the subject matter of Duffield’s presentations at the Water Board hearing and Work Group meeting differed, she relied on quantitative data in both. At the Water Board hearing, she set out the half-lives of several radionuclides and the numerical incidence of cancer for residents living within two miles of the site as compared to residents living within five miles of the site (Water Board Tr., pp. 312, 314). Duffield took a similar approach at the Work Group meeting, where she told her audience the number of tons of radioactively contaminated waste Boeing disposed of at facilities unlicensed to accept it (Duffield Tr., p. 1). In addition, Hirsch’s presentations at both the Water Board hearing and the Work Group meeting were heavy with quantitative data as support for his claims. He told the Water Board the precise number of Boeing’s exceedances at various outfalls (testing sites) and spoke of the proposed permit limits in terms of how many times higher they were than the

Environmental Protection Agency standards he argued should apply to the site (Water Board hearing Tr., p. 334). He shared these same numbers with his audience at the Work Group meeting, as well as quantitative knowledge about the acreage of SSFL that houses endangered species (Hirsch Tr., pp. 3-4). Lastly, the Teens Against Toxins presentation was rich with numeric data about the quantities of contaminants present at SSF and Boeing's previous fines for permit violations. Each of these speakers heavily utilized quantitative knowledge in both their Work Group meeting and Water Board hearing presentations, replicating the pattern of experts' reliance on quantitative knowledge that we saw at the Water Board hearing.

Hirsch, Duffield, and Gortner's reliance on quantitative knowledge at the Work Group meeting reveals a finding similar to that of the Expert Panel's quantitative presentations at the Water Board hearing. In both instances, expertise appears to correlate with the use of quantitative knowledge. That is not to say that experts may never express qualitative knowledge. Indeed, Hirsch, Duffield and Gortner include some evaluative claims in their presentations at both the Water Board hearing and the Work Group meeting. Rather, it is simply to say that persons who exhibit no quantitative knowledge in these proceedings were never granted expert status. Like the Water Board hearing, here we see the ideograph of <expert> reflecting an ideology that values quantitative knowledge. And, once again, we can see how "expert" role designations and their emphasis on quantitative knowledge can act as Mediation Means to promote the flow of quantitative information and perhaps impede the flow of qualitative information.

V.b. Accounting for Information Flow at the Work Group Meeting: Blurred Lines
Between Experts and Public in Interactional Model

At the Work Group meeting, persons who lacked certification and instead demonstrated only contributory and interactional expertise, along with the possession of “encyclopedic” knowledge, were treated as experts and spoke from positions of power. Moreover, members of the “public” were not limited in the amount of time they had to speak. These factors suggest that role designations in this mechanism promoted the flow of information among participants more so than those at the Water Board. A further reason for why this might be so is the blurring of boundaries between the designated experts and “the public” at the Work Group meeting.

In contrast to the Water Board hearing, the line between the designated experts and members of “the public” was less distinct at the Work Group meeting. This is evidenced in several ways. First, there were not explicit role designations for Work Group meeting participants. Second, the presenters spoke in ways that identified themselves as members of both a community of experts and “the public.” For example, as explained above, Gortner positioned herself as part of the community of SSFL experts with statements such as, “*we want the community* to be aware that we have concerns” (Gortner Tr., p. 1, emphasis added). In this statement, she aligned herself as part of the expert community and distinguished that group from the local resident and audience community. She made a similar move when she stated, “it is important that the community is aware of what is happening [...],” once again separating herself from “the community” (Gortner Tr., p. 1, emphasis added). At the same time, Gortner also positioned herself as part of “the public” through statements such as: “So if any public

person wanted to really understand what the new permit was compared to the old one, they had to spend several days, hours, I don't know, it was a long time going through it [...] So I called the Water Board saying, "Look, you really want me to read this 180 page document, line by line and compare it to the other one?" (Gortner Tr., p. 2). Here, Gortner positioned herself as a member of "the public," rather than as an expert.

The presenters at the Work Group meeting also took a less one-directional approach to their audience. Instead of only informing their audience, they expressly sought audience participation. For example, Gortner closed her presentation by stating, "So we are letting you know that we would request people to attend the [Water Board] hearing next week and I encourage you to speak up" (Gortner Tr., p. 4). In "deconstructing" the boundary between "expert" and "public," the Work Group meeting's role designations acted as Mediation Means that promoted information flow by encouraging the blending of traditionally "expert" and "public" input to contextualize all participants' contributions (Kinsella, 2002, p. 3). Doing so reveals an ideology behind the ideographs of <expert> and <public> in this mechanism that values a wider range of contributions than the Water Board hearing (Kinsella, 2002, p. 3).

IV.d.v. Conclusions Regarding the Work Group Meeting

At the Work Group meeting, no one was expressly called an expert, but by applying Hartelius's "congruities," we can infer that the presenters were the designated experts at this proceeding. These designated experts spoke from positions of authority, as evidenced by the fact that they were given a platform from which to share information with their audience, and the audience looked to them to answer their questions. Further, at the Work Group meeting no one else was explicitly designated an expert (in contrast to

the Water Board hearing’s “Expert Panel”) and these presenters were not explicitly designated something non-expert (in contrast to being granted “party status” and called “the Organizations” at the Water Board hearing).

These designated experts were uncertified, thus we can conclude that unlike the Water Board hearing, the ideograph of <expert> at the Work Group meeting represents an ideology that accepts as experts persons who have acquired their expertise through experience rather than formal training or credentials. However, just like at the Water Board hearing, the <expert> ideograph at the Work Group meeting reflects an ideology that values both interactional and contributory expertise, as well as the possession of quantitative, scientific knowledge rather than values-based or qualitative knowledge.

VI. Conclusion

As demonstrated above, <expert> and <public> serve as an ideograph for distinct ideas about power and knowledge at the Water Board hearing and Work Group meeting, respectively. At the Water Board hearing, <expert> represented an ideology that credentials and formal training matter. We saw that without such certification, persons who had experiential knowledge and were conversant in the technical language about the NPDES permit were not granted expert status. At the Work Group meeting, in contrast, <expert> represents an ideology that experience-based knowledge is what matters. There, persons with extensive knowledge about SSFL, acquired through their own experience rather than through a formal degree or training program, were the designated experts.

This difference matters, and sheds light on how role designations function as Mediation Means in STE public engagement mechanisms. Recognizing uncertified experts opens the door for persons with decades of accumulated knowledge, such as

Hirsch, to speak from a position of authority on an issue they are intimately familiar with, allowing information to flow in ways that it cannot in mechanisms that restrict expert designations to persons who possess credentials. In this way, it answers scholars' calls to reconceptualize where expertise resides, and how and by whom knowledge is constructed (Flower & Heath, 2000, p. 53). It further opens the door for young people like those involved with Teens Against Toxins to share their knowledge. Lastly, because persons who hold advanced degrees tend to come from higher socioeconomic backgrounds (Cahalan & Perna, 2015, p. 39), public engagement mechanisms that recognize uncertified experts provide opportunities for persons of lower socioeconomic status to speak from positions of authority and share their experiential knowledge that mechanisms that recognize only certified experts do not. This reconceiving of the Mediation Means of role designations to maximize of information flow is one way to address the call by many scholars for greater inclusion of marginalized voices in public policymaking mechanisms (e.g., Benhabib, 1994, pp. 33-34; Long, 2008, p. 205). Further, as the designated experts at the Work Group demonstrate, one can possess relevant and technical, "encyclopedic" knowledge on a subject, and be highly conversant about it—that is, one can possess contributory and interactional expertise on a subject—without possessing any formal certification about it. This is an important finding in the face of those who view credentials as a way to assess whether someone is qualified to contribute to a decision about a given controversy. It is also a variation of "flipping the script" of traditional expert/non-expert interactions, which usually entail persons of more power imparting knowledge on persons with less (Flower & Heath, 2000, p. 45). Instead of creating a collaboration between experts and non-experts—i.e. those with and those

without power—this broadened view of <expert> to include those who are uncertified goes a step further to give all persons with relevant knowledge in positions of power, regardless of if they possess formal credentials. This begs the question, of course, of what counts as “relevant” knowledge, and from the presentations at both the Water Board hearing and the Work Group meeting, it appears that quantitative knowledge is still the bar.

Conceptions of knowledge notwithstanding, however, the findings in this chapter suggest that whether one is designated as an expert or non-expert in a given public engagement mechanism mediates how information in that mechanism. That is, because those persons designated as experts speak from positions of authority, and, as we will see in Chapter 6, their opinions are sometimes taken into account when those of non-experts are not, role designations likely impact whose voices are heard in a given public engagement mechanism. Thus, what we see in this chapter is that viewing role designations as Mediation Means allows us to consider the impacts of those designations in a new and important way. Doing so allows us to explore and better understand how such “expert” and “public” role designations, and the ideologies behind them, mediate the flow of information in a given public engagement mechanism. From there, we can begin to craft public engagement mechanisms that maximize on the contributory potential of all participants in that mechanism.

CHAPTER 4
EXAMINING STRUCTURAL FEATURES OF THE SSFL WATER BOARD
HEARING
AND WORK GROUP MEETING AS MEDIATIONAL MEANS

I. The Problem Driving This Chapter: Structural Features and Information Flow

Not all public engagement mechanisms are created equal; instead, how such mechanisms are structured (such as the time and day they occur, who is invited to attend, and how participation is governed) matters. That is, different structural features can promote or impede the flow of both particular types of information as well as the information possessed by particular people. In fact, research has found that several structural features of public engagement mechanisms impact their effectiveness in cultivating fair and efficient information flow (Rowe & Frewer, 2005, pp. 262, 264). This is because the structural features of a public engagement mechanism impact who can be present there (e.g., via when it is scheduled), who can participate (e.g., via who is granted an opportunity to speak), and who can participate meaningfully (e.g., via how much time various participants are given to prepare and present). Therefore, assessing how an STE public engagement mechanism is structured allows one to better understand why particular information flows more or less in that mechanism.

In this chapter, I use Rowe and Frewer's work as a guide to look for the presence or absence of several structural features of the February 12, 2015 Water Board hearing and February 4, 2015 Work Group meeting, in order to better understand whether, and if so, how the presence or absences of those features mediates the flow of information in each mechanism. To begin this chapter, I explain my methodology; next, I apply Rowe

and Frewer’s “effectiveness variables”—the structural features they have identified as impacting effectiveness—to the Water Board hearing and Work Group meeting. I conclude with a consideration of how these variables work together to mediate information flow in each mechanism.

II. Methodology

To conduct my analysis, I use Rowe and Frewer’s research on structural mechanisms that impact public engagement mechanism effectiveness. Specifically, I consider the extent to which the Water Board hearing and Work Group meeting maximized the variables that Rowe and Frewer have theorized impact a public engagement mechanism’s effectiveness—or, in activity-systems theory terms, variables that mediate the flow of information in each mechanism.

Rowe and Frewer (2005) define effectiveness as both the “fairness” of a public engagement mechanism and the “competence/efficiency” of that mechanism in achieving its intended purpose, whether that purpose is educating the public, achieving consensus, eliciting views from the public, or something else (p. 262). They describe “fairness” as related to public acceptability, equity, democracy, representativeness, transparency, and influence, and explain that fairness “concerns the perceptions of those involved in the engagement exercise and/or the wider public, and whether they believe that the exercise has been honestly conducted with serious intent to collect the views of an appropriate sample of the affected population and to act on those views” (Rowe & Frewer, 2005, p. 262). Rowe and Frewer (2005) describe the second component of effectiveness—“competence/efficiency”—as “maximizing the relevant information (knowledge and/or opinions) from the maximum number of relevant sources and transferring this efficiently

to the appropriate receivers” (p. 263). They explain that efficiency may be compromised when a speaker’s information is incomplete, irrelevant, or incorrect, and that “structural features of [a public engagement mechanism] will limit or enhance the chances of effectiveness” (Rowe & Frewer, 2005, p. 263). In this chapter, I look at structural features of the Water Board hearing and the Work Group meeting that concern both the efficiency and fairness components of effectiveness.

III. Effectiveness Variables at Water Board Hearing and Work Group Meeting

Rowe and Frewer identify five key variables that impact the efficiency of a public engagement mechanism: (1) the number of participants; (2) the relevant information elicited from those participants; (3) the relevant information provided by sponsors; (4) the transfer of information to, and processing by, recipients; and (5) the aggregation of all relevant information from participants. Rowe and Frewer theorize that the more each of these variables is maximized, the more effective a public engagement mechanism will be. In addition to these variables, here I also consider a sixth: (6) the degree to which ostensibly independent designated experts—the sponsor’s advisors here—are perceived as such. This variable speaks to the “fairness” aspect of effectiveness in Rowe and Frewer’s framework. Below, I explain my analysis of the transcripts of the Water Board hearing and Work Group meeting in light of each variable. To conduct this analysis, I reviewed one transcript at a time for the presence of a variable, and identified each instance where it appeared. Once I completed my review of the Water Board hearing transcript for this variable, I moved to the next variable, and continued until I had looked for each Rowe and Frewer variable. I then conducted this same analysis for the Work Group meeting transcripts. After completing this review, I noticed that multiple

commenters at the Water Board hearing raised the issue of the perceived independence (or lack thereof) of the Expert Panel, so I added this as a sixth variable to consider, and re-reviewed each transcript for it. In the discussion that follows, I ask whether and if so, how, each of these six variables mediated the flow of information in each mechanism.

III.a. Number of Participants

Maximizing the number of participants in a public engagement mechanism is important because doing so “maximizes the amount of potentially relevant information that might be distributed or attained” (Rowe & Frewer, 2005, p. 267). In considering this variable, Rowe and Frewer (2005) differentiate among the following: (1) the population of individuals affected or interested in the controversy at issue in a given public engagement mechanism; (2) the intended sample size of the mechanism; and (3) the proportion of that sample that is actually engaged (pp. 266-267). Participants are actively engaged if they process or respond to information (depending on the particular mechanism used (e.g. a presentation versus a survey)). Rowe and Frewer (2005) note that mechanisms in which the sponsor or organizer has some degree of control over participant selection—such as by targeting communications at, or attempting to elicit information from, a certain sample of the population—may be more likely to maximize the number of participants than mechanisms in which public participants self-select to be involved (p. 268). Instead of counting the number of participants (information not available to me), below I examine two other structural variables affecting participation: (1) Access: Timing of the Event and (2) Notice: News of the Event.

III.a.i. Access: Timing of the Event

While there are no records regarding the number of people in attendance at the Water Board hearing or Work Group meeting, the timing of each mechanism likely impacted attendance and participation by “the public.” The Water Board hearing was held on a Thursday at 9am (Water Board Tr., p. 1). By the time the Water Board got to the issue of Boeing’s NPDES permit renewal (there were 18 other items on the agenda), it was 3:10pm (Water Board Tr., p. 245). This is an obvious structural impediment to public participation: for anyone who works during the week, attending the Water Board hearing would have required missing work. Further, at the start of this mechanism it was explicitly stated that “the agenda items are numbered for identification purposes and may not necessarily be considered in that order” (Water Board Tr., p. 6). This made it impossible for someone to take half a day off of work to attend the hearing, because they could not know in advance when during the day this agenda item would be considered. In contrast, the Work Group meeting was held on a Wednesday at 6:30pm. While this may not prove a convenient time for everyone who would like to attend, it seems far better than 9am, as it is after the end of the workday for most people.

In addition to actually being more convenient, setting the Work Group meeting at 6:30pm has the added and important benefit of giving the impression that this meeting was scheduled with “the public’s” schedules and needs in mind, and with an interest in having “the public” attend. Setting the Water Board hearing at 9am on a workday, on the other hand, may lead members of “the public” to feel as though their presence does not matter to that mechanism’s sponsors (the Water Board). Along similar lines, the Water Board hearing’s legally required 30-day public comment period for written comments

took place in December, over Christmas, Hanukah, and New Years. Both Organizational speaker Tucker and member of “the public” Gortner expressed concern over this (Water Board Tr., pp. 318, 327). In the same way that holding a hearing at 9am on a weekday decreases the chances that members of the public can attend and increases the chances that they will perceive the mechanism’s sponsors as unconcerned with—or perhaps even discouraging of—their participation, having a public comment period over the holiday season likewise lowers the odds of participation and raises feelings of unimportance by members of the “public.”

In these ways, the time at which each of these mechanisms occurred mediated information flow by restricting whose information flowed in them. If members of “the public” could not submit written comments or attend the Water Board hearing due to scheduling conflicts, their information was de facto excluded from circulation. Further, if these timing issues led members of “the public” to feel like their input was not valued, they might have been less likely to go to the trouble of participating. Conversely, by setting the Work Group meeting at a time when members of “the public” were more likely to be able to attend, this mechanism set the stage to promote the circulation of “the public’s” information.

III.a.ii. Notice: News of the Event

Another important component of maximizing the number of participants in a public engagement mechanism is notifying potential participants of the event and of the opportunity for participation. The Water Board hearing fell short in this respect. One way that members of “the public” are notified of Water Board hearings is to place themselves on a listserv and receive emails informing them of upcoming hearings. As pointed out in

a written comment from the Rocketdyne Cleanup Coalition, the subject line of this hearing's notification email read, "Tentative Waste Discharge Requirements for Boeing Santa Susana Field Lab" (Water Board Tr., p. 269). As such, it gave no indication that members of "the public" could comment on it. In response to this concern, Water Board staff said at the hearing, "Staff appreciates the constructive criticism and will be implementing a protocol that requires that the description included in the email specifically states that the attached documents are for public comment and provide the deadline for the comments as well [...] So we will clarify that in future emails" (Water Board Tr., p. 269). If potential participants do not know about the opportunity to participate, they cannot participate, and their information is thereby prevented from flowing in that mechanism. Although here the proposed permit was circulated to potential participants, it was not done in a way that made clear that "the public" could participate.

Further, for persons not on this listserv, their options for viewing the proposed permit in a manner that allowed for meaningful participation in this mechanism were limited. The hearing was noticed twice in a local newspaper prior to the close of the public comment period, and the agenda for the hearing was posted on the Water Board's website at least ten days before the hearing (which is all that is legally required). However, the tentative permit itself was not included in these announcements, and it was not posted on the Water Board's website until after the written comment period closed (Water Board Tr., pp. 345-346). This means that persons who did not receive the Water Board's email had no way to review the terms of the proposed permit prior to the close of the written comment period, making attending the Water Board hearing their only option

to participate. But because the hearing took place on a weekday, this may have proved an insurmountable impediment to participation for many would-be participants.

In these ways, the notification mechanisms here contributed to the Water Board hearing's failure to maximize the number of participants—in particular, the number of “public” participants. By denying members of the “public” access to this STE public engagement mechanism itself, or to the materials at issue in this mechanism, this mechanism denied them the opportunity to meaningfully participate in it. As such, this failure restricted the flow of the “public’s” information, eliminating potentially rich sources of information and perspectives from this mechanism. Conversely, because the Expert Panel’s presence was assured at the hearing, this mechanism ensured that its information would circulate there.

III.b. Relevant Information Elicited from Participants

Maximizing the relevant information elicited from “public” participants is also tied to increasing a public engagement mechanism’s efficiency (Rowe & Frewer, 2005, p. 268). Rowe and Frewer (2005) explain that all mechanism participants:

possess a quantity of *relevant* information regarding the problem in hand (whether this is knowledge or simply an opinion) as well as other information of no relevance. An effective exercise needs to elicit all relevant information from each active participant while not eliciting irrelevant or spurious information. Should appropriate information remain unelicited or be confounded or confused by irrelevant information, effectiveness will be negatively impacted. (p. 268, emphasis in original)

Below, I consider the extent to which the Water Board hearing and Work Group meeting maximized the amount of relevant information elicited from participants by looking at three specific factors: (1) whether each mechanism elicited irrelevant and spurious information from participants; (2) whether each mechanism utilized facilitators, whether they had “open” versus “closed” response formats, and how much time participants were given to prepare and present; and (3) whether each mechanism maximized participants’ knowledge of the mechanism sponsors’ information.

III.b.i. Irrelevant and Spurious Information

While there is unfortunately no record of the question and answer period at the Work Group meeting, the Water Board hearing transcript reveals that the hearing elicited some “irrelevant or spurious information.” According to Rower and Frewer’s theory, this information “confounded or confused” the relevant information and negatively impacted this mechanism’s effectiveness (Rowe & Frewer, 2005, p. 268). For example, one “public” commenter stated, “I would just like you to *not weaken any standard of cleanup*” (Water Board Tr., p. 339). Similarly, another said, “I feel that the standards that we’re allowing for Boeing to dump all the contaminants is wrong. And they’re the polluter, and *they need to clean up the site completely*. [...] I feel that this Board needs to enforce the cleanup [...]” (Water Board Tr., p. 340, emphasis added). While the beginning of this comment is relevant, if imprecise, the rest is beyond the scope of the Water Board’s control and not at issue at the Water Board hearing. The Water Board makes this clear at the outset of the hearing when the Water Board’s Executive Officer states:

The California Department of Toxic Substances has oversight responsibilities for the cleanup, and *the Water Board is not involved in the cleanup*. [...] However, stormwater runoff from the site is a Board issue and it is regulated through the permit that is before you today. [...] So, once again, before I turn it over to Cassandra [a Water Board staff member], I just want to remind you that *we are not here to consider the cleanup of the Santa Susana Field Lab*, but actually the regulation of stormwater that drains from the site during wet-weather events.

(Water Board Tr., pp. 249-250, 252, emphasis added)

Despite these repeated statements, however, commenters offered information that, while important to other aspects of the SSFL controversy, was irrelevant to the Water Board hearing. According to Rowe and Frewer's theory, this information distracted from the relevant information "the public" offered, likely inhibiting the flow of that information by decreasing the likelihood that listeners would take it seriously.

In addition, some "public" commenters at the Water Board hearing offered technically spurious information—or at least information that revealed a lack of interactional expertise. For example, one public commenter stated, "Boeing should not be discharging anything" (Water Board Tr., p. 341). While the sentiment of this comment is perhaps that Boeing should not be discharging contaminants at levels that are harmful to human health or the environment, as stated this comment requests a factual impossibility. A "discharge" simply means a release, and even if by "anything" this commenter meant pollutants, this is still inaccurate because there are natural levels of pollutants—called background levels—that would be discharged from the site no matter how stringently it

was cleaned up. Comments like these reveal that this mechanism failed to elicit only relevant information from participants. Instead, it elicited erroneous and irrelevant information, primarily from members of the “public,” which made these speakers look as though they lacked both interactional and contributory expertise. This is problematic in two ways. First, it reinforced the idea that members of the “public” were properly denied expert status in this mechanism—that is, the idea that members of the “public” lacked both relevant or accurate information, as well as the ability to know which information was relevant to this particular controversy. Second, it furthered the all too common notion that the “public” is too ill-informed and unsophisticated to offer valuable contributions to STE deliberations and decisions. As a result, this mechanism’s failure to elicit only relevant information from members of the “public” made it less likely that the decision-maker (the Water Board) would seriously consider what the “public” had to say. Instead, it increased the likelihood that only information proffered by the designated experts in this mechanism would flow, effectively excluding important voices with valuable perspectives from this conversation. In this way, this failure to elicit only relevant information was as a Mediation Means that filtered whose information flowed in this mechanism.

III.b.ii. Facilitators, “Open” Versus “Closed” Responses, and Time to Prepare and Present

Rowe and Frewer identify two structural aspects of public engagement mechanisms that affect whether the maximum amount of relevant information is elicited from “public” participants. First is the presence or absence of a facilitator, who aids “public” participants in ensuring that they share all of their relevant information before

accepting a decision. Mechanisms with such facilitation have been shown to elicit more relevant information than identical mechanisms without it (Rowe & Frewer, 2005, p. 269). Second is whether the response mode available to participants is “open”—meaning it allows free responses, like a focus group or conference—or “closed”—meaning it only allows participants to choose among two or more options, like a referendum or a survey with a ratings scale (Rowe & Frewer, 2005, p. 269). Mechanisms using “closed” mechanisms are likely to elicit less of participants’ relevant information than “open” ones (Rowe & Frewer, 2005, p. 269). This is because the sponsor of a closed mechanism will not know the reasons behind participants’ choices and therefore will not know whether some participants’ choices should be given more weight than others (Rowe & Frewer, 2005, p. 269).

Neither the Water Board hearing nor the Work Group meeting utilized a facilitator, and both allowed for open choices insofar as they allowed participants to say anything they wished during the designated question and answer period. However, another variable, which is similar in flavor to “open” versus “closed” mechanisms, differentiated the Water Board hearing from the Work Group meeting and likely contributed to how well each mechanism elicited relevant information from participants. This variable is the amount of time participants were given to offer that information. At the beginning of the Water Board hearing, a spokesperson for the Water Board stated that “public” comments would be limited to “three minutes maximum or less depending on the time and number of speakers” (Water Board Tr., pp. 246-247). By the time Water Board reached this step in the proceeding, however, these comments were capped at “two minutes each so that we have enough time” (Water Board Tr., p. 336). Two minutes is an

insufficient amount of time for speakers to express either multiple questions/comments/concerns or to express even one in depth, leading to the same shortcomings that Rowe and Frewer identify for “closed” mechanisms. This is especially the case when there is no facilitator present to aid speakers in identifying what information is relevant and presenting it concisely. Conversely, the Work Group meeting did not cap the time participants were given to speak, theoretically allowing for elicitation of more information from “public” participants.

Moreover, other structural aspects of the Water Board hearing made it likely that even the Organizations that were granted party status could not offer maximal relevant information. As Gortner explained in her presentation, “while we’re grateful for party status, we were only given 3 days to prepare for this” (Water Board Tr., p. 318). Thus, even though the Organizations were given forty rather than two minutes to speak, the Water Board hearing failed to maximize the relevant information elicited from not only “the public” but the Organizations as well. As a result, we see once again structural features that promoted the flow of the designated experts’ information while impeding the flow of the non-experts’ information. Doing so stifled the robust and broad deliberation scholars have called for regarding STE issues, in several ways. First, these features essentially made the designated experts’ information the only information that decision-makers could consider. Second, they reinforced the widely criticized model of STE decision-making as a one-way process that privileges the voices of technical experts over those of persons with other perspectives and kinds of knowledge to contribute. As such, we see here that the absence of a facilitator, the use of a closed rather than open response format, and the tight limits on response times for non-experts acted as

Mediational Means that limited whose and how much relevant information was put into circulation in this mechanism.

III.b.iii. Knowledge of Sponsor's Information

In order to maximize the relevant information elicited from participants in the Water Board hearing—which was information regarding the terms of the proposed permit—participants had to know what those terms were. This information was in the hands of the mechanism's sponsor, the Water Board. This mechanism was problematic regarding the circulation of this information in several respects. First, as noted above, the email sent to potential Water Board hearing participants containing the proposed permit did not specify that it was open for public comment (Water Board Tr., p. 269). Second, also as noted above, the proposed permit was not posted to the Water Board's website until after the 30-day written-public-comment-period closed (Water Board Tr., pp. 332, 345). The Water Board staff's response to this concern was, "Unfortunately, there was a mistake. The item should have been posted on the date that it was emailed to the interested parties. When staff became aware that it was not posted, it was—it was subsequently posted" (Water Board Tr., p. 369). Another Water Board staff member continued, "it's a good idea to post things online; I would note, there is no legal requirement to do so. But it is a good idea to do so. I just want to let you know that it's not a legal impediment for not doing that" (Water Board Tr., p. 345).

While Water Board staff's failure to make the proposed permit available online to potential Water Board hearing participants may have prevented some people from participating at all, as explained in section III.a.ii above, it likely also prevented maximal elicitation of relevant information from those who could participate. This is because

people who wanted to submit written comments but were not emailed the tentative permit could not offer specific comments on the permit's terms, and people who were able to attend the Water Board hearing were limited to two minutes each. Further, the Water Board staff's failure to post the tentative permit online in a timely manner further contributed to participants' feelings of unfairness and unimportance in this mechanism, as evidenced by Tucker's statement that "the Board didn't even post the tentative permit until after the public comment period—which ran over the Christmas holidays—closed. Boeing's application for the permit has been kept secret for more than a year" (Water Board Tr., p. 332).

Furthering these feelings of unfairness and distrust was a perceived lack of candor by the Water Board regarding the proposed permit changes. When the Notice of Public Hearing was finally posted on the Water Board's website, it was titled, "Proposed Reissuance of Waste Discharge Requirements—National Pollution Discharge Elimination System Permit" (Water Board Tr., p. 317; Rocketdyne Cleanup Coalition et al., p. 3). While a "reissuance" suggests a mere duplication of the existing permit, the proposed permit contained significant revisions. Yet these changes were at best not highlighted, and at worst intentionally obscured, from the public's attention. As one commenter told the Water Board:

I don't know about you, but if you've gone through this, this is a beast. Okay? I tried to do this [...] line by line, 195 pages [in the old permit] compared to 180 pages [in the proposed permit]. I did call the Water Board. [...] I asked him is there, please, a list of changes. I really can't go through this. And he said no. He

referred me to one specific page, but there was no list of changes. (Water Board Tr., p. 318)

Because the proposed changes to the new permit were made neither easily identifiable nor easily accessible to members of “the public,” the likelihood that they could offer maximal relevant information about those changes significantly decreased.

These factors made it logistically difficult for potential “public” participants to obtain information about the proposed permit’s terms, which in turn impeded their ability to offer the relevant information they possessed regarding the proposed permit. In this way, this mechanism’s failure to maximize “public” participants’ knowledge of the Water Board’s information once again served as a Mediation Means that restricted the flow of the “public’s” information.

III.c. Relevant Information Provided by Sponsors

Maximizing the relevant information provided by sponsors is just as important as maximizing that elicited from “the public” (Rowe & Frewer, 2005, p. 270). Rowe and Frewer hypothesize that mechanisms that allow for “flexible, variable, and responsive information provision from sponsors”—what Asen explained as thin discursive norms—are more likely to maximize relevant sponsor information than mechanisms that set the information provision prior to the interaction—Asen’s thick discursive norms (Rowe & Frewer, 2005, p. 270). This is because flexible information provision mechanisms allow “public” participants to identify holes in the information and clarify uncertainties, such as those resulting from the use of technical jargon (Rowe & Frewer, 2005, p. 270). Doing so would allow “the public” to offer better-informed input, meaning information flow would be enhanced by such flexibility.

The Water Board hearing theoretically allowed “public” participants to “identify holes in the information and clarify uncertainties” during the public comment period. However, this period is expressly a period for “comments” rather than a question and answer period, unlike at the Work Group meeting. As such, “the public” may pose questions, identify holes, or express confusion or uncertainty during this time at the Water Board hearing, but the Water Board is under no obligation to respond, and in fact the procedure for the hearing expressly builds in no mechanism for such responses. Instead, “[a]fter completion of oral comments [from the public], the Board Members may ask questions of staff, parties, and interested persons” (Water Board Tr., p. 247). In this way, this mechanism is designed to ensure that the Water Board—the sponsor— rather than mechanism participants, gets to clarify uncertainties. Further, the Water Board’s failure to post the proposed permit on its website in a timely fashion, as well as its failure to create a list of proposed changes between the old and new permits, are other instances of this mechanism’s failure to maximize the relevant information provided by its sponsors. In these ways, these structural mechanisms impeded the flow of both the Water Board’s and “the public’s” information in this mechanism.

III.d. Transfer and Processing of Information

Maximizing the efficient transfer of information to, and processing by, recipients is another variable tied to a public engagement mechanism’s efficiency (Rowe & Frewer, 2005, p. 271). Transfer of information is efficient when participants fully understand that information (Rowe & Frewer, 2005, p. 271). The most significant variable impacting efficient transfer is the medium through which the information is conveyed, and face-to-face mediums are the least likely to lead to information loss or misunderstanding (Rowe

& Frewer, 2005, pp. 271-272). Another factor affecting information transfer and processing is the use of technical terminology and jargon, which decreases efficient transfer (Rowe & Frewer, 2005, p. 273).

Both the Water Board hearing and the Work Group meeting conveyed information through face-to-face interactions at the events themselves. However, speakers at the Water Board hearing were commenting on the written proposed permit (if they were able to access it, that is). Consistent with the notorious reputation of legal and scientific documents, the proposed permit was replete with highly technical terminology and jargon—both legal and scientific. For example, the proposed permit stated:

The discharge shall not cause a violation of any applicable water quality standards for receiving waters adopted by the Regional Water Board or the State Water Resources Control Board as required by the federal CWA and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to section 303 of the federal CWA, and amendments thereto, the Regional Water Board will revise and modify this Order in accordance with such more stringent standards. (California Regional Water Quality Control Board Los Angeles Region, 2015, p. 6)

As discussed further in Chapter 6, the use of nominalizations such as “cause a violation” instead of verbs such as “violate” interferes with readability and comprehension, and “limits access to [this information] to those accustomed to reading and interpreting this form of discourse” (Killingsworth & Palmer, 1992, p. 174). Similarly, words such as “thereunder” and “thereto” are legal “jargon” that do “no more than reinforce the esoteric quality of legal discourse,” making the proposed permit needlessly difficult to understand

for persons not versed in such discourse (Ufot, 2013, p. 628). Similarly, a glance at the tentative permit’s Table of Contents (figure 5, below) reveals highly technical terminology that is likely inaccessible to persons without specialized knowledge:

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	F. Instantaneous Minimum Effluent Limitation.	28
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Figure 5: Tentative Boeing NDPEs Permit Table of Contents

Unless one is well-versed in hydrology and Clean Water Act terminology and concepts, phrases such as “Final Ambient WLAs for Pollutants in Sediment for Stormwater Dischargers,” “Single Constituent Effluent Limitation,” “Instantaneous Maximum

Effluent Limitation,” and “Mass Emission Rates”—none of which are explained or defined in the body of the permit—are likely meaningless. In contrast to the Water Board hearing, attendees at the Work Group meeting were not reliant on a written document to obtain relevant information, but instead were provided oral explanations of the proposed permit terms at the meeting.

Moreover, at the Water Board hearing itself, Water Board staff and the Expert Panel used technical terminology without defining or explaining it, such as “radionuclides,” “Tests for Significant Toxicity,” “whole effluent toxicity,” “primary constituents of concern,” “Best Management Practices,” and “proactively implementing compliance activities” (Water Board Tr., pp. 249, 250, 258, 259, 262). In contrast, speakers at the Work Group meeting usually clearly defined the technical terms they used. For example, Gortner told her audience at the Work Group meeting, “I am going to show you on this fancy slide that I did not make, the different outfalls are going to come up number by number and show you how many violations. What is a violation? That means it has exceeded the amount that the permit has said is safe for the public” (Gortner Tr., p. 2). In contrast, even when speakers at the Water Board hearing attempted to define or explain technical terms, those explanations themselves contained technical terminology and jargon. For example, a Water Board staff member stated:

Now I would like to explain the difference between the exceedance of an effluent limit and the exceedance of a benchmark in the context of this permit. An effluent limitation is a numeric restriction on the amount of a pollutant that can be discharged from an authorized location. Effluent limitations can be derived from a variety of factors, including the Basin Plan, the California Toxics Rule,

the National Toxics Rule, the Board's professional judgment or guidance. [...] A benchmark is a limit that is used to evaluate the performance of Best Management Practices with regards to removal of pollutants present in the discharge. (Indiscernible) the benchmarks are established based on the numeric effluent limitations. (Water Board Tr., p. 263)

The extensive use of technical terminology at the Water Board hearing, coupled with no express opportunity for people to seek clarification or explanation, inhibited the flow of information in this mechanism by decreasing the efficient transfer and processing of it.

In contrast, the presenters at the Work Group meeting used far fewer technical terms and jargon. This difference is apparent when looking at explanations of the same concepts at the Water Board hearing and Work Group meeting, respectively. For example, a Water Board staff member at the Water Board hearing explained:

Regulating stormwater from the site presents a number of technical challenges. The site is located actually in two watersheds, the upper reaches of the Los Angeles River and the Arroyo Simi, which drains to Calleguas Creek and then to Mugu Lagoon. Further, the site is largely undeveloped and, in many areas, the drainages are very steep. Consequently, groundwater treatment BMPs need to be distributed throughout the site. (Water Board Tr., p. 250)

Gortner explained this same concept at the Work Group meeting without technical terminology by saying:

Well, Santa Susana is on the top of a hill. So logically when it rains, all the radioactive and chemical contamination that is getting into the soil near the water can run off down the hill in multiple locations. Here is a picture of the water

going off. Water is running where? Well, it is running into a number of areas, partially into Bell Creek which is the headwaters for the L.A. River. It is also running in our area over here in Simi towards Arroyo Simi, Runkle Canyon, and Dayton Canyon. (Gortner Tr., p. 1)

Similarly, Water Board staff stated at the Water Board hearing that, “[...] the acute toxicity requirements have been replaced by the more stringent chronic toxicity requirements. And, in evaluating chronic toxicity using the Test for Significant Toxicity, the acute endpoint is also evaluated. The test evaluates mortality as well as reduced growth and reproduction” (Water Board Tr., p. 269). Gortner once again offered a simpler, if less thorough, explanation at the Work Group meeting: “The permit also eliminates monitoring and compliance requirements for acute toxicity. Acute toxicity means that it is something that kills you instantly versus chronic” (Gortner Tr., p. 2).

What accounts for these differences between the Water Board hearing and the Work Group meeting? While there are likely many factors, two primary sources are the differing audiences and purposes between these two mechanisms—and the structural variables that then follow. Presenters at the Water Board hearing are speaking to the Water Board, which is composed of persons knowledgeable about and well versed in the technical concepts at issue. Members of the community, though invited to comment (via a legally required comment period), are not the intended recipients of the information presented at the Water Board hearing. Presenters at the Work Group meeting, in contrast, are speaking to an audience of community members, many of whom are unfamiliar with the NPDES permitting process or subject matter. Relatedly, the purpose of the Water Board hearing is for the Water Board to gather information (from its staff, the Expert

Panel, the permittee (Boeing), the Organizations, and the public) and make a decision regarding the terms of Boeing's new NPDES permit, not to educate, inform, or engage in a dialogue with the public. The Work Group meeting's explicit purpose, on the other hand, is to do just that.

Thus, there may be logical reasons for the greater use of technical terminology and jargon at the Water Board hearing than at the Work Group meeting. However, regardless of why this is so, the end result remains that some of the recipients of information at the Water Board hearing—namely members of “the public”—were less likely to transfer and process information there than they were at the Work Group meeting. In this respect, these structural features of the Water Board hearing can be viewed as Mediation Means that inhibited the flow of information to and from the “public” to a greater extent than those of the Work Group meeting, contributing once again to the loss of important and valuable information and perspectives in this mechanism.

III.e. Aggregation of Relevant Information

Also important to achieving an effective public participation mechanism is efficiently and accurately combining all relevant information from participants (Rowe & Frewer, 2005, p. 273). Once again, the presence of a facilitator can help to maximize this aggregation (Rowe & Frewer, 2005, p. 273). Neither the Water Board hearing nor the Work Group meeting used a facilitator, but the Water Board explicitly requested aggregation. At the Water Board hearing, the Acting Chair of the Board told the “public”: “Persons with similar concerns or opinions are encouraged to choose one representative to speak” (Water Board Tr., p. 246). This statement seems difficult for members of the

“public” to act on unless they convened in advance of the hearing to coordinate their comments. Further, while avoiding duplicate comments is practical considering the time constraints of the hearing (which lasted 45 minutes longer than the hearing room was reserved for), one wonders if the repetition of particular concerns is important for the decision-making process. In the same way that constituents are encouraged to call their legislators en masse to sway him or her to vote a particular way on a bill, does the number of comments the Water Board receives that state the same concern impact how much weight Board members give to that concern? If so, one must pause to consider how consolidating the “public’s” comments might affect the impact of those comments.

III.f. Perceived Independence of Sponsor’s Advisors

In addition to Rowe and Frewer’s variables discussed above (which they note is a non-exhaustive list) (Rower & Frewer, 2005, p. 286), the extent to which a sponsor or decision-maker’s advisors were viewed as independent versus biased contributed to the fairness aspect of effectiveness at the Water Board hearing.

Prior to this hearing, when the Water Board first decided to create the Expert Panel, it put Boeing in charge of selecting its members (Boeing SSFL NPDES Compliance Program, 2008, p. 1). Further, rather than allocating separate, independent presentation timeslots at the Water Board hearing for Boeing, the “Expert Panel,” and the Organizations, the Water Board allotted 40 minutes to “the Boeing Company and the Expert Panel” and 40 minutes to “the organizations,” respectively. What is more, the Water Board did so without any explanation as to why it saw fit that the presumably neutral and independent “Expert Panel” should share a presentation slot with Boeing, the permittee. Even more egregious, the acting chair of the Water Board stated that “the

Boeing Company and the Expert Panel with [sic] make *its* presentation, which cannot exceed 40 minutes; after *Boeing*, the organizations I've previously mentioned will make its presentation. [...]" (Water Board Tr., p. 246, emphasis added). In this statement, consciously or not, the acting chair expressly conflated Boeing and the supposedly "independent" Expert Panel by referring to them collectively as "it" and "Boeing."

These acts by the decision-maker sent a significant and troubling message to all participants and onlookers in this public engagement mechanism. Putting Boeing in charge of assembling the advisory panel that recommends Boeing's course of action—while perhaps due to the Water Board's limited time and financial resources—feels an awful lot like the fox guarding the henhouse. Regardless of whether this act actually had any bearing on the neutrality, viewpoints, or recommendations of the Expert Panel's members, it created the illusion of impartiality and caused this public engagement mechanism to lose legitimacy and credibility. Moreover, giving Boeing and the Expert Panel one shared timeslot while giving the Organizations a separate slot, and referring to Boeing and the Expert Panel collectively as "Boeing," sent the message that Boeing and the Expert Panel are aligned in their positions and/or goals for the permit renewal hearing and permit terms, while the Organizations are at a minimum not part of this collaboration, or, perhaps, adverse to it. Further, it conveyed that Boeing is part of, or at least connected to, a group of ordained experts, but that the Organizations possess no such expert status or connections. This seemingly inconsequential act thus placed Boeing in a position of more power than the Organizations, and potentially impacted the credibility and deference that the Water Board bestowed each. In other words, this act potentially limited the circulation of the Organization's information and promoted the flow of Boeing's

information in this mechanism. In these ways, the Water Board's treatment of the Expert Panel, and the impressions that treatment created, negatively impacted the flow of the Organizations' information at the Water Board hearing.

IV. Conclusion

The structural components of a public engagement mechanism impact how, what, and whose information flows in that mechanism. The Water Board hearing and the Work Group meeting shared some structural similarities, in that they both included formal presentations followed by a period allocated for members of "the public" to speak. Further, as Rowe and Frewer explain, both the Water Board hearing—a "public hearing"—and the Work Group meeting—a "public meeting"—"rely on the public to come to the information rather than vice versa. As such, the involved "public" is largely self-selected and biased in terms of those most proactive and interested. Information is communicated face-to-face by sponsors to those individuals and is variable, depending to some degree (often small) on what participants ask" (Rowe & Frewer, 2005, p. 278). Because of this "self-selection of participants and also flexible information," Rowe and Frewer (2005) conclude that these types of public engagement mechanisms "seem less optimal from the perspective of maximizing information distribution (unless one considers that the sponsors may themselves be unclear as to *who* are the appropriate participants and *what* is the most important information to impart)" (p. 283, emphasis in original). At both the Water Board hearing and the Work Group meeting, the sponsors seem clear on both the appropriate participants (at the hearing, the appropriate participants appear to be anyone who can spare a Thursday to offer two minutes of commentary, while at the Work Group meeting the appropriate participants are concerned

community members) and the most important information (the proposed permit terms and their significance and impacts). Despite these similarities, however, applying Rowe and Frewer's effectiveness variables reveals several stark and important differences between these two mechanisms.

The Water Board hearing failed to maximize the number of participants, due to a combination of factors. First is the timing of the hearing—9am on a Thursday—and of the preceding written comment period, which was over Christmas, Hanukah, and New Years holidays. Second is the notification process, wherein the transmittal email circulating the proposed permit to members of “the public” did not indicate that it was open for public comment, and wherein the proposed permit was not posted to the Water Board's website until after the written public comment period had closed.

The Water Board hearing also failed to maximize the relevant information elicited from participants, and instead elicited some relevant information as well as some spurious and irrelevant information. This is likely attributable in part to the two-minute time limit for public comments. In addition, the failure to timely provide participants with the permit on which they were to comment, the lack of a list of changes between the old and proposed permits, and the perceived lack of candor by the Water Board in titling the permit a “reissuance” rather than a revision, also contributed to this mechanism's less than maximal elicitation of relevant information from participants.

In addition, the Water Board hearing did not maximize relevant information provided by the sponsor, because it did not provide an opportunity for participants to receive clarification or explanations of issues on which they were uncertain or confused. Neither did it maximize participants' transfer or processing of information, due to its

extensive use of technical terminology and jargon. It further failed to maximize the aggregation of relevant information, due to its lack of facilitation. Lastly, the Water Board's decision to allocate one joint timeslot to Boeing—the permittee—and the Expert Panel, its reference to both as “Boeing,” and the fact that the Water Board put Boeing in charge of selecting the Expert Panel members all contributed to a perceived lack of fairness in this mechanism, further inhibiting the flow of information there and decreasing its effectiveness.

While the Work Group meeting was not executed perfectly either, it maximized participants, relevant information from both participants and sponsors, and information transfer more so than the Water Board hearing. This is because it was held at 6:30pm (after the workday ended), there was no time limit for public questions, it utilized a two-directional question and answer period rather than a one-directional comment period, and it had limited technical terminology and jargon. In these ways, the structural features of the Work Group meeting enhanced rather than impeded the flow of information in this mechanism.

We have seen from this analysis that the structural features of a public engagement mechanism act as Mediation Means that impact how, what, and whose information flows there. In the case of the Water Board hearing, its structural features tended to reinforce the notion that the designated experts were better qualified to offer information than the Organizations or the “public,” such as by allotting the designated experts more time to speak or prepare than the “public” or Organizations, and by failing to elicit only relevant information from the “public.” They also tended to promote the flow of the designated experts' information while restricting that of the “public's”

information, excluding potentially valuable and important knowledge and perspectives from circulation there. In contrast, the Work Group hearing utilized structural features that made the “public’s” information more likely to flow. As a result, the information that flowed in each of these mechanisms was in many ways very different: the designated experts’ technical, “encyclopedic,” specialized knowledge was a central component of the Water Board hearing, while the “public’s” non-technical information about values and fairness was a larger part of the Work Group meeting. In Chapter 6, I will consider the implications of these impacts insofar as they are reflected in the terms of the permit that the Water Board issued at the close of the Water Board hearing. But first, in the next chapter, I ask how and whether the stylistic features utilized by the speakers at the Water Board hearing and Work Group meeting mediated information flow in each mechanism.

CHAPTER 5

EXAMINING STYLISTIC FEATURES OF THE SSFL WATER BOARD HEARING AND WORK GROUP MEETING AS MEDIATIONAL MEANS

I. The Problem Driving This Chapter: Role Designations and Information Flow

STE scholars have found that particular stylistic features of a message can restrict who can access, process, and respond to it (see, e.g., Dahlstrom, 2014, p. 13614; Killingsworth & Palmer, 1992, p. 173; Rowe & Frewer, 2005, p. 273). Stylistic features are elements that structure language use—often at the sentence level, such as passive voice, the use of nominalizations, and deferential language, for instance. Because of the exclusionary power associated with certain stylistic features, identifying which messages utilized those features in a given STE mechanism sheds light on whose information circulated, and to whom, in that mechanism. Recognizing how stylistic features mediate information in an STE public engagement mechanism allows us to better understand how the discourse that takes place in that mechanism impacts its outcome. To accomplish this task, in this chapter, I ask which stylistic features persons designated as experts and non-experts used at the Water Board hearing and Work Group meeting, and whether, and is so, how these features mediated the flow of information in each mechanism. As I elaborate next, this chapter is based on prior scholarship that attributes certain stylistic features to discourse that restricts access to a message (Dahlstrom, 2014, p. 13614; Killingsworth & Palmer, 1992, p. 173; Rowe & Frewer, 2005, p. 273). In this chapter, I examine stylistic features that characterize presentations made at both the Water Board hearing and Work Group meeting. This chapter also analyzes the stylistic features of speakers who spoke at both events. This two-part analysis sheds light on how stylistic

features mediate what, whose, and how information flows in these STE public engagement mechanisms.

II. Methodology

I base my methodology for this chapter on M. Jimmie Killingsworth and Jacqueline S. Palmer's analysis of Environmental Impact Statements in *EcoSpeak*. Environmental Impact Statements are reports that federal agencies must prepare in which they consider the environmental impacts of their proposed actions. Just like in the NPDES permit process, federal agencies must accept written and oral public comments about a tentative Environmental Impact Statement prior to finalizing it. Killingsworth and Palmer explain that:

[T]he primary readers of the [Environmental Impact Statement] are people who make decisions about land use and air and water quality—executive administrators and sometimes judges and legislators. The intended audience also consists of invited commentators, related government agencies, and concerned citizens—all of whom may in principle influence the final decision of the primary audience through testimony, advice, lobbying, and voting. (Killingsworth & Palmer, 1992, p. 170)

The same is true for the Water Board hearing presentations, which have as their primary audience the Water Board—the decision-maker—and as their secondary audience concerned citizens.

Below, I examine the Water Board hearing and Work Group meeting presentations first for: (1) passive voice; (2) nominalizations; (3) strings of noun modifiers; and (4) acronyms. These are the features that Killingsworth and Palmer (1992)

looked for in Environmental Impact Statements to see how well those documents communicated information to their audiences (p. 173). Next, I look for (5) technical language, which, as noted in Chapter 3, Rowe and Frewer (2005) have identified as negatively impacting the effectiveness of public engagement mechanisms (p. 273). I then look for (6) narrative, which research suggests is easier to comprehend and more engaging than traditional “logical-scientific communication” (Dahlstrom, 2014, p. 13614). Lastly, I examine (7) how precise and (8) how deferential the language that speakers used in their presentations was. In conducting these analyses, I consider in particular differences between the presentations made by the same persons at the Water Board hearing and Work Group meeting, respectively, as well as between the presentations made by the designated experts and non-experts at the Water Board hearing.

III. Stylistic Features

The style one uses to communicate a message has implications for both who can understand that message (Killingsworth & Palmer, 1992, p. 170)—and thus participate in decisions about it—and for how an audience perceives its speaker (e.g. C. Miller 2003, p. 200). Indeed, “[t]he very language” of agency documents like [Environmental Impact Statement] reports ensures that “the interested public” is “systematically excluded from participation in the [decision-making] process, even while their rights to be heard are ostensibly maintained” (Killingsworth & Palmer, 1992, p. 170). Research has shown that, perhaps because of this exclusion, “the likelihood of an outsider influencing an agency action is slight” (Killingsworth & Palmer, 1992, p. 170).

Certain stylistic features decrease the accessibility of a message, thereby impeding information flow. These include passive voice, nominalizations, strings of noun modifiers, acronyms, and technical terminology (Killingsworth & Palmer, 1992, pp. 173-174; Rowe & Frewer, 2005, p. 273). Killingsworth and Palmer (1992) refer to this combination of features as “the expert’s style,” and explain that this style “limits access to the information of the [message] to those accustomed to reading and interpreting this form of discourse” (p. 170). This style is typical of bureaucratic and technical prose, and it decreases “general readability and comprehension” (Killingsworth & Palmer, 1992, p. 170). Below, I examine the use of each of these features, in addition to narrative, precise language, and deferential language, at the Water Board hearing and Work Group meeting and ask whether, and if so, how they impacted the flow of information in each mechanism.

III.a. Passive Voice

Passive voice “obliterates agents of actions and thereby obscures responsibility and/or authority” (Killingsworth & Palmer, 1992, p. 173). At the Water Board hearing, the Water Board and Water Board staff used passive voice often. For example, Acting Water Board Chair Diamond stated, “Today you will hear from members of the Expert Panel about some of the systems *that were implemented*” (Water Board Tr., p. 246, emphasis added). Similarly, Water Board staff explained that “[d]ischarges from the Groundwater Extraction and Treatment system *have been terminated* until Boeing can work with the California Department of Fish and Wildlife to determine the requirements and the amount of treated wastewater *that can be discharged*” (Water Board Tr., p. 257, emphasis added). In these statements, the actor(s) who implemented the systems and who

discharges wastewater is absent. Water Board staff also used passive voice to eliminate the actor responsible for drafting the new permit's terms, which is Water Board staff. For example, Water Board staff explained that “[*t*]he first item considered [when developing the revised permit terms] was the Reasonable Potential Analysis” (Water Board Tr., pp. 257, 258, emphasis added), instead of an active voice statement such as “the first item we considered [...]” or “the first item Water Board staff considered [...]” Water Board staff’s explanation of certain testing requirements also omitted the human actors who set the permit’s terms and who will conduct the tests: “The acute toxicity requirements *have been replaced by* the more stringent chronic toxicity requirements. And, in evaluating chronic toxicity using the Test for Significant Toxicity, the acute endpoint *is also evaluated*” (Water Board Tr., pp. 258, 269, emphasis added). Similarly, in addressing concerns that the tentative permit was not posted on the Water Board website, Water Board staff explained, “When staff became aware that [the tentative permit] was not posted, it was—*it was subsequently posted*” (Water Board Tr., p. 269, emphasis added). Once again, the actor responsible for posting the permit—Water Board staff—is absent from this statement.

Each of these statements removed the human actor responsible for the action at issue, which helped these speakers “achieve distance from their subject matter and audiences” and “obscures responsibility” (Killingsworth & Palmer, 1992, p. 173). As such, passive voice mediated the flow of information here by restricting the flow of information about the actors responsible for deciding on the proposed terms of the revised permit, and for making those terms accessible on the Water Board’s website. It also made these speakers’ messages less accessible to listeners, especially listeners not

well versed in this speaking style. Because the Water Board, Water Board staff, the Expert Panel, and the Organizations routinely read documents and hear testimony that utilize passive voice, the listeners most likely to be unaccustomed to it were members of the “public.” In this way, passive voice inhibited the flow to the “public” of the information contained in these messages, which in turn impeded the “public’s” ability to circulate their information in response. Once again, we see a Mediation Means that restricted the circulation of the “public’s” viewpoints in this mechanism, creating a less robust information landscape for the Water Board to make a decision in.

Both the Expert Panel and one of Boeing’s presenters, Steve Shestak, used some passive voice, but spoke largely in active voice, through statements such as this one by Shestak:

Since the last hearing in 2010, *we’ve ceased* all industrial operations at the site; *we’ve substantially completed* demolition of Boeing’s building infrastructure; *we’ve cleaned up* numerous source areas; *we’ve constructed* several advanced stormwater treatment systems; and *we’ve completed* extensive erosion control and re-vegetation actions all in the interest of improving water quality. As a result, *we made* considerable progress in achieving compliance at the majority of the outfalls. (Water Board Tr., p. 277, emphasis added)

In statements such as this one, where Shestak discussed Boeing’s accomplishments, he tended to use active voice. However, during the few instances in this presentation where he discussed Boeing’s shortcomings, he tended to use passive voice. For example, Outfalls 008 and 009 were areas of weakness for Boeing: exceedances dropped by only one per year for Outfall 008, and increased for Outfall 009, over the previous permit

period (Water Board Tr., p. 333). When Shestag explained this to the Water Board, he said, “At Outfalls 008 and 009, where conventional contain-and-treat or flow-through systems are not practical, Best Management Practices *have been implemented* [...]” (Water Board Tr., p. 278). Shestag similarly explained that Boeing worked with the Expert Panel “to improve surface water quality in the watersheds where *it was not feasible* to construct stormwater treatment systems [...]” (Water Board Tr., p. 281). In these instances, Shestag omitted the actor responsible for implementing Best Management Practices (that is, Boeing) and for constructing stormwater treatment systems, but included the actor who proactively worked with the Expert Panel to find alternatives (once again, Boeing). Shestag thus used passive voice to obscure responsibility for the negative aspects of Boeing’s permit compliance while emphasizing Boeing’s responsibility for the positive ones. In this way, he used passive voice selectively (whether intentionally or not) to promote the flow of positive information. Like the Water Board and Water Board staff, he also used passive voice to make negative information about Boeing more difficult for members of the “public” to process and respond to. Doing so eliminated from this mechanism—and from the universe of data considered by the decision-maker—the information that those members of the “public” could have brought to bear on these issues.

The Organizations also used passive voice at times. For example, Duffield stated that “Perchlorate and Strontium-90 *were found at Runkle Ranch*” (Water Board Tr., p. 314). In this instance, removing the actor who found the perchlorate and strontium-90 helped to sustain the image of science and scientific tests as objective and not subject to human error or interpretation. Further, rather than telling the Water Board, “You must

strictly enforce the NPDES permit,” she said, “The NPDES permit *must be strictly enforced* to ensure the protection of all” (Water Board Tr., p. 315, emphasis added). As discussed further below in section III.h, this is perhaps connected to the fact that at the Water Board hearing, Duffield was not an ordained expert who was granted authority, but was instead speaking from a place of less authority to persons with more authority (the decision-maker).¹⁰

Organizational speaker Gortner also used passive voice at the Water Board hearing, which allowed her to avoid directly accusing the Water Board. For example, she told the Water Board, “We *were only given* three days to prepare for this” (Water Board Tr., p. 318, emphasis added). Likewise, she explained, “It took the Board 14 months to write the new permit, and *the public was only given* 30 days [...] to provide public feedback” (Water Board Tr., p. 317, emphasis added). In contrast, at the Work Group meeting she told her audience: “Well *they* [the Water Board] took 14 months to write the new permit and *gave the public* only 30 days over the holidays no less to provide public feedback [...]” (Gortner Tr., p. 1, emphasis added). Gortner thus used active voice to discuss the Water Board’s actions at the Work Group meeting, where she was in a position of authority as a designated expert, but used passive voice to describe these same actions at the Water Board hearing, where she was not. Because passive voice decreases the accessibility of a message, she thus promoted the flow of her information at the Work Group meeting, but inhibited its flow at the Water Board hearing. As we will see in Chapter 6, the Water Board did not take her comments into account in the final permit it

¹⁰ Duffield’s Work Group meeting presentation is about the status of building demolition at SSFL, rather than the proposed NPDES permit, so she made no comparable statements in that mechanism.

issued at the end of the Water Board hearing. While it seems highly improbable that her use of passive voice at the hearing was the cause of that omission, it is plausible that it was a contributing factor, especially when viewed in conjunction with her non-expert role designation and the other structural and stylistic features of that mechanism discussed in this project.

By using passive voice, each of these speakers avoided placing or accepting blame throughout their presentations at the Water Board hearing, and also made the content of some of their messages more difficult for “public” recipients to understand. At the Water Board hearing, the use of passive voice thus mediated information flow in ways that kept the “public” from processing other speakers’ information and, in turn, from offering their own information in response. In contrast, at the Work Group meeting speakers used passive voice far less often, thus promoting the flow of speakers’ information there. As noted above, whether the “public” understands and is thus able to respond to speakers’ information with their own directly impacts what information is on the table for decision-makers and other mechanism participants to consider. The “public’s” information tends to be values-based and evaluative rather than technical, like that typical of designated STE experts, so when the circulation of that information is hampered, those decision-makers and participants do not get to consider the full range of perspectives about the issue at hand. In these ways, restricting the flow of information to and from the “public” shapes the deliberations that take place during, and the outcome of, a public engagement mechanism in ways that lead to less thorough deliberations and decisions.

III.b. Nominalizations

Nominalizations “favor stasis over action by using words in their noun forms when they might just as well be written as verbs or adjectives” (Killingsworth & Palmer, 1992, p. 173). Just as with passive voice, the Water Board and Water Board staff used nominalizations frequently in their presentations at the Water Board hearing, and often did so in conjunction with passive voice. Below, I list several of these nominalizations from the Water Board hearing transcript and include non-nominalized, active voice alternatives in brackets to highlight how nominalizations unnecessarily clutter and complicate messages:

- “After completion of oral comments” [After we *complete* oral comments] (p. 247)
- “After the conclusion of Board questions” [After the Board *concludes* their questions] (p. 247)
- “These operations resulted in contamination of soil and groundwater” [These operations *contaminated* soil and groundwater] (p. 249)
- “The Board required that an Expert Panel be convened to provide recommendations for stormwater treatment” [The Board *convened* an Expert Panel to *recommend* stormwater treatment plans] (p. 250)
- “Implementation of traditional Best Management Practices was not a viable option” [We could not *implement* traditional Best Management Practices] (p. 258)
- “The actual excavation and restabilization efforts were completed in November 2013. Some of the restabilization efforts included the installation of native plants to hold the disturbed soils in place, installation of filters with specialized media to remove specific contaminants, and installation of retention basins [...]” [We

completed our efforts to *excavate* and *restabilize* the area in November 2013.

Some of our efforts to *restabilize* included *installing* native plants to hold disturbed soils in place, *installing* filters with specialize media to remove specific contaminants, and *installing* retention basins] (p. 258)

- “Exceedance of a benchmark triggers additional actions, such as, evaluation and implementation of new or upgraded Best Management Practices” [*Exceeding* a benchmark triggers additional actions, such as *evaluating* and *implementing* new or upgraded Best Management Practices] (p. 264)

In each of these statements, the Water Board or Water Board staff made their messages needlessly wordy and complex by using passive voice combined with a nominalization, rather than active voice combined with a verb. Doing so made their messages less accessible, stymying the flow of the information contained in them, particularly to members of the “public,” who, as noted above, are less likely to be accustomed to this speaking style.

Shestag, a Boeing presenter, used nominalizations as well, in statements such as, “[...] using treated groundwater for onsite dust *suppression* and temporary *irrigation purposes* presents a wealth of opportunity to *reduce consumption* of potable water supplies” (Water Board Tr., p. 285, emphasis added). Instead, he might have said, “If we use treated groundwater to *suppress* onsite dust and temporarily *irrigate* the site, we will *use* less potable water.” Shestag also tells the Water Board that Boeing is working “to achieve full compliance with the permit,” where he could have said Boeing is working “to fully *comply*” with the permit (Water Board Tr., p. 286). Like the Water Board and

Water Board staff, here Shestag's use of nominalizations makes his messages less accessible and makes it more difficult for his message to circulate.

Likewise, the Expert Panel made statements such as, "So we know that [the devices] are working from this *performance monitoring* that we're doing at these locations in addition to *observations*, you know, at the area of *accumulation* of sediment" (Water Board Tr., p. 297, emphasis added). The Expert Panel could have made this statement easier to follow by instead saying, "We know these devices are working from *monitoring* their performance at these locations and *observing* how much sediment is *accumulating*." Especially when used in conjunction with passive voice and technical terminology, nominalizations made these speakers' messages less accessible to persons unfamiliar with this style of speaking. As such, the "public's" understanding of, and ability to respond to, this information was disproportionately excluded by these nominalizations.

Although the non-experts at the Water Board hearing (that is, the Organizations and the "interested persons," i.e. the "public") used some nominalizations, they did so only a few times, and most often in conjunction with non-technical language. For example, one public commenter at the Water Board hearing told the Water Board, "I agree with some of the previous speakers that fines of minimal amounts to such a wealthy company is not *a deterrent* to polluting" (Water Board Tr., p. 339, emphasis added). Although this speaker could have said, "do not *deter* polluting," this statement is not so complex that the nominalization makes it particularly difficult to understand. Accordingly, the non-experts' messages were likely more accessible, at least in this respect, than those of the Water Board, Water Board staff, Boeing, and the Expert Panel.

The presenters on behalf of the Organizations used virtually no nominalizations at the Water Board hearing, but did use some at the Work Group meeting. For example, Duffield stated at the Work Group meeting, “*Failure* to dispose radioactive waste appropriately can result in *contamination* of groundwater and through it, *exposure* to the public in drinking water [...]” (Duffield Tr., p. 2, emphasis added). Here, Duffield might have said, “*Failing* to dispose radioactive waste properly can *contaminate* groundwater and through it, *expose* the public through drinking water [...]” Because Duffield’s presentation at the Work Group meeting—where she spoke as a designated expert—was about a different issue than her presentation at the Water Board hearing, we cannot make an apples-to-apples comparison between her two presentations, but it is worth noting that her Water Board hearing presentation—where she held an expressly non-expert role—included no similar nominalizations.

III.c. Strings of Noun Modifiers

Strings of noun modifiers “obscure relationships among people and things by increasing the number of nouns and extending their function to replace that of adjectives, adverbs, prepositional phrases, and dependent clauses” (Killingsworth & Palmer, 1992, p. 174). As with passive voice and nominalizations, many speakers at the Water Board hearing used strings of noun modifiers, but the most frequent users were the Water Board and Expert Panel at the Water Board hearing. Examples include (cited as speaker followed by Water Board Tr. page number):

- “Groundwater remediation investigation program” (Water Board staff, p. 256)
- “National Pollutant Discharge Elimination System permit” (throughout)

- “Effluent-limit benchmark and receiving-water exceedances” (Water Board staff, p. 263)
- “Erosion control measures and treatment systems” (Boeing, p. 280)
- “Innovative statistically rigorous approach” (Expert Panel, p. 290)
- “Pollutant concentration reductions” (Expert Panel, p. 296)
- “Wastewater treatment plant” (Expert Panel, p. 302)
- “Plutonium and uranium carbide fuel fabrication facilities” (Organizations, p. 310)
- “Pollution discharge limits” (Organizations, p. 325)

Of course, some of these phrases are from the Clean Water Act itself, such as “National Pollutant Discharge Elimination System permit,” and thus unavoidable. Similarly, one of the only strings of noun modifiers at the Work Group meeting was Hirsch’s discussion of a “suburban residential cleanup level,” a term taken directly from the EPA (Hirsch Tr., pp. 3-4, U.S. Department of Energy, “Environmental Assessment”). The extensive strings of noun modifiers in phrases such as these, taken directly from laws and regulations, go to issues of accessibility of the laws and regulations themselves, rather than of the public engagement mechanisms by which they are implemented. Such terms notwithstanding, the frequent use of other strings of noun modifiers at the Water Board hearing—especially when combined with technical language, passive voice, and nominalizations—unnecessarily complicated already complex messages, further impeding information flow. Just as with the use of passive voice and nominalizations, this likely impacted members of the “public” more than anyone else at the Water Board hearing, making it harder for them to process and respond to this information. As a result, the circulation of

the “public’s” information in this mechanism was restricted, meaning that the decision-maker (the Water Board) and other mechanism participants were denied the opportunity to hear and consider it.

III.d. Acronyms

In written documents, acronyms “cause the reader unused to government jargon the inconvenience of constant page turning to locate original references or lists of abbreviations” (Killingsworth & Palmer, 1992, p. 173). They also increase the density of information that must be absorbed in a short space,” which “intimidate[s] the average reader” (Killingsworth & Palmer, 1992, p. 174). In the case of oral presentations like at the Water Board hearing and Work Group meeting, audience members lack the ability to turn a page to find out what acronyms stand for, further increasing the potential for audience members’ confusion, exclusion, and intimidation.

Overall, the presenters at the Water Board hearing and Work Group meeting used relatively few acronyms and usually defined the ones they did use (e.g. Water Board Tr., pp. 279 (Boeing: “BMPs, or Best Management Practices”), 295 (Expert Panel: “We’re now at NASA facility called the ‘LOX site,’ Liquid Oxygen site [...]”); Hirsch Tr., p. 2 (Hirsch: “the Cleanup Agreement, what we call the AOC”)). However, several times, Water Board hearing speakers used acronyms that neither they nor anyone else at the hearing defined. For example, Water Board staff stated, “These limits, which include limits for TSS, oil and grease, BOD, settleable solids, and sulfides, are for the protection of the receiving water’s beneficial uses [...]” (Water Board Tr., p. 267). No one at the hearing defined “TSS” or “BOD,” leaving those unfamiliar with these acronyms to wonder what they meant.

Even when a speaker or author defines the acronyms they use, if they use many acronyms for technical terms in close proximity to one another, this can lead to information overload for the audience (Killingsworth & Palmer, 1992, p. 174). This may have happened at the Water Board hearing and Work Group meeting, particularly when speakers used acronyms in conjunction with technical language. For example, the Expert Panel stated at the Water Board hearing, “NASA has already invested in an ELV media filter. Through extensive testing at over 70 locations, we identified that this ELV, or Expendable Launch Vehicle, was a particularly potent source of dioxins, thus, that 16-acre area is treated by the BMP that you see here; sedimentation infiltration” (Water Board Tr., p. 295). Although the Expert Panel defines “ELV,” this term combined with “NASA,” “BMP,” and specialized terminology like “dioxins,” “media filter,” and “sedimentation infiltration,” make this message difficult to absorb. Similarly, Duffield explained at the Work Group meeting:

So in July of 2013, just as Boeing was about to begin the demolition and disposal of more nuclear structures including a plutonium fuel fabrication facility, several public interest groups, Physicians for Social Responsibility-Los Angeles and Consumer Watchdog and Southern California Federation of Scientists and Committee to Bridge the Gap, filed suit against DTSC and DPH for not complying with CEQA prior to the demolition and disposal activities. In December of 2013, the court ruled that there was a reasonable likelihood that DTSC had violated CEQA in permitting the Area 4 building demolition before conducting environmental review. (Duffield Tr., p. 2)

Here, the combination of acronyms, strings of noun modifiers, technical language, nominalizations, and a very long first sentence potentially makes this passage particularly overwhelming for listeners.

Overall, presenters at both the Water Board hearing and Work Group meeting did not use acronyms extensively, but when they did, it likely further impeded the flow of the information contained in their messages, particularly to members of the “public.” Thus we see a continuation of the trend whereby the stylistic features speakers used hampered the “public’s” processing of and ability to respond to the information presented. This, in turn, leads to a skewed universe of information before the decision-maker: when the “public’s” information cannot circulate, or its circulation is restricted, the information of other presenters such as the Expert Panel and Boeing comprises a disproportionately large amount of the information upon which the Water Board will make its decision, likely impacting not only the procedural exercise of the mechanism but its substantive outcome as well.

III.e. Technical Language

Using technical language that is unfamiliar to one’s audience makes a message more difficult for that audience to understand (Rowe & Frewer, 2005, p. 273) and increases audience confusion (Killingsworth & Palmer, 1992, p. 172). By “technical language,” here I mean “true jargon,” “pseudo (popular) jargon,” and “specialized vocabularies” (Ike, 2002, pp. 8, 12). “True jargon” is “technical words or vocabulary freely used and generally well understood among members of a particular profession” (Ufot, 2013, p. 624, citing Ike, 2002, p. 8). “Popular jargon” is “verbose, pompous, and overdosed with clichés and hackneyed expressions that mostly add little or nothing to the

general meaning of what is written but rather tend to obscure the real meaning to a point of incomprehensibility (Ufot, 2013, p. 624, citing Ike, 2002, p. 8). Much of this kind of jargon is captured in the previous sections on passive voice and nominalizations. Lastly, “specialized vocabulary” consists of “words that have different meanings in general English from the meaning in the technical sense” (Ike, 2002, p. 12). Such language, “however unintelligible to the layman, is never obscure as long as it is used in its proper context. But when it is employed by experts to laymen who do not understand it, it is both a form of bad manners and, like pseudo-jargon, a barrier to communication” (Ufot, 2013, p. 624). Further, “[i]n social terms, jargon helps to create and maintain connections among those who see themselves as ‘insiders’ in some way and to exclude ‘outsiders’” (Ufot, 2013, p. 624). As we will see below, this language likely did just that at the Water Board hearing.

Just as we saw with passive voice, nominalizations, and strings of noun modifiers, speakers for the Water Board, Boeing, and the Expert Panel used technical language frequently in their Water Board hearing presentations. For example, Water Board staff explained that, “The chronic test evaluated using the Test of Significant Toxicity methodology is more stringent, and the chronic test evaluates the acute endpoint of mortality along with growth and reproduction” (Water Board Tr., p. 267). Here, “chronic,” “significant toxicity,” and “acute endpoint” are specialized vocabulary, which have specialized meanings in this context that only persons familiar with such testing understand. This jargon-filled sentence is likely inaccessible to persons unversed in this specialized vocabulary, meaning the information contained in it will not flow to them.

Similarly, Boeing explained, “Prior to 2009, we installed flow-through multimedia infiltration systems at outfalls and subsequently upgraded them using a media blend developed by the Expert Panel” (Water Board Tr., p. 281). This sentence includes more technical than non-technical terms, and excludes as outsiders anyone not familiar with terms such “flow-through multimedia infiltration systems,” “outfalls,” and “media blend.” Likewise, the Expert Panel stated, “Permit limit exceedances at Outfall 009 persist for lead and dioxins at low concentrations and they’re undoubtedly partially affected by atmospheric and natural soil contributions” (Water Board Tr., p. 300). This sentence is rife with jargon and could easily be restated as follows to be more accessible: “At Outfall 009, lead and dioxin are still exceeding permit limits at low concentrations. Contributions of these substances from the atmosphere and soil are no doubt partially affecting these levels.” The extensive use of technical language excludes those who are not well-versed in it—namely, the “public”—from understanding these statements, thereby preventing this information from flowing to them. Once again, it also further prevents any potential responses to it, since one cannot substantively respond to a message that he or she cannot access.

One might think there is no way to avoid technical language when speaking about technical issues, and that exclusion is therefore a necessary if unintended consequence of such communications. But the Organizations’ speakers demonstrated that this is not the case. For example, Hirsch explained at the Water Board hearing, “Remember that we’re in a drought [...] there simply hasn’t been much rain.” (Water Board Tr., p. 334). Water Board staff explained this same concept with more technical language: “the discharge that is regulated by this permit only occurs during wet weather, except for a small amount

of groundwater that is treated before it is discharged, and, as we all know, we haven't had many wet-weather events over the past three years" (Water Board Tr., pp. 251-252). Instead of discussing "wet-weather events," Hirsch simply discussed "rain," making his message accessible to all listeners.

Along similar lines, Water Board staff explained, "The site is located actually in two watersheds, the upper reaches of the Los Angeles River and the Arroyo Simi, which drains to Calleguas Creek and the Mugu Lagoon" (Water Board Tr., p. 250). Gortner also conveyed this same information at the Water Board hearing, but with less technical language. She said, "And, as you've heard, the water is running off in different directions, including into the L.A. River—the headwaters for the L.A. River—and the Arroyo Simi, which flows all the way to the ocean and recharges groundwater in Simi used in part for drinking water and elsewhere for agriculture" (Water Board Tr., p. 316). Her message dispenses with technical language, making it easier for everyone to access. Similarly, at the Work Group meeting, she said:

Why do we care about the water? Well, Santa Susana is on the top of a hill. So logically when it rains, all the radioactive and chemical contamination that is getting into the soil near the water can run off down the hill into multiple locations. Here is a picture of the water going off. Water is running where? Well, it is running into a number of areas, partially into Bell Creek which is the headwaters for the L.A. River. It is also running in our area over here in Simi towards Arroyo Simi, Runkle Canyon and Dayton Canyon. (Gortner Tr., p. 1)

Instead of a dry, technical explanation of the site's location in relation to "watersheds," Gortner's explanations at both the Water Board hearing and Work Group meeting used

primarily non-jargon language, telling listeners that the site is “on top of a hill” and that “water is running off in different directions.” Further, unlike Water Board staff, Gortner adds context to make this information meaningful to her audience by explaining that this water ends up in our drinking and agricultural supplies. From examples like these we see that the Organizations’ presenters—at both the Water Board hearing and Work Group meeting—generally used less technical language than the Water Board staff and Expert Panel. In doing so, they proved that one can demonstrate command of complex concepts without using complex terminology, which increases the circulation of information to all participants. However, unless one views their target audience as persons unfamiliar with such terminology, they have no motivation to do so.

III.f. Narrative

Narrative communication is associated with increased recall, easier comprehension, and higher engagement than traditional logical-scientific communication (Dahlstrom, 2014, p. 13615). In addition, once out of school, narrative is one of the most common formats through which scientific information is delivered to members of “the public,” via the mass media (Dahlstrom, 2014, p. 13614). Key features of narrative communication are: (1) the depiction of cause-and-effect relationships (causality); (2) that take place over a particular period of time (temporality); and (3) that impact particular characters (character) (Dahlstrom, 2014, p. 13615).

Water Board staff did not utilize narrative in their presentations at the Water Board hearing. Instead, they spoke only of the proposed permit terms, the written comments they received about those terms (e.g., “the first comment [...],” “the next comment was [...]” (Water Board Tr., p. 267), and their responses (e.g., “The staff’s

response is [...] (Water Board Tr., p. 267). Further, not only did Water Board staff not use narrative, but, as explained above, they also frequently omitted actors from their statements through the use of passive voice.

In contrast, Boeing's presenters framed their presentations in part as a narrative. Shestag explained:

Since the last hearing in 2010, we've ceased all industrial operations at the site; we've substantially completed demolition of Boeing's building infrastructure; we've cleaned up numerous source areas; we've constructed several advanced stormwater treatment systems; and we've completed extensive erosion control and re-vegetation actions all in the interest of improving water quality. As a result, we made considerable progress in achieving compliance at the majority of the outfalls. [...] And these have greatly improved water quality in those areas [...].” (Water Board Tr., p. 277)

Here, Shestag presented a cause-and-effect relationship between Boeing's actions and improving water quality at SSFL, over a period of time. Similarly, another Boeing presenter, Debbie Taege, explained, “Over the past six years, Boeing has implemented a variety of Best Management Practices to improve surface water quality through an iterative and adaptive process. [...] [T]hese BMPs, or Best Management Practices, have been effective in treating stormwater compounds, such as, metals and dioxins” (Water Board Tr., p. 279). Shestag concluded Boeing's presentation by stating:

[W]e hold true to our commitment that we expressed six years ago, and that is to take actions to protect public health and improve water quality and strive for 100 percent compliance, to work with the Board and the stormwater Expert Panel to

implement the best technical solutions to achieve full compliance with the permit, to keep the community informed of our progress and efforts, and to engage with others on the best practices to help advance effective stormwater solutions at the Santa Susana site. (Water Board Tr., p. 286)

By framing the issue of permit compliance as a narrative about a permittee on a journey to improve water quality and protect public health, Shestag effectively communicated a memorable and easy-to-comprehend message about his company.

In contrast, when Shestag asked the Water Board to lax the terms of the proposed permit, he obscured the meaning of his requests by framing them in technical terms without the use of narrative. For example, he stated:

Our first request is that the aquatic toxicity requirements be based on the duration of the discharge. As noted in our written comments, the discharges from the site's outfalls are intermittent, they're infrequent, and they're short duration. The permit should establish (indiscernible) toxicity limits for discharges of only seven days or longer and acute toxicity limits for discharges of less than seven days. This is more appropriate based on the actual exposure. (Water Board Tr., p. 285)

By expressing requests such as this one in dry, technical terms with no narrative arc, Shestag made his message less accessible and memorable to persons unaccustomed to this communication style. Similar to his strategic use of passive voice, Shestag used narrative to enhance the flow of positive information about Boeing while hindering the flow of negative information about it.

The Expert Panel used narrative in much the same way as Shestag did when he discussed Boeing's progress—it told a narrative story about its efforts at the site and the

impacts of those efforts over time. For example, Expert Panelist John Jones explained that “our panel has been together—it’s hard to believe—for seven years, and it’s been a great pleasure. [...] We have received input from the public via e-mail and at [many] meetings, and that has made a big impact on the way that we’ve approached this. We’ve also had an excellent working relationship with your staff [...] Of course, we’ve worked regularly with NASA and Boing [...] As a result of this big, collaborative effort, BMPS have been implemented [...]” (Water Board Tr., p. 300). Although neither Boeing nor the Expert Panel told lengthy or extensive narratives, they framed their presentations in part as narratives about the cause-and-effect of their actions at the site over time. This familiar causality/temporality/character structure aided listeners in understanding their messages (*see* Dahstrom, 2014, p. 13615), thereby promoting the circulation of the information they contained.

The Organizations utilized narrative more so than any other presenters at the Water Board hearing. After introducing himself, Daniel Hirsch began his presentation by telling his audience:

Thirty-five years ago, I was teaching at UCLA and some of my students began a research project that uncovered a partial nuclear meltdown at the Santa Susana Field Laboratory that had been kept secret for 20 years. With additional research, they found that, not only was it kept secret, but many other accidents had occurred at the facility producing widespread radioactive and chemical contamination. (Water Board Tr., p. 307)

He continued:

The government and the company that ran the site were neither candid nor open and, on top of that, they had a very cozy relationship between the regulator and the company. These problems have continued now for the 70 years since that site was established, and we are here today to talk about a—we're going to petition that pattern that places people at risk, a longstanding disregard of environmental rules, and a spending of money primarily through lobbyists to relax regulatory requirements. [...] The site continues to leak badly; Boeing is cutting corners terribly to avoid its obligations to stop the releases. The ISRA hasn't worked.

(Water Board Tr., p. 307-308)

These passages reflect the storytelling nature of Hirsch's presentation. Unlike Boeing and the Expert Panel, Hirsch framed not only his own actions but those of everyone he spoke of in narrative form; he cast each person as a character in a gripping narrative about the site. Doing so made it easier for his audience to follow and remember his message, and in this way enhanced its circulation, especially to members of the "public."

Organizational presenter Duffield took a similar approach. She explained: "As you've heard, the Santa Susana Field Lab was established in the late '40s for rocket testing. In 1949, it was chosen for nuclear testing that was considered too dangerous to do in a populated area; population has since dramatically increased [...]. There were many nuclear accidents at the site" (Water Board Tr., p. 309). As she told this chronological story, she showed corresponding photographs, further cementing the narrative in viewers' minds (Water Board Tr., pp. 309-310). She then stated, "The health impacts of radionuclides: This is why our organization is involved, this is why a physician's organization has been involved in efforts to clean up the fuel lab for over 30 years; this is

why we're all here; this is why we should be here: Because the materials that we're talking about impact people's health, they impact their lives and their well-being" (Water Board Tr., p. 312). Duffield likewise used narrative in her presentation at the Work Group meeting, explaining to her audience that "Boeing dumped a total of 1,963 tons of waste into sites not designated for radioactive waste and it recycled 2,925 tons of contaminated debris [...]. Where did it go? These are some sites throughout Southern California that it went to [...]. None were licensed to receive radioactive waste. There are a couple matters that are at issue here, first the potential impacts on public health [...]." (Duffield Tr., p. 2). In each of these presentations, Duffield, like Hirsch, conveyed her message as a narrative replete with characters that caused effects over time, helping her audience to absorb and remember it.

The use or absence of narrative in each of these presentations thus mediated the flow of information at these mechanisms by enhancing the circulation of the information conveyed in narrative form while hampering the flow of information conveyed without it.

III.g. Precise Language

In reviewing the public comments at the Water Board hearing, one immediately sees that many of them had a different feel than the statements made by other speakers at both the Water Board hearing and Work Group meeting. Upon closer examination, one sees that one reason for this difference, in addition to the stylistic features discussed above, is a lack of precise language. This lack of precision demonstrated a potentially costly lack of interactional expertise, and at times resulted in statements that were, on their face, inaccurate. For example, one commenter stated:

I live in the community. I have gardened at the community garden that's within a couple of miles, and I know people who died of cancer who were gardeners there. There were many former Boeing workers who have worked there and many of them have gotten cancer. I believe that it is really imperative to this community that this Board follow up on making the discharge of water not allowed into our community of pollutants. (Water Board Tr., p. 339)

In contrast to this comment, other presenters at the Water Board hearing and Work Group meeting used precise measurements and quantities. For example, Duffield stated that “[t]he incidence of cancer was more than 60 percent greater among residents living within two miles of the site than of those living within five miles for types of cancer including thyroid, upper aero/digestive track, bladder, blood, and lymph tissue” (Water Board Tr., p. 314). The “public” comment above, in contrast, discussed a garden that is “a couple of miles” from SSFL, and “many” people who have gotten cancer. Further, the “public” commenter asked the Water Board to “mak[e] the discharge of water not allowed into our community of pollutants” (Water Board Tr., p. 339). Although the sentiment of this statement may be that the Water Board should not allow Boeing to discharge pollutants at levels that endanger people and the environment, as stated this comment asks that no discharge of pollutants be allowed at all. This is not only unrealistic for this site but likely impossible, as there are naturally occurring levels of certain pollutants in the environment, even for sites without contamination as extensive as that at SSFL (*see*, e.g., the Expert Panel’s statements that “atmospheric and natural soil contributions” contribute to contaminant discharge levels and that “no stormwater site ever has zero violations if they have a permit that’s stringent” (Water Board Tr., pp. 300,

304)). The imprecision of this “public” comment conveys a lack of both interactional and contributory expertise, and lies in stark contrast to the precise nature of other speakers’ remarks.

Another “public” commenter reflected this trend by stating:

[...] I’ve been involved with trying to get the site cleaned up for over 25 years.
[...] And I feel the standards that we’re allowing for Boeing to dump all the contaminants is wrong. And they’re the polluter, and they need to clean up the site completely. [...] And I feel that the water standard needs to be really strict and Boeing should not be discharging anything. And if they are, fine them, fine them so hard that it bites their tushes. (Water Board Tr., pp. 340-341)

While the idea of “clean[ing] up the site completely” may sound appealing at surface level, those familiar with the laws and the science surrounding the cleanup know this is neither financially nor practically feasible. Further, although the statement “Boeing should not be discharging anything” may express a popular sentiment, it is, as stated, a factual impossibility. A “discharge” simple means a release, and discharges of water happen regardless of whether that water contains pollutants. Moreover, informal and imprecise statements like, “fine them so hard it bites their tushes” likely detracted from the degree of seriousness with which the Water Board viewed this speaker’s comment, as they convey a lack of interactional expertise.

Likewise, this “public” commenter stated regarding the fines the Water Board has assessed against Boeing for its permit violations, “I feel that this Board needs to enforce the cleanup, enforce that fine, make it really steep. Don’t make it like a little dollar or whatever; make it billions of bucks, because that’s how much this corporation is making.

And they don't care about our health" (Water Board Tr., p. 341). Once again, this speaker is well intentioned but exhibits a fundamental lack of understanding, or utter disregard for, the legal limitations and realities of the situation, as well as a lack of interactional expertise. Assessing Boeing fines of "billions of bucks" is not only entirely unrealistic, but also illegal. While this commenter may be expressing a sentiment with which many people agree, her lack of demonstrated interactional expertise in these inaccurate and imprecise overstatements may have prevented her from achieving credibility with her certified expert audience.

Statements such as these conveyed to these speakers' audience a lack of interactional expertise. These "public" commenters are arguably uncertified experts regarding community experiences and desires about SSFL's cleanup. However, the imprecision and inaccuracy of their words may have caused the certified experts and decision-makers to whom they were speaking to see them as unknowledgeable and lacking understanding. This in turn could have lead those certified experts and decision-makers to disregard the input of those "public" commenters' because it did not look or sound like the type of input that they believed qualified as valuable. In this way, the use of precise versus imprecise language acted as a Mediatonal Means that impeded the flow of information presented with imprecise language and promoted the flow of information presented with precise language. In addition, the "public's" use of imprecise language, like the presentation of irrelevant or erroneous information discussed in Chapter 4, reinforced the notion that the failure to designate any of the "public" commenters as experts at the Water Board hearing was warranted, and that the "public" lacked the

contributory and/or interactional expertise required to be valuable participants in STE deliberations and decisions.

III.h. Deferential Language

Another stylistic feature that differed among participants at the Water Board hearing and Work Group meeting is whether they used deferential or authoritative language. By “deferential” language or style, I adopt Jo Liska, Elizaebeth Mechling, and Susan Stathas’s concept of “deferential language” as a language category comprised of the following “set of language characteristics”: “speaking more frequently, being interrupted more frequently, using more tag questions [questions formed by adding an interrogative fragment to the end of a declarative statement, e.g., “You’re John, aren’t you?”], using more ‘wh’ imperative constructions, avoiding coarse language and expletives, more frequently posing questions rather than making statements, using more qualifiers, using more apologies, more polite commands, and using more modal construction (can, may, would, should, and ought) (1981, p. 41). Of particular relevance here are qualifiers and polite commands. In this section I juxtapose “deferential” language with “authoritative” language. By “authoritative” language or style, I mean the corollaries to the deferential language characteristics, particularly the use of fewer qualifiers and polite commands. By “authoritative” style, I also mean assuming a teacher-like role, wherein one positions him or herself as an explainer of specialized knowledge, rather than a subordinate requester. Whether one uses deferential or authoritative language is significant because persons who use deferential language are perceived as having less power and slightly less believability (1981, p. 47).

In examining the Water Board hearing and Work Group meeting transcripts of Gortner, the only presenter who spoke about the same issue at both proceedings, an interesting trend emerged: she used a more deferential style at the Water Board hearing, where she was in an expressly non-expert role, and a more authoritative style at the Work Group meeting, where she was cast as a resident expert. For example, Gortner defined terms for her audience at the Work Group meeting but not at the Water Board hearing. At the Water Board hearing, she discussed “violations” without any explanation of what this term meant, but at the Work Group meeting, she explained, “What is a violation? That means it has exceeded the amount that the permit has said is safe for the public” (Gortner Tr., p. 2; Water Board Tr., p. 317). One likely reason for Gortner’s added explanations at the Work Group meeting is that she knew that her Water Board audience was already familiar with the specialized terminology she used, while her audience of community members at the Work Group meeting may not have been. But there is another factor worth considering.

By explaining these terms to her audience at the Work Group meeting, Gortner cast herself as an expert and teacher who possessed specialized knowledge that her audience lacked. At the Water Board hearing, in contrast, Gortner was not granted expert status and therefore was not speaking from a place of authority. When speaking in this non-authoritative role, Gortner no longer addressed her audience as a teacher addresses a class of students: she omitted phrases such as “I will explain to you,” “I think it is important,” “we want the community to be aware,” and “I am going to show you” (Gortner Tr., p. 1). She also omitted statements to her audience that told them how to interpret the information she gave them. For example, at the Work Group meeting she

told her audience that the new permit was less protective of the public, and that “[m]ercury, for example, we all know mercury is not good for people. That has changed from 0.02 pounds to 0.07 pounds per day which is three times more. This is amazing” (Gortner Tr., p. 2). At the Water Board hearing, she merely stated that “[m]ercury changed from .2 to .7” (Water Board Tr., p. 319). In this way, she transitioned from an authoritative, explanatory speaker at the Work Group meeting to a mere relayer of information at the Water Board hearing. It is impossible to determine from the bounds of this project what the impacts or significance of this difference is, but it seems worthy of further exploration.

Along similar lines, Gortner made non-qualified statements at the Work Group meeting, but qualified them at the Water Board hearing. For example, at the Work Group meeting she told her audience in unqualified language that the proposed NPDES permit “eliminated monthly average pollution limits and *they are not sampling frequently enough*” (Gortner Tr., p. 3, emphasis added). At the Water Board hearing, on the other hand, she deferentially stated, “They’ve also eliminated monthly average pollution limits for the outfalls, and *we don’t feel that sampling is occurring frequently enough*” (Water Board Tr., p. 320, emphasis added). The addition of “we don’t feel,” combined with passive voice that avoids pointing a finger at the Water Board, made this statement less authoritative than the one Gortner made at the Work Group meeting.

Likewise, in explaining her efforts to identify the differences between the old and proposed NPDES permits, Gortner used unqualified language to authoritatively tell her Work Group meeting audience:

They called the new permit a reissuance. Well a reissuance sounds pretty, you, know, harmless. But if you read the fine prints, you would find many things changed and not in the public's favor. So I called the Water Board saying, 'look, you really want me to read this 180 page document, line by line, and compare it to the other one? Are you kidding me?' (Gortner Tr., p. 1-2)

In contrast, she deferentially explained this to her Water Board audience using qualifiers and polite language as follows:

They called it a re-issuance, but we disagree. We think there are quite a few changes. [...] So I did call the Water Board. Mazur Ali is a very nice person. I asked him, 'Is there, please, a list of changes? I really can't go through this. And he said no. He referred me to one specific page, but there was no list of changes. So I didn't feel that [was] very helpful for the public. (Water Board Tr., p. 318)

In her explanation of this issue at the Work Group meeting, where she was a designated expert, Gortner was commanding and assertive, but when she explained this same issue to the Water Board in an expressly non-expert capacity, she was deferential and polite bordering on timid. Gortner repeated this pattern when discussing the changes between the old and new permits. She assumed her teacher role and stated authoritatively at the Work Group meeting, "And the old permit was weak to begin with and was actually expired April 10th of last year. And this new permit, I will explain to you in detail, is even less protective of public health" (Gortner Tr., p. 1). But at the Water Board hearing, she deferentially told the Water Board, "We also felt the old permit was weak and expired and the new permit we believe is even less protective" (Water Board Tr., p. 316). By adding qualifiers such as "we also felt" and "we believe," she positioned herself as

less authoritative and more deferential when speaking at the Water Board hearing versus the Work Group meeting.

In these ways, Gortner made moves to cast herself as an authority figure at the Work Group meeting made that she did not make at the Water Board hearing. Exactly how these moves impacted the flow of information at these mechanisms is difficult to know, but because the use of deferential language is associated with less power and less believability, it stands to reason that her authoritative statements may have circulated more than her deferential, qualified statements, since the former conveyed a sense of confidence and expertise that the latter seemed to lack.

IV. Conclusion

Speakers at the Water Board hearing and Work Group meeting were addressing different audiences in public engagement mechanisms that had different aims. The primary audience for the Water Board hearing presenters was the Water Board—the decision-makers—and the purpose of that mechanism was to reach a decision on the terms of the revised NPDES permit. In contrast, the primary audience at the Work Group meeting was members of “the public,” and that mechanism’s aims were to inform “the public” of the presenters’ views on the problems with the proposed permit’s terms, and to persuade them to comment on the permit at the upcoming hearing.

In examining the stylistic features of the presenters in each of these mechanisms, several trends emerged. Regarding passive voice, speakers in positions of authority tended to use active voice to explain their accomplishments (e.g. Shestag regarding Boeing), or when they sought to place blame (e.g. Gortner at the Work Group meeting), and used passive voice to obscure responsibility for their actions (e.g. Shestag and Water

Board staff at the Water Board hearing). When some of those same speakers were placed in non-authoritative positions, they tended to use more passive voice (e.g. the Organizations at the Water Board hearing). Regarding nominalizations and acronyms, speakers in authoritative designated expert roles tended to use them more than speakers in non-authoritative, non-expert roles. This was particularly evident in the Expert Panel's use of nominalizations and acronyms, as well as the Organizations' speakers' use of these features at the Work Group meeting but not at the Water Board hearing. We also saw extensive use of noun modifiers and technical language at the Water Board hearing but hardly any at the Work Group meeting. Another noteworthy trend is the use of imprecise language by members of "the public," compared to much more precise language by other speakers, which likely hampered the flow of "public" commenters' information. Finally, by comparing one speaker's presentations on the same issue at both the Water Board hearing and Work Group meeting, we saw that she tended to use a more authoritative speaking style when holding an designated expert role, and a more deferential one when in a non-expert role. While the exact relationship between deferential versus authoritative speaking style and information flow is difficult to ascertain here, the use of deferential language likely negatively impacted speakers by causing audiences to view them as less powerful and less believable

Overall, just as we saw with structural features, the stylistic features of speakers' messages at the Water Board hearing tended to reinforce the unfortunate notion that members of the "public" lack the sophistication or understanding necessary to participate meaningfully or productively in STE deliberations or decisions, and thus that those persons were properly denied expert status there. They also tended to promote the

circulation of the designated experts' information while hampering the circulation of the "public's" information. As such, these stylistic features served as Mediation Means that by and large restricted the flow of the "public's," and to some extent the Organization's, information at the Water Board hearing. This left the decision-maker a skewed universe of data—consisting primarily of the Expert Panel's and Boeing's information—to consider in setting the new NPDES permit's terms. In this way, the stylistic features of participants' messages at the Water Board hearing acted as Mediation Means that omitted from deliberation the diversity of perspectives that robust circulation of the "public's" information would have made possible. I address this omission's impacts on substantive outcomes in the next chapter.

CHAPTER 6

IMPLICATIONS AND FUTURE RESEARCH

This project examined the transcripts of two STE public engagement mechanisms—the February 12, 2015 Water Board hearing and the February 4, 2015 Work Group meeting—to explore whether, and if so, how (1) being designated as an expert or non-expert; (2) the structural features; and (3) the stylistic features of participants’ contributions, operated as Mediation Means to mediate the flow of information in each mechanism. Below, I provide a brief summary of my findings, then consider how these Mediation Means work together in each mechanism to mediate information flow. I follow that with an analysis of the impacts these Mediation Means had on the measurable outcomes of the Water Board hearing, and close with a discussion of how future work might build on this study.

I. Summary of Findings

I.a. Role Designations

Examining <expert> and <public> as ideographs (McGee 1980) at the Water Board hearing and Work Group meeting unearthed important, otherwise unspoken connotations and associations that these role designations carried with them at each mechanism. Specifically, this examination revealed that: (1) <expert> signified the possession of formal credentials at the Water Board hearing but not the Work Group meeting, which has implications for whose, what, and how information flowed at each mechanism; (2) <expert> signified the possession of “encyclopedic” knowledge at both mechanisms, which restricted whose, what, and how information flowed; and (3) the relationships between the recognized experts and assumed non-experts in each

mechanism further mediated the flow of information. Below, I address each of these findings in turn.

I.a.i. Certified Versus Uncertified Designated Experts

First, the ideograph of <expert> at the Water Board hearing and Work Group meeting signified two very different ideologies about whether expertise is tied to the possession of formal credentials. At the Water Board hearing, only persons with formal credentials were designated experts. Indeed, of the six members of the Water Board hearing's Expert Panel, five held PhDs (the sixth holds a Masters), five were current or past professors, three were registered "Professional Engineers," and one was certified as a specialist in the field of water resources engineering. In contrast, the non-experts at the Water Board hearing lacked advanced degrees or formal certifications regarding the issues on which they spoke. Instead, they possessed contributory knowledge acquired through years of firsthand experience, but this was insufficient to qualify them as designated experts in this public engagement mechanism. In contrast, the designated experts at the Work Group meeting were treated as such despite lacking formal certification. Indeed, some of the same persons designated as experts at the Work Group meeting were explicitly designated as non-experts at the Water Board hearing. As such, we can conclude that at the Water Board hearing, <expert> represented an ideology that formal training and certification matter, while the Work Group meeting overlooked this formality and, instead, the ideograph of <expert> there represented an ideology that experience-based knowledge is what matters.

Relatedly, <expert> at both mechanisms reflected an ideology that being an expert requires both contributory and interactional expertise, but at the Water Board

hearing this expertise was not sufficient—the designated experts there needed formal credentials as well. At both the Water Board hearing and the Work Group meeting, the persons recognized as experts displayed both contributory and interactional expertise. That is, they had both substantive contributions to make and the ability to communicate them in ways that resonated with their audiences. However, at the Water Board hearing, several persons deemed non-experts also demonstrated both contributory and interactional expertise, but lacked formal credentials, and were not granted expert status. Specifically, while the Expert Panel members used specialized language that demonstrated their belonging in the discourse community of hydrology experts, so too did several Organizations speakers and public commenters. Yet, despite using the specialized language of the technical discourse community in which they sought membership, the Organizations speakers and public commenters were not recognized as experts at the Water Board hearing. In contrast, these same speakers were the designated experts at the Work Group meeting. As such, it appears that contributory and interactional kinds of expertise were necessary to obtain expert status in both mechanisms, but that these kinds of expertise were sufficient only at the Work Group meeting. At the Water Board hearing, the designated experts had to possess not only contributory and interactional expertise, but had to be certified via formal credentials, as well.

Because role designations at the Water Board hearing and Work Group meeting were tied to the possession of formal credentials, they served as Mediation Means that mediated whose, what, and how information flowed in each mechanism. At the Water Board hearing, only persons certified with credentials were designated as experts. This

meant that (aside from the decision-makers—members of the Water Board) only persons with formal credentials spoke from a place of authority, and only their information flowed down to “the public,” or laterally to the Water Board. On the other hand, the non-credentialed non-experts in this mechanism—the Organizational speakers and public commenters—spoke from a place of no such authority or deference, and their information flowed up from their non-authoritative positions. Indeed, as we will see below, no input from these non-experts was incorporated into the final NPDES permit.

In contrast, role designations at the Work Group meeting mediated the flow of information differently: persons without formal credentials were the designated experts who spoke from a place of authority and deference, allowing their information to flow more freely and persuasively. Recognizing these uncertified experts as contributory designated experts would be one answer to scholars’ calls to reconceptualize where expertise resides, and how and by whom knowledge is constructed (Flower & Heath, 2000, p. 53). Moreover, persons who hold advanced degrees tend to come from higher socioeconomic backgrounds (Cahalan & Perna, 2015, p. 39). Therefore, public engagement mechanisms that recognize the potential value of uncertified experts’ contributions provide opportunities for persons of lower socioeconomic status to speak from positions of authority and to share their experiential knowledge in ways that mechanisms recognizing only certified experts do not. In these ways, recognizing persons without credentials as experts begins to address scholars’ (e.g., Benhabib, 1994, pp. 33-34; Long, 2008, p. 205) pleas for greater inclusion of marginalized voices in public engagement mechanisms.

I.a.ii. The Possession of “Encyclopedic” Knowledge

A notable similarity between the Water Board hearing and Work Group meeting was that the designated experts in both mechanisms demonstrated scientific, “encyclopedic” knowledge. While at the Work Group, the designated experts also demonstrated evaluative, values-based knowledge, all of the designated experts in both mechanisms utilized “encyclopedic” knowledge. This reliance on “encyclopedic” knowledge is significant. It “technicizes” the issues considered in these mechanisms, shifting the central question away from the “safe enough” aspect of “how safe is safe enough”—an evaluative, values-based question that persons lacking technical knowledge about hydrology could answer. Instead, the central question becomes one focused on “how safe,” which requires specialized knowledge to answer. The controversies at issue at the Water Board hearing and Work Group meeting are no doubt technical, thus requiring some participants to possess technical knowledge. However, granting expert status only to those persons with such knowledge excludes important voices and considerations from the conversation, and sends the message that qualitative concerns and input are less important than quantitative ones. In this way, the designation as experts of only those persons possessing technical knowledge is a Mediatonal Means that mediates—in this case by restricting—the flow of information in these mechanisms.

I.a.iii. Relationships Between Designated Experts and Non-Experts

The final trend we saw regarding the ideographs <expert> and <public> at the Water Board hearing and Work Group meeting concerned how the relationships between these groups mediated information flow. At the Water Board hearing, the designated experts and non-experts were explicitly treated as distinct entities in a one-directional

hierarchy, whereby the designated experts' job was to educate and enlighten "the public." At the Work Group meeting, on the other hand, the line between the designated experts and "the public" was less distinct. This was evidenced in several ways. First, the designated experts at the Water Board hearing were explicitly labeled as such, while the Work Group meeting dispensed with such titles. Second, the designated experts at the Water Board hearing spoke in ways that clearly delineated themselves from "the public," while the designated experts at the Work Group meeting spoke in ways that identified themselves as both members of a community of experts and of "the public." For example, the Expert Panel at the Water Board hearing explained that they "advise the public" and that they "have taken on the job of informing the public" (Water Board Tr., p. 288). In contrast, one of the designated experts at the Work Group meeting positioned herself as a member of "the public" when she explained: "if any public person wanted to really understand what the new permit was compared to the old one, they had to spend several days, hours, I don't know, it was a long time going through it. [...] So I called the Water Board saying, "Look, you really want me to read this 180 page document, line by line and compare it to the other one?" Lastly, the Water Board hearing took a transmission model view of the designated expert-"public" relationship, as evidenced by the Expert Panel's explanation of their role as to "advise the public" and "informing the public" (Water Board Tr., p. 288). The Work Group meeting took a more interactive view, expressly seeking participation by "the public" rather than seeking only to inform them. We see this in statements such as Gortner's closing remark at the Work Group meeting that, "we are letting you know that we would request people to attend the [Water Board] hearing next week and I encourage you to speak up" (Gortner Tr., p. 4). These

differences further demonstrate how role designations mediate the flow of information in these mechanisms.

I.a.iv. Implications of “Expert” and “Public” Role Designations as
Mediational Means

Taken together, we see that <expert> and <public> at the Water Board hearing and Work Group meeting reflect distinct ideologies about power and knowledge. While the designated experts in both mechanisms demonstrated contributory expertise, interactional expertise, and “encyclopedic” knowledge, only those persons possessing formal credentials were designated experts at the Water Board hearing, while persons with experienced-based knowledge but lacking formal credentials were designated experts at the Work Group meeting. As such, we see that at the Water Board hearing, <expert> represented an ideology that credentials and formal training matter, while at the Water Board hearing, this term represented an ideology that experience-based knowledge is what matters.

This difference matters. It allowed persons who possessed valuable, experience-based knowledge but lacked formal credentials to speak from a position of authority at the Work Group meeting but not at the Water Board hearing. Further, because formal credentials require time and money to acquire, and because the majority of people who hold advanced degrees come from higher socioeconomic backgrounds (Cahalan and Perna 39), this difference has important implications for the relationship between power and socioeconomic standing as well. In these ways, the Work Group meeting offers an example of one way to answer scholars’ calls for greater inclusion of marginalized voices in public engagement mechanisms. Lastly, the uncertified designated experts at the Work

Group meeting demonstrated that one can possess relevant technical, quantitative knowledge about a subject and be able to communicate that knowledge without possessing formal credentials about it, calling into question the use of credentials as a means of assessing expertise. In each of these ways, role designations operated as Mediation Means in these mechanisms, impacting how information flowed among participants.

I.b. Structural Features

Prior research has shown that the structural features of a public engagement mechanism directly impact the effectiveness of that mechanism (Rowe & Frewer 2005, pp. 262, 264), and the Water Board hearing and Work Group meeting were no exception. Analyzing the Water Board hearing and Work Group meeting transcripts revealed several key differences between the structural features of these mechanisms—differences that highlight how these structural features mediated information flow in each mechanism.

First, the timing and notification procedures of the Work Group meeting increased access to it more so than those of the Water Board hearing, making Work Group meeting more likely to maximize participants than the Water Board hearing. While the Work Group meeting was held at 6pm on a weeknight, the Water Board hearing was held at 9am on a weekday, making it difficult for people who work on weekdays to attend. Not only did this difference make it practically easier for people to attend the Work Group meeting than the Water Board meeting, but it also sent a message to potential participants that their attendance was valued and was taken into consideration in scheduling the Work Group meeting but not the Water Board hearing. Further, the Water Board hearing's notice procedure decreased the likelihood that members of "the public" would participate

in that mechanism The subject line of the email in which the Water Board circulated the proposed NPDES to persons signed up for their listserv read, “Tentative Waste Discharge Requirements for Boeing Santa Susana Field Lab,” giving no indication to recipients that “the public” could comment on the proposed permit. The subject line could have easily indicated that there was a role for the public here, by stating, for example, “Opportunity for Public Comment on Tentative Waste Discharge Requirements for Boeing Santa Susana Field Lab,” or “Tentative Waste Discharge Requirements for Boeing Santa Susana Field Lab Open for Public Comment.” Moreover, persons not on the listserv could not view the tentative permit via the Water Board website, because the Water Board failed to post it prior to the deadline for public comments (Water Board Tr., pp. 345-346). If people cannot attend a public engagement mechanism due to scheduling conflicts, if they do not know they can participate in that mechanism, or if they do not have access to the materials that are the subject of that mechanism, they are effectively barred from participating, which is likely what happened to many potential participants at the Water Board hearing. As such, these structural features mediated the flow of information at the Water Board hearing and Work Group meeting by effectively excluding information flow to and from some would-be participants at the Water Board hearing, while coming closer to maximizing information flow at the Work Group meeting.

In addition to failing to maximize the number of participants, the Water Board hearing failed to maximize the relevant information elicited from both participants and the mechanism’s sponsor (the Water Board), instead eliciting some spurious and irrelevant information from members of “the public.” This mechanism did not utilize a

facilitator to aid “the public” in ensuring that they shared all relevant information before a decision was made. Further, it gave members of “the public” only two minutes each to speak, and gave the Organizations only three days’ notice of their opportunity to present. Lastly, the 30-day period for written public comments was in December, during the holiday season, further decreasing the likelihood that potential participants would contribute relevant information. This mechanism similarly failed to maximize the relevant information elicited from the Water Board in that it did not provide members of “the public” an opportunity to ask questions and receive answers on issues which were unclear or confusing. Instead, it allowed “the public” the chance to comment, but the Water Board was under no obligation to respond to those comments. In contrast, the Work Group meeting had a dedicated question and answer period in which members of “the public” could ask questions, with no limits on how long they could speak. Once again, these structural features operated as Mediation Means to mediate the flow of information in each of these mechanisms.

The Water Board hearing also fell short in maximizing the transfer and processing of information by participants by using technical terms and jargon without explaining it in both the tentative permit and at the hearing. This problem was confounded by the Water Board hearing’s lack of opportunity for members of “the public” to seek clarifications or explanations. In contrast, speakers at the Work Group meeting used far fewer technical terms and jargon, even when explaining the same concepts as Water Board staff at the Water Board hearing. Two reasons for this difference are the differing audiences and purposes of the Water Board hearing and Work Group meeting. The speakers’ audience at the Water Board hearing was the Water Board, which is composed

of persons knowledgeable about the technical terms and concepts surrounding water quality and monitoring, while the speakers' audience at the Work Group meeting was community members, many of whom were likely unfamiliar with the NPDES permitting process and accompanying terminology. Relatedly, the purpose of the Water Board hearing was for the Water Board to gather information (from its staff, the Expert Panel, the permittee (Boeing), the Organizations, and "the public") and make a decision regarding the terms of Boeing's new NPDES permit, not to educate, inform, or engage in a dialogue with "the public." The Work Group meeting's explicit purpose, in contrast, was to do just that. Regardless of the reasons for the prevalence of unexplained technical terminology at the Water Board hearing, the end result was that some recipients of information at the Water Board hearing—namely, members of "the public"—were less likely to transfer and process information there than they were at the Work Group meeting. In this way, these structural features impeded the flow of information at the Water Board hearing but not the Work Group meeting.

In addition, the Water Board hearing did not take steps to maximize the efficient and accurate aggregation of all relevant information elicited from participants. Despite the acting Water Board chair's request to members of "the public" that "[p]ersons with similar concerns or opinions are encouraged to choose one representative to speak" (Water Board Tr., p. 246), this mechanism did not utilize a facilitator or provide other means by which to combine participants' input. Further, one wonders whether choosing one participant to voice similar concerns would have the same impact that the repetition of particular concerns by multiple members of "the public" has—similar to how

constituents are encouraged to call their legislators en masse to persuade them to vote a particular way.

Finally, certain structural features of the Water Board hearing contributed to a perceived lack of fairness. Specifically, Boeing—the entity subject to regulation at the Water Board hearing—was responsible for selecting the members of the Expert Panel—the entity tasked with recommending what regulations Boeing should be subject to. In addition, rather than allocating separate, independent presentation timeslots for Boeing, the “Expert Panel,” and the Organizations at the hearing, the Water Board allotted 40 minutes to “the Boeing Company and the Expert Panel” and 40 minutes to “the organizations,” respectively. Further, the acting Water Board chair stated that “the *Boeing Company and the Expert Panel* with [sic] make *its* presentation, which cannot exceed 40 minutes; *after Boeing*, the organizations I’ve previously mentioned will make *its* presentation. [...]” (Water Board Tr., p. 246, emphasis added). Perhaps unintentionally, here the acting Water Board chair expressly conflates Boeing and the ostensibly “independent” Expert Panel by referring to them collectively as “Boeing” (Water Board Tr., p. 246). Regardless of whether these structural features actually impacted the impartiality of the hearing, they potentially created the perception of unfairness and sent the message that Boeing and the Expert Panel are aligned in some way, while the Organizations are at a minimum not part of this collaboration, or, perhaps, adverse to it. Further, treating Boeing as affiliated with ordained experts placed Boeing in a position of more power than the Organizations.

Although the Work Group meeting was not conducted perfectly either, it generally utilized more of the structural features associated with mechanism effectiveness than the Water Board hearing did.

In each of these ways, the structural features of the Water Board hearing and Work Group meeting can be seen as Mediational Means that enhanced or impeded the flow of information among participants in each mechanism.

I.c. Stylistic Features

The style one uses to communicate a message has implications for both who can understand that message (Killingsworth & Palmer, 1992, p.170)—and thus participate in decisions about it—and for how an audience perceives its speaker (e.g., C. Miller, 2003, p. 200). Certain stylistic features decrease the accessibility of a message, thus impacting the flow of the information contained in that message. These include passive voice, nominalizations, strings of noun modifiers, acronyms, and technical terminology (Killingsworth & Palmer, 1992, p. 173-174; Rowe & Frewer, 2005, p. 273). The presence or absence of each of these features mediated information flow at the Water Board hearing and Work Group meeting.

Passive voice “obliterates agents of actions and thereby obscures responsibility and/or authority” (Killingsworth & Palmer, 1992, p. 173). At the Water Board hearing, Water Board staff and Boeing used active voice when talking about their accomplishments and the progress they had made in complying with the terms of the previous NDPES permit. In contrast, they tended to use passive voice when discussing the areas in which they fell short in meeting their obligations. Because passive voice allows speakers to “achieve distance from their subject matter and audiences” and

“obscures responsibility” (Killingsworth & Palmer, 1992, p. 173), passive voice mediated the flow of information in this mechanism by allowing speakers to avoid blame for particular actions. In addition, the use of passive voice restricted the flow of information by making messages that utilized it less accessible to listeners, especially listeners not well versed in this speaking style. Because the Water Board, Water Board staff, the Expert Panel, and the Organizations routinely read documents and hear testimony that utilize passive voice, the listeners most likely to be unaccustomed to it were members of “the public.” In this way, passive voice inhibited the flow to “the public” of the information contained in these messages, which in turn impeded the “public’s” ability to circulate their information in response. Because the “public’s” information tends to be values-based and evaluative rather than technical, like that typical of the “experts,” when the circulation of that information is hampered, decision-makers and participants do not get to consider the full range of perspectives about the issue at hand. In contrast, at the Work Group meeting speakers used passive voice far less often, thus promoting the flow of speakers’ information and participants’ responses there. In these ways, passive voice mediated information flow in different ways at the Water Board hearing and Work Group meeting.

Nominalizations “favor stasis over action by using words in their noun forms when they might just as well be written as verbs or adjectives” (Killingsworth & Palmer, 1992, p. 173). At the Water Board hearing, the Expert Panel, Water Board, and Water Board staff used nominalizations liberally, often in conjunction with passive voice and technical terminology. Doing so made their messages needlessly wordy and complex, which stymied the flow of the information contained in them, particularly to members of

the “public,” who, as noted above, are less likely to be accustomed to this speaking style. Accordingly, the “public’s” understanding of, and ability to respond to, these messages was disproportionately excluded by these nominalizations. In contrast, the Organizations’ speakers used very few nominalizations at the Water Board hearing. As such, the non-experts’ messages at the Water Board hearing were likely more accessible, at least in this respect, than those of the Water Board, Water Board staff, Boeing, and the Expert Panel.

Strings of noun modifiers “obscure relationships among people and things by increasing the number of nouns and extending their function to replace that of adjectives, adverbs, prepositional phrases, and dependent clauses” (Killingsworth & Palmer, 1992, p. 174). Speakers at the Water Board hearing—particularly the Water Board and Expert Panel—used them frequently, while speakers at the Work Group meeting used almost none. The frequent use of other strings of noun modifiers at the Water Board hearing—especially when combined with technical language, passive voice, and nominalizations—unnecessarily complicated already complex messages, further impeding information flow. Just as with the use of passive voice and nominalizations, this likely impacted members of “the public” more than anyone else at the Water Board hearing, making it harder for them to process and respond to this information. As a result, the circulation of the “public’s” information in this mechanism was restricted, meaning that the decision-maker (the Water Board) and other mechanism participants were denied the opportunity to hear and consider it.

In written documents, acronyms “cause the reader unused to government jargon the inconvenience of constant page turning to locate original references or lists of abbreviations (Killingsworth & Palmer, 1992, p. 173). They also increase the density of

information that must be absorbed in a short space,” which “intimidate[s] the average reader” (Killingsworth & Palmer, 1992, p. 174). In the case of oral presentations like the Water Board hearing and Work Group meeting, audience members lack the ability to turn a page to find out what acronyms stand for, increasing the potential for audience members to be confused, intimidated, and excluded. Overall, the speakers at the Water Board hearing and Work Group meeting used relatively few acronyms and usually defined the ones they did use, but they still may have benefitted from using even fewer. And, once again, the use of this stylistic feature likely hampered the “public’s” processing of and ability to respond to the information presented, which in turn skewed the universe of information before the decision-maker: if the circulation of the “public’s” information was restricted, the information of other presenters such as the Expert Panel and Boeing comprised a disproportionately large amount of the information upon which the Water Board made its decision, likely impacting not only the procedural exercise of the mechanism but its substantive outcome as well.

Using technical language that is unfamiliar to one’s audience makes a message more difficult for that audience to understand (Rowe & Frewer, 2005, p. 273) and increases audience confusion (Killingsworth & Palmer, 1992, p. 172). At the Water Board hearing, speakers for the Water Board, Boeing, and the Expert Panel used technical language frequently in their presentations, excluding those unfamiliar with such language from understanding their messages. One might think there is no way to avoid technical language when speaking about technical issues, and that exclusion is therefore a necessary if unintended consequence of such communications. However, the Organizations’ speakers at both the Water Board hearing and Work Group demonstrated

that this is not the case, using terms like “rain” instead of “wet-weather events” (Water Board Tr., pp. 334, 251-252), and putting technical concepts in context to make them meaningful for listeners instead of expressing them as dry, abstract and a-contextual. In short, the Organizations’ presenters at both the Water Board hearing and Work Group meeting proved that one can demonstrate command of complex concepts without using complex terminology. However, unless one views their target audience as persons unfamiliar with such terminology, they have no motivation to do so.

The use or non-use of narrative also mediated information at the Water Board hearing and Work Group meeting. Narrative communication is associated with increased recall, easier comprehension, and higher engagement than traditional logical-scientific communication (Dahlstrom, 2014, p. 13615). In addition, once out of school, narrative is one of the most common formats through which scientific information is delivered to members of “the public,” via the mass media (Dahlstrom, 2014, p. 13614). Key features of narrative communication are: (1) the depiction of cause-and-effect relationships (causality); (2) that take place over a particular period of time (temporality); and (3) that impact particular characters (character) (Dahlstrom, 2014, p. 13615). Water Board staff did not utilize narrative in their presentations at the Water Board hearing, but instead spoke only of the proposed permit terms, the written comments they received about those terms (e.g., “the first comment [...],” “the next comment was [...]” (Water Board Tr., p. 267), and their responses (e.g., “The staff’s response is [...]”) (Water Board Tr., p. 267). Further, not only did Water Board staff not use narrative, but, as explained above, they also frequently omitted actors from their statements through the use of passive voice. In contrast, Boeing, the Expert Panel, and, to an even greater extent, the Organizations at the

Water Board hearing and the speakers at the Work Group meeting, all utilized narrative to present their information as stories about causal relationships about characters over time. Doing so helped these speakers effectively communicate memorable and easy-to-comprehend messages to their audiences. In these ways, the use of narrative mediated the flow of information at the Water Board hearing and Work Group meeting by enhancing the circulation of the information conveyed in narrative form while hampering the flow of information conveyed without it.

Another difference that emerged in reviewing the Water Board hearing and Work Group meeting transcripts was that many of the comments by members of “the public” at the Water Board hearing used imprecise language. At worst, this lack of precise language sometimes caused these comments to be inaccurate, and at best convey a lack of interactional expertise on the part of these commenters. These public commenters are arguably uncertified experts regarding community experiences and desires about SSFL’s cleanup. However, the imprecision and inaccuracy of their words may have caused the certified designated experts and decision-makers to whom they were speaking at the Water Board hearing to see them as unknowledgeable and lacking understanding, and thus to disregard their input because it did not look or sound like the type of input that those certified designated experts and decision-makers believed qualified as valuable. In this way, the use of precise versus imprecise language acted as a Mediation Means that impeded the flow of information presented with imprecise language and promoted the flow of information presented with precise language. In addition, “the public’s” use of imprecise language reinforced the notion that the failure to designate any of “the public” commenters as experts at the Water Board hearing was warranted, and that “the public”

lacked the contributory and/or interactional expertise required to be valuable participants in STE deliberations and decisions.

Finally, in analyzing the Water Board hearing and Work Group meeting transcripts, we saw an interesting difference in whether speakers at each mechanism spoke deferentially or authoritatively. Specifically, we saw that Gortner, the only presenter who spoke on the same issue at both the Water Board hearing and Work Group meeting, used a more deferential style at the Water Board hearing, where she was in an expressly non-expert role, and a more authoritative style at the Work Group meeting, where she was cast as a resident expert. In particular, she defined terms for her audience at the Work Group meeting but not at the Water Board hearing, and addressed her audience as a teacher would a class of students, saying things such as, “I will explain to you” and “I am going to show you” (Gortner Tr., p. 1). Although one likely reason for these differences is that Gortner knew her Water Board audience was already familiar with the specialized terminology she used, while her audience of community members at the Work Group meeting may not have been, there is another factor worth considering.

By providing explanations to her audience at the Work Group meeting, Gortner cast herself as an expert who possessed specialized knowledge that her audience lacked. At the Water Board hearing, in contrast, Gortner was not granted expert status and therefore was not speaking from a place of authority. Indeed, when speaking as a designated expert at the Work Group meeting, Gortner made direct statements, but qualified them at the Water Board hearing. For example, at the Work Group meeting she told her audience that the proposed NPDES permit “eliminated monthly average pollution limits and *they are not sampling frequently enough*” (Gortner Tr., p. 3,

emphasis added). At the Water Board hearing, on the other hand, where she was not designated as an expert, she deferentially stated, “They’ve also eliminated monthly average pollution limits for the outfalls, and *we don’t feel that sampling is occurring frequently enough*” (Water Board Tr., p. 320, emphasis added). Similarly, when speaking as a designated expert at Work Group meeting, Gortner was often commanding and assertive, but when she explained the same issues to the Water Board in an expressly non-expert capacity, she was deferential and polite, bordering on timid. She stated at the Work Group meeting, “And the old permit was weak to begin with and was actually expired April 10th of last year. And this new permit, I will explain to you in detail, is even less protective of public health” (Gortner Tr., p. 1). But she told the Water Board, “We also felt the old permit was weak and expired and the new permit we believe is even less protective” (Water Board Tr., p. 316). In short, Gortner made multiple rhetorical moves at the Work Group meeting through which she cast herself as an authority figure, which she distinctly did not make at the Water Board hearing. Exactly how these moves impacted the flow of information at these mechanisms is difficult to know, but it stands to reason that her authoritative, more direct statements may have circulated more than her more deferential, qualified statements, since the former conveyed a sense of confidence and expertise that the latter seemed to lack.

II. Putting It All Together: Role Designations, Structural Features, and Stylistic Features as Concurrent Mediation Means

In addition to understanding role designations, structural features, and stylistic features as independent Mediation Means at the Water Board hearing and Work Group

meeting, this project also yielded important insights into how these features work together as concurrent Mediation Means.

At the Water Board hearing, we saw several particular Mediation Means combine to mediate the flow of information in ways that did not maximize participants' contributory potential. First, this mechanism made a sharp distinction between the designated experts and non-experts in a hierarchical transmission model of engagement. Second, all of the designated experts here possessed formal credentials. Third, the structural features of this mechanism did not maximize efficiency. Finally, structural and stylistic aspects of this mechanism sent the message to potential and actual participants that non-experts' understandings and input were not important. These aspects included:

- The hearing's notice procedures and timing (which made it difficult for non-experts to participate);
- The use of nominalizations, strings of noun modifiers and technical language without explanations (which conveyed that non-experts' understandings did not matter);
- The lack of a question-and-answer period in which non-experts could seek clarifications and have their concerns addressed (which likewise sent a message that non-experts' understandings and concerns did not matter)
- The sponsor's treatment of Boeing and the Expert Panel as one entity (which suggested a lack of impartiality); and
- The limiting of public comments to two minutes or less (which conveyed that input by "the public" did not matter).

In short, this mechanism assessed expertise based on formal credentials, utilized a transmission model of engagement, and had structural and stylistic features that both excluded and devalued members of “the public” and persons unfamiliar with technical concepts and specialized language. Because each of these Mediation Means occurred together, they compounded the hindrance on maximizing participants’ contributory potential in this mechanism.

At the Work Group meeting, in contrast, we saw a different set of Mediation Means combine to mediate information flow in a way that was more likely to maximize participants’ contributory potential. First, this mechanism blurred the lines between the designated experts and “the public” (via a lack of express labels for each, and by the designated experts’ explicit references to themselves as members of “the public”) in an interactional model of engagement. Second, in this mechanism, experience-based knowledge was enough to establish expertise. Third, this mechanism did a better job than the Water Board hearing of utilizing the structural variables that lead to effective public engagement mechanisms. Lastly, structural and stylistic features of the Work Group meeting conveyed to potential and actual participants that non-expert understandings and input mattered. Specifically, in this mechanism:

- The meeting was scheduled at a time that took into consideration “the public’s” work schedules (indicating that their attendance and participation mattered);
- Speakers used less technical terminology than those at the Water Board hearing, and usually provided explanations when they did (conveying that “the public’s” understanding mattered);

- There was an explicit question and answer session (further suggesting that non-experts' understanding and concerns mattered); and
- There were no caps on question length during the question and answer session (once again conveying that non-expert input and understanding was important in this mechanism).

In sum, the Work Group meeting combined several Mediation Means—assessing expertise based on experience, an interactional model of engagement, and structural and stylistic features that included and valued members of “the public” and persons unfamiliar with technical concepts and specialized language—to mediate information flow in a way that came closer to maximizing participants' contributory potential.

In examining the transcripts of the Water Board hearing and Work Group meeting, we also saw another interesting and significant combination of Mediation Means. Specifically, in the presentations by the Organizational speakers, we saw that persons who held positions of authority as designated experts used more authoritative, less deferential speaking styles. When these Organizational speakers presented as non-experts at the Water Board hearing, they used more deferential language and passive voice. In contrast, when they held designated expert roles at the Work Group meeting, they used more authoritative, assertive language and more active voice. This finding is significant for several reasons. First, it extends Cheryl Geisler's work on the differences between how experts and non-experts interact with texts. As discussed more thoroughly in Chapter 2, Geisler found that experts challenge and engage with texts, while non-experts assimilate and regurgitate them. Along similar lines, here we see another characterizable difference between experts and non-experts: experts *explain*

authoritatively, while non-experts *ask deferentially*. Second, this difference in speaking style reflects a power differential between those who hold expert status and those who do not. Participants' awareness of this power inequity is reflected in Tucker's presentation on behalf of the Organizations, in which she refers to local residents as "the 'little people' that live near the Santa Susana site" (Water Board Tr., p. 328). Further, as explained below, neither the Organizations' nor "the public's" input was incorporated into the final NPDES permit. These findings reinforce the significance of role designations and stylistic choices in public engagement mechanisms, and highlight the importance of examining both in conjunction as concurrent Mediation Means that work together to mediate the flow of information.

Finally, we saw that the Mediation Means of role designation—that is, of holding a position of authority as a designated expert—co-occurred with the use of both "encyclopedic" knowledge and precise language. All of the designated experts at both the Water Board hearing and Work Group meeting used "encyclopedic" knowledge and precise language, while most members of "the public" at the Water Board hearing did not. This suggests that, at a minimum, to be viewed as an expert in STE public engagement mechanisms, one should incorporate these features into his or her arguments.

Perhaps none of this is surprising. The audience at the Water Board hearing was the Water Board, which was well versed in the technical concepts and terminology surrounding water pollutant regulation and monitoring. In contrast, the audience at the Work Group meeting was community members, many of whom were unfamiliar with the language and science regarding Boeing's NPDES permit. Further, the purpose of the Water Board hearing was for the Water Board to make a decision regarding the terms of

Boeing's new NPDES permit, and the goal of speakers in that mechanism was to request or persuade the Water Board to set the terms in accordance with their preferences. The purpose of the Work Group meeting, on the other hand, was to give community members a better understanding of the issues surrounding Boeing's new NPDES permit, and the goal of speakers in that mechanism was to inform those community members about these issues and persuade them to participate in the Water Board hearing. But regardless of the likely reasons for the co-occurrence of certain sets of Mediatlional Means, the fact that they did co-occur matters. Instead of examining these Mediatlional Means in isolation, researchers would be wise to try to understand the activity systems of STE public engagement mechanisms more holistically by considering these Mediatlional Means in conjunction with one another to better understand their real-world impacts. In doing so, it is also important to recognize that all Mediatlional Means are not equal. While some are static and unchangeable, such as one's credentials, others are dynamic and can be altered, such as the stylistic features one uses in conveying her message. Further, Mediatlional Means often overlap and impact one another. For example, we saw here that role designations and stylistic features are interdependent: the stylistic choices one makes appear to be related to one's expert or non-expert role designation. It is important to account for this relational nature of Mediatlional Means when trying to understand their impacts through an activity systems lens.

III. Impacts on Measurable Outcomes

While it impossible to know for certain what impacts speakers' comments had on Water Board members' thoughts about the terms of Boeing's new NPDES permit, the follow-up questions that Water Board members asked after speakers' presentations, as

well as the revisions that Water Board members made to the final NPDES permit in response to speakers' comments, are revealing.

Following the public comment period, Water Board members had an opportunity to ask questions before deliberating and voting on the terms of the final NPDES permit. This question period started with Board member Mehranian stating:

Well, you know, we hear you and we understand the contamination, the scale of this project, it has been an environmental disaster. I don't think anybody on the Board or on the staff questions—ever questions that. So having said that, because of the past incidences, the scale of contamination, of course, the cleanup is very complicated. And, as a result of that, we're trying to listen to all the points that were brought up. (Water Board Tr., p. 343)

Board member Mehranian then proceeded to ask five questions of Water Board staff. She asked about “benchmarks versus the numeric values of the cleanup,” Water Board staff's failure to post the tentative permit online, how fines for permit violations were determined, why “we think we're not weakening the standards,” and whether there was a discrepancy between how many permit exceedances Water Board staff and the Organizations said Boeing had (staff explained that there was no discrepancy, and that staff had cited the number of violations, while the Organizations had stated the number of exceedances, which is larger because not all exceedances constitute violations) (Water Board Tr., pp. 343, 345, 345, 347, 348). Here, although this Board member only asked questions of Water Board staff and not of Boeing, the Expert Panel, the Organizations, or “the public,” each of these questions sought to address a concern raised by either the

Organizations or “the public.” This conveys that this Board member was taking the Organizations’ and “public’s” concerns seriously and valued their input.

The second Board member to speak, Board Member Camacho, repeated this pattern. He began:

It’s like knowing the history of the site, knowing the amount of time the site was used for the various uses, knowing where it’s located in terms of its proximity to various communities, knowing it’s the headwaters of the river and of multiple waterways, and knowing the work that Boeing has done to try to implement new BMPs and really try to move forward in creative and innovative ways, which is exciting, but then hearing the concerns and the statements made by various stakeholders and by various groups, it’s just really confusing. (Water Board Tr. 353)

He continued:

And I think, you know, I understand that—I think it was Boeing team had explained that, you know, 97 percent compliance with the permit, but obviously the goal is 100 percent. [...] What is it going to take to get that 3 percent? And even with the 97 percent of compliance now, there’s still—it seems there’s still a lot of concern, there’s children playing in creeks, they’re people with health, you know, issues. (Water Board Tr. 353-354)

A Water Board staff member responded to this Water Board member’s comment by stating, “I think we’ve heard from—from members of the community and the coalition who spoke today and, they kind of drew a nexus between the cleanup and the stormwater quality, and we agree, there is that nexus.” (Water Board Tr., p. 357). This statement

suggests that this Water Board staff member respected and took seriously the non-experts' comments. She also said, "I think the community is right to be concerned about the potential health effects of what is coming off from the stormwater [...]," again indicating a respect for and agreement with "the public's" comments and perspectives (Water Board Tr., p. 358). Similarly, Water Board member Yee stated, "And, you know, if I were a neighboring resident, I, too, would be extremely frustrated that, you know, we just can't make the responsible parties act responsibly and get this thing taken care of" (Water Board Tr., p. 363). This Board member also appears to empathize and agree with "the public's" position. Likewise, acting Chair Diamond asks, "what more can Boeing do to protect public—for me, to protect public health? [...] If there was all the money in the world to clean up stormwater, what more could be done?" (Water Board Tr., pp. 367-368). She later asked, "Another issue I wanted to ask about was the—the community groups, the organizations, talked a lot about their concern with mass versus—what is it—concentration based limits. [...]" (Water Board Tr., p. 372). She continued, "So, you know, given this site and given the fact that we're concerned about public health, and obviously the people who live there are concerned about health issues, and well they should be with all the activities that have gone on at that site, why don't we keep it [sic] concentration levels to protect—to protect—to be the most protective?" (Water Board Tr., p. 372). Each of these questions and comments suggest that the Water Board members and staff were indeed taking the non-experts' concerns and comments to heart, notwithstanding the non-experts' lack of formal credentials, and, in the case of some members of "the public," a lack of interactional expertise and quantitative knowledge.

However, other comments reflect a less positive reaction to non-experts' input. For example, Water Board member Glickfeld states, "You know, what I want to add here is that, you know, for the community to think that we're giving them penny ante penalties only, I think it's disappointing that they don't understand that we are making them [Boeing] spend whatever we can make them spend to fix this problem" (Water Board Tr., p. 362). This comment suggests that Glickfeld perceived "the community" not as understanding the fine assessments and disagreeing with them, but rather as being too confused or unsophisticated to understand them. In other words, Glickfeld seemed to presume that "the public," who often spoke here with imprecise and non-technical language, lacked the ability to understand what the designated experts were up to.

Perhaps of greater significance, as actions speak louder than words, the actual revisions to the final permit (or lack thereof) in response to comments are telling. Regarding the written comments that Boeing, "the public," and the Organizations submitted prior to the Water Board hearing, Tucker stated on behalf of the Organizations that "about half of Boeing's proposed changes to the tentative permit have been accepted by the Board staff and made the permit even weaker. By contrast, of the comments submitted by the public groups trying to strengthen the permit and protections of health and the environment, not one has been accepted" (Water Board Tr., p. 332). Gortner echoed Tucker's concern: "Our organizations were told [their] concerns were provided to the Board and it had decided to make no changes" (Water Board Tr., p. 318). Regarding revisions in response to oral comments and presentations at the hearing, the Water Board revised the permit to expressly retain the Expert Panel and submit a work plan, but made no other changes, then voted to approve the revised NPDES permit. (Water Board staff

also stated that they would issue an order requiring Boeing to conduct a Human Health Risk Assessment, but that this would not be part of the permit (Water Board Tr., p. 381). In other words, despite multiple Water Board members' repeated comments suggesting that they valued and echoed the non-experts' concerns, the only change they made to the final permit was to add a provision that explicitly retained the designated experts. *None* of the non-experts' input was incorporated into the final permit. Uncovering precisely which Mediation Means—or combination thereof—impacted the outcome of the Water Board hearing may be impossible, but better understanding how role designations, structural features, and stylistic features mediated whose, what, and how information flowed there versus at the Work Group meeting is an important step towards developing public engagement mechanisms that have a greater likelihood of maximizing participants' contributory potential.

IV. Opportunities for Future Research

The purpose of this study was to serve as a stepping-stone on the path to creating more effective STE public engagement mechanisms. This study revealed some interesting—though nuanced—insights about how expert and non-expert role designations, structural features, and stylistic features operate both independently and concurrently as Mediation Means that mediate the flow of information in such mechanisms. It did not, however, allow for any broad generalizations about these Mediation Means, as it was a case study of only two STE public engagement mechanisms. Further, because this project was an observation of two real-world mechanisms, where these Mediation Means co-occur, it did not allow for an understanding of precisely how each of these Mediation Means impact information

flow on their own. Further research should explore whether the trends identified in this project are replicated in other STE mechanisms, and should consider using simulated public engagement mechanisms that isolate and examine the impacts of one Mediation Means at a time. Future projects should also test whether, and if so, how changing the combinations of Mediation Means impacts information flow and outcomes by designing new or modifying existing public engagement mechanisms to incorporate various combinations of Mediation Means, and seeing whether non-experts' input is incorporated to a greater extent in mechanisms outcomes. This work would be particularly valuable in light of the fact that Rowe and Frewer explained that they were "hypothesiz[ing]" regarding the impacts of their "effectiveness variables" (Rowe & Frewer, 2005, pp. 270, 272, 285). In short, this project has begun the process of theorizing that role designations, structural features, and stylistic features operate as concurrent Mediation Means, and continuing to develop, test, and refine this theory is an area worthy of further study.

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